

**EFFECT OF AI-ASSISTED SCENARIO-BASED LEARNING IN DEVELOPING
MATHEMATICAL SKILLS AMONG STUDENTS WITH HEARING IMPAIRMENT**

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University of Mysore



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JUNE, 2026

CERTIFICATE

This is to certify that this dissertation entitled "**Impact of Exposure-Based Intervention on Language and Cognitive Development in Preschool Children with Hearing Impairment**" is a bonafide work submitted as part of fulfilment of the degree of **Master of Education – Special Education (Hearing Impairment)** of the student with Registration Number **P01II24E012006**. This has been carried out under the guidance of a faculty of this institute and has not been submitted earlier to any other university for the award of any other Diploma or Degree.

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DECLARATION

This is to certify that this dissertation entitled **“Effect of AI-assisted Scenario-Based Learning in Developing Mathematical Skills among Students with Hearing Impairment”** is the result of my own study under the guidance of Dr Santosh Yadav, Assistant Professor in Special Education, All India Institute of Speech and Hearing, Mysuru and has not been submitted earlier to any other university for the award of any other Diploma or Degree.

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DEDICATED TO
GOD ALMIGHTY

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LIST OF ABBREVIATIONS

AI – Artificial Intelligence

AI-SBL – Artificial Intelligence-assisted Scenario-Based Learning

DHH – Deaf and Hard of Hearing

ELPS – Experience, Language, Pictures & Symbols

NCFFS – National Curriculum Framework for Foundational Stage

NCFSE – National Curriculum Framework for School Education

NEP – National Education Policy, 2020

NIPUN – National Initiative for Proficiency in Reading with Understanding and Numeracy

RPWD – Rights of Persons with Disabilities Act, 2016

RTE – Right to Education Act, 2009

SBL – Scenario-Based Learning

SwHI – Students With Hearing Impairment

UDID – Unique Disability Identity

UDISE+ – Unified District Information System for Education Plus

UNCRPD - United Nations Convention on the Rights of Persons
with Disabilities

WHO – World Health Organisation

ABSTRACT

There is a need to enhance mathematical learning among Students with Hearing Impairment (SwHI), which is affected due to the various challenges related to language development, barriers of communication and the abstract nature of mathematics, with the help of innovative and inclusive pedagogical approaches. This study investigated the effectiveness of one such pioneering approach, named the Artificial Intelligence-assisted Scenario-based Learning (AI-SBL), in developing mathematical skills among SwHI.

The study followed a quasi-experimental design with a survey method. 20 SwHI were selected using the purposive sampling technique for the study, along with 13 special educators, from two special schools in and around Mysore. The analysis was carried out using descriptive statistical measures such as mean, median, standard deviation, and interquartile deviation and inferential statistical measures such as paired t-test and independent t-test.

The results showed that though the difference between the post-test scores of the SwHI who were intervened using the AI SBL and those who were taught using the traditional method was not significant, there was a clear sign of a trend towards improvement in mathematical performance. Also, enhanced engagement levels among the students who were intervened using AI-SBL coupled with high positive perspectives among teachers working with SwHI indicate that this nascent method has the potential to make mathematical learning more engaging, interesting, accessible and meaningful, suiting inclusive learning requirements.

Keywords: *AI-assisted Scenario-based Learning, Mathematics, Teachers, Students with Hearing Impairment*

CHAPTER-I

INTRODUCTION

1.0 INTRODUCTION

Education is what shapes an individual's character and leads to nation-building, socially and economically. The quality of education determines the quality of life and development of a country (Kumar et al. 2020). Section 3 of The Right to Education Act, 2009, provides the right of free and compulsory education to every child between the ages of 6 and 14 years in a neighbourhood school till the completion of elementary education in India.

According to Section 16 of the Rights of Persons with Disabilities Act, 2016, the appropriate Government and the local authorities shall strive to ensure that all educational institutions that are funded or recognised by them provide inclusive education to children with disabilities. To make it a reality, they shall ensure ease of admission without discrimination, provide equitable opportunities in scholastic and non-scholastic areas, provide commensurate infrastructural facilities and accommodation, use appropriate modes of communication as per the requirements of the students, detect disabilities at the earliest, and ensure provision of transport facilities to students with special needs. Section 17 of Chapter III discusses about the specific measures to promote and facilitate inclusive education, stressing the promotion and facilitation of inclusive education in India. Chapter IV discusses about the vocational training and self-employment facilities to be provided to the specially-abled, the kind of environment to be created in Government sectors related to employment, which should be non-discriminatory in nature, the mandatory need to follow the Equal Opportunity Policy and the requirement to maintain records related to the differently abled employees.

Chapter VI of the same Act focuses on special provisions for persons with benchmark disabilities, including free education for children with benchmark disabilities, a minimum of

5% reservation in higher educational institutions, and a minimum 4% reservation in employment in government institutions.

In alignment with the aforementioned provisions of The RPWD Act, 2016, The National Education Policy, 2020, has aimed at ensuring ‘Learning for All’, by focusing on Equitable and Inclusive Education. The policy recognises the importance of creating and building supportive and enabling mechanisms for providing specially abled children opportunities to obtain unrivalled quality education, as any other typically developing child. The purpose of the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD, 2007) is to promote, protect, and assure that all people with disabilities, fully and equally, enjoy all the human rights and fundamental freedom and to promote respect for their inherent dignity. UNCRPD, through Article 24, focuses on providing inclusive education to persons with disabilities.

National Initiative for Proficiency in Reading with Understanding and Numeracy (NIPUN BHARAT, 2021) stresses the need for developing a strong foundation of language, literacy, and mathematical skills during the early years (3-9 years), since it is considered to be the critical period for all future learning. Some of the key components in Foundational Language and Literacy include oral language development, reading comprehension, concept about print, writing, vocabulary, phonological awareness, decoding, reading fluency, and culture of reading/ inclination towards reading. In general, numeracy skills include the usage of the four fundamental operations, such as addition, subtraction, multiplication, and division, to solve day-to-day problems of life and relate mathematical knowledge to the surroundings.

As per the Census 2011, the population of differently abled in India is around 2.68 crores. Around 21,49,258 children with special needs are being educated from the foundational to secondary stages in India as per the UDISE+(2024-25) report. About 1.26 crore differently

abled are UDID card holders in India, among which 1.44 lakh children are hearing impaired, with 12,605 of them being speech and language impaired in the 0-15 age group.

Hearing impairment has been defined as a hearing loss of 60 decibels or more in the better ear, covering both deaf individuals, with over 70 decibels or more, and hard-of-hearing individuals falling between the range of 60-70 decibels, as per the RPWD Act, 2016. Around 6.3 crore people in India, constituting about 6.3% of the population, live with significant hearing impairment (WHO, 2023). In Karnataka alone, the National Program for Prevention and Control of Deafness estimated 13,213 children, which included 7,241 boys and 5,972 girls, who suffer from hearing impairment, falling within the age range of 6-15 years.

The National Curriculum Framework for Foundational Stage (NCFFS, 2022) suggests for the usage of strategies such as learning through storytelling, toy-based learning, songs and rhymes, music and movement, art and craft, and others to ensure learning through play at the foundational stage. Further, it suggests developing mathematical abstract ideas through concrete experience using 'ELPS' (Experience, Language, Pictures & Symbols), connecting mathematical learning with children's day-to-day life and prior knowledge and developing a positive attitude towards learning mathematics. The National Curriculum Framework for School Education (NCFSE, 2023) emphasises the use of play-way, discovery/inquiry-based, problem-solving, and inductive and deductive methods to teach mathematics at the preparatory level, with an extensive emphasis on play-way and inductive methods.

Despite measures taken at the National and Global levels, children with hearing impairments are unable to fully reap the benefits of education due to delayed language development and associated academic difficulties. According to Holt, 1993, where a study was conducted comparing the performance of hearing impaired children and hearing children, where the children attempted the Stanford Achievement Test - 8th Edition, it was concluded that

the academic performance of hearing impaired students are poorer than that of their hearing peers and as the severity of their hearing loss increases, their level of academic achievement decreases or there is a strong correlation between the severity of hearing loss and academic achievement. The cognitive foundations of language learning among Deaf and Hard of Hearing students fall into two categories, namely domain-general skills and conceptual word learning biases, both of which influence language (Levine et al. 2020).

The domain general skills include attention, working memory and statistical learning. There is a bidirectional relationship between attention, which is considered to be a foundational domain-general skill for language acquisition, and language skills, as both influence each other's development. Though sustained attention does not differ between hearing and hearing-impaired children, Deaf and Hard-of-Hearing(DHH) children, lacking language experience, such as deaf children who are born to hearing parents, may struggle with developing sustained attention. Also, the working memory among DHH students may be impacted due to a dearth of early language experience. Statistical learning, being another domain-general skill along with attention and working memory, is the ability to identify and understand predictable patterns in the world, which is considered to be essential for language development. The aspect of statistical learning is also impacted in DHH, who have difficulty with statistical learning among sensory domains like auditory, visual and tactile domains. Conceptual word learning biases, such as perceptual salience and prelinguistic event categorisation biases, which are basically language independent but are later refined by language, are usually delayed among DHH when compared to hearing children. These domain-general skills are also considered fundamental to mathematical knowledge acquisition.

Other factors contributing to educational difficulties among children with hearing impairment in India include barriers, such as a lack of accessibility, a lack of quality resources, and the usage of traditional methods of teaching, which are not updated as per the current global

educational trends, to name only a few. In this backdrop, it is important to discuss about a method of teaching known as the Scenario-Based Learning method, which may help children with hearing impairment to learn and perform well academically, by strengthening their ability to connect learning with their real life.

1.1 SCENARIO-BASED LEARNING

Scenario-based Learning (SBL), according to Smith et al. (2018), is “the use of scenarios as a vehicle for the teaching and learning process, providing students with the opportunity to learn from and apply their learning to realistic experiences”. The basis of Scenario-based Learning is Situated Learning (Wenger & Lave, 1991). Situated Learning places its primary focus on the relationship between learning and the social situations in which it occurs.

According to Volpe (2024), the pedagogical approach within which Scenario-based Learning develops emphasises constructivism and experiential learning. These principles are applied by designing learning environments where students are required to participate actively, by placing them in realistic and complex situations, which are not simple, wherein they are expected to solve problems and make decisions on their own. Piaget’s theory of constructivism asserts that children learn best through self-initiated discovery, by actively exploring and through mental schemas, all of which form the basis for Scenario-based Learning. Also, Vygotsky’s emphasis on the proximal development in learning and the role of a more knowledgeable other denotes the importance of a facilitator in Scenario-based Learning, enabling the process of cognitive development to ensure meaningful learning (Adebiyi, 2019). Bruner’s enactive, iconic and symbolic stages also have a generous contribution towards the theoretical foundation of Scenario-based Learning.

Hence, we can say that constructivism and experiential learning serve as the pedagogical foundations of Scenario-based Learning. The principles of these pedagogical approaches are acted upon by fostering learning environments that require the students to participate actively in the realistic situations characterised by complexity rather than simplicity, where they are expected to apply decision-making skills and solve problems.

As per Smith et al. (2018), “Scenarios can therefore range from simple sets of circumstances and conditions, to detailed sequences of events that take into account plots, roles and team relationships, which students may navigate via multiple pathways and which therefore have a multitude of possible outcomes”. In simple terms, we can say that Scenario-based Learning is a method that integrates learning into real-life scenarios, wherein learners are provided with real-life scenarios, which enables them to construct knowledge that is not far from their reach or vague.

Use of narratives or stories in Scenario-based Learning, which are usually short and uninterrupted in nature, aids in maintaining motivation among students, without much effort (Smith et al. 2018). Ray Jimenez (2009), in his book “Scenario-Based Learning Using Stories to engage e-learners”, believes that the story is the soul of Scenario-based Learning and that injecting feedback into it leads to interpreting the story, which in turn hinders active knowledge construction. However, excluding feedback would make the learning process incomplete. So, we can say that the primary focus of Scenario-based Learning should be on the story or narrative, and feedback should be given secondary status. In a nutshell, Scenario-based Learning, which is based on the constructivist approach, should help learners build knowledge by experiencing scenarios in the form of stories, backed by feedback, which ensures that authentic knowledge has been constructed.

According to Skipwith & Budhai (2021), there are six types of scenarios, namely, (i) branching scenarios- these are the scenarios that branch out into multiple scenarios, which

further branch out into multiple ones, backed up with the help of timely feedback, which ensures that the learners construct authentic knowledge; (ii) gaming scenarios – these are scenarios that involve the use of games for learning; (iii) issue-based scenarios – these are the scenarios wherein learners deal with issues, by involving humanitarian perspectives and explore them to understand its impact on decision making in professional settings; (iv) problem-based scenarios – these are scenarios that require the learners to combine and form meaningful connections between their theoretical and practical knowledge to understand and investigate a problem; (v) skill-based scenarios – these are the scenarios in which learners demonstrate skills and knowledge they have already acquired; (vi) speculative scenarios – these scenarios are those in which learners are expected to predict or estimate an event’s future outcome.

“Learner autonomy and critical thinking are encouraged under Scenario-based Learning, which allows the students to reach a deeper level of learning as they evaluate the available options, analyse, and interpret the implications of their decisions” (Smith et al. 2018).

Volpe(2024), through her research study titled ‘Scenario-Based Learning: An Inclusive Methodology’, thinks that “Scenario-based Learning stands out for its ability to integrate subject-specific content with transversal skills, crafting educational experiences that simulate real-life situations while being designed to stimulate students' interest and motivation”.

In Scenario-based Learning, learning is inductive rather than instructive, and the instruction is guided (Clark & Mayer, 2012), which emphasises the fact that learning is induced in the learning environment, rather than being in the form of instructions given by the facilitator. Smith et al. (2018) talk about the augmentation of scenarios using technology, which underlines the need to integrate scenario-based learning with technology.

1.2 ARTIFICIAL INTELLIGENCE

One of the emerging technologies in today's world is undoubtedly Artificial Intelligence. The origin of Artificial Intelligence can be traced back to an era, even before the modern computers came into existence, wherein early philosophers and mathematicians were interested in understanding human reasoning, logic and decision-making (Saboowala, 2025). Thinkers like Aristotle explored the concept of formal logic, which provided the foundation for the idea that human thought can follow structured rules and patterns.

The Modern Artificial Intelligence revolution was launched at the Dartmouth Conference in 1956, which was organised by John McCarthy, who is popularly known as the Father of Artificial Intelligence, along with other scientists, namely Marvin Minsky, Nathaniel Rochester and Claude Shannon (Mishkoff, 1988).

Artificial intelligence is an emerging technology that the education sector can benefit from, as it has had an impact on almost all sectors of human life, providing a lot of benefits to it, including the field of education (Sadiku et al. 2022). Many people now see AI as a key component of Industry 4.0, and it has the potential to spark a fourth revolution in education. (Okur & Göçmez, 2023). Teachers play a very critical role in the introduction of AI technologies into classes (Alahmari et al. 2024). Mathematics education is one of the popular areas to incorporate AI technologies to facilitate students' learning (Sadiku et al., 2022). AI has the potential to transform the traditional teaching and learning process through its advanced technological tools such as Gemini AI, Chat GPT, Claude AI, Perplexity AI, Microsoft Copilot, DreamBox Math, Prodigy Math, Duolingo Math, Microsoft Math Solver, Photomath, MathGPT and others, to name just a few.

1.3 MATHEMATICAL SKILLS OF STUDENTS WITH HEARING IMPAIRMENT

The vocabulary of mathematics may seem daunting for a student who is already deficient in general vocabulary knowledge (Richburg & Smiley, 2011). In addition to this, it

has been stated that the syntactic complexity involved in the written mathematical problems may make students with hearing impairment (SwHI) unable to identify the math skills being targeted in a problem. Thus, we can say that language plays an important role in acquiring mathematical skills among students with hearing impairment. So, this creates a need to use simple and context-specific language to initiate ease of mathematical learning.

There is a focus on the crucial need to use symbolic representations and visuals in mathematics instruction, which, if commensurately and pertinently designed, can aid in overcoming communication barriers. In addition to this, the importance of interactions between teachers and students in learning mathematics was also discussed, highlighting the need for social interactions for learning and developing better mathematical skills. It was also stated that additional educational challenges linked to cognitive and perceptual impairments are faced by SwHI. To overcome the persisting communication barriers among SwHI, it is of foremost importance that we use rich, vivid, attractive and commensurate visuals coupled with an environment that fosters student-teacher interactions and also peer interactions and facilitates better mathematical learning (Bashir et al., 2024)

Some of the characteristics of non-strategic learners in mathematics which effects their mathematical performance include learned helplessness, passivity, memory difficulties, attention difficulties, cognitive and metacognitive difficulties, processing deficits, low levels of achievement and math anxiety (Allsopp et al., 2007). These qualities, which are specific to learners of mathematics in general, also seem applicable to students with hearing impairment.

As rightly stated by Levine et al. (2020), the domain general skills such as attention, working memory and statistical learning are poorer in hearing impaired students when compared to their hearing peers, which are crucial for acquiring language skills. These skills hold immense significance in the acquisition and development of mathematical skills as well. Thus, teaching students with hearing impairment, the subject of mathematics should include

teaching strategies which can tackle the characteristics of non-strategical mathematics learners, such as learned helplessness, passivity, attention and memory difficulties, underachievement, math-anxiety and others and also addresses the domain-specific skills such as attention, working memory and statistical learning.

In the journal article titled ‘The Impact of Scenario-Based Learning on the Scientific Creativity and Reflective Thinking Skills of Fourth-Grade Students in Primary School’, where an experiment was done on students of STD-4, it was found that the use of Scenario-based Learning activities would benefit courses related to science at the primary level (Guler, 2025). Scenario-based learning, coupled with the use of technology, enhanced the critical thinking skills of students of STD-9 in Social Science (Joaquin & Hermosa, 2023). So, only minimal studies have been conducted to study the impact of Scenario-based Learning on mathematical learning among hearing-impaired students, which constitutes the need for the study.

1.4 NEED OF THE STUDY

There are well-documented gaps in mathematical achievement between students with hearing impairment and their hearing peers (Traxler, 2000; Gottardis, Nunes & Lunt, 2013). The numerous specific challenges faced by SwHI when studying mathematics are significantly influenced by their communication and language disabilities (Bashir et al. 2024). Delays are particularly evident when conventional mathematical signs and abstract concepts are used, underscoring the need for adapted pedagogies. Since STD-4 is a preparatory stage for developing number sense, symbolic representation, and problem-solving skills, exploring innovative strategies to bridge this gap is crucial. Posamentier (2009) stresses the need to encourage students to use their developing mathematical skills to solve problems within contexts of similar situations. This makes it clear that there is a need to connect mathematical concepts to similar situations or contexts.

Scenario-based Learning (SBL) has shown promise in fostering active participation, personalisation, and deeper conceptual understanding across disciplines (Della Volpe, 2024; Jawaharlal et al., 2004; Caballada et al., 2025). It has also proven effective in inclusive classrooms and teacher education, enhancing engagement, collaboration, and practical skill development (Tiffin & Klassen, 2024). In addition to this, Volpe (2024) opines that the implementation of the Universal Design for Learning (UDL) model is supported by Scenario-based Learning, which upholds the need to design educational activities to meet the diverse learning needs and styles of students, which means that Scenario-Based Learning suits the varying learning requirements of children with special needs.

Parallely, Artificial Intelligence (AI) has emerged as a transformative force in inclusive education. Speech-to-text, real-time translation, and sign language recognition significantly reduce communication barriers and promote equitable access (Mukabbir, 2023; Sur & Chakraborti, 2024). Studies reveal improved accessibility, higher engagement, and positive teacher perceptions toward AI integration in mathematics education for SwHI (Alahmari et al., 2025; Shivani, Gupta, & Gupta, 2024). Furthermore, AI-powered visualisations and adaptive platforms make abstract mathematical concepts more concrete, enhancing learning for deaf students (Göçmez & Okur, 2023). Despite these advancements, there remains a lack of empirical research combining AI-assisted Scenario-based Learning specifically for mathematics education among SwHI at the primary level. While separate evidence supports the effectiveness of SBL and AI tools, their combined potential in addressing achievement gaps, improving engagement, and shaping teacher perspectives has not been systematically studied.

Hence, the present study investigates the effectiveness of AI-assisted Scenario-based Learning in developing the mathematical skills of students with hearing impairment of STD-4, thereby contributing to inclusive, technology-enabled pedagogical practices.

1.5 AIM OF THE STUDY:

To study the effectiveness of AI-assisted Scenario-based Learning in developing Mathematical skills among students with hearing impairment in STD-4.

1.6 OBJECTIVES OF THE STUDY:

1.6.1 To study the performance in mathematics of a group of students with hearing impairment studying in STD-4, using the AI-assisted Scenario-based Learning Module against a control group using traditional teaching.

1.6.2 To compare the performance in mathematics of a group of students with hearing impairment studying in STD-4, using the AI-assisted Scenario-based Learning Module against a control group using traditional teaching.

1.6.3 To study the engagement levels of students with hearing impairment in STD-4 with respect to the use of AI-assisted Scenario-based Learning in the subject of mathematics.

1.6.4 To study teachers' perspectives towards the use of AI-assisted Scenario-based Learning in mathematics.

1.7 RESEARCH QUESTIONS

1.7.1 How is the mathematical performance of students with hearing impairment of STD-4, taught through an AI-assisted Scenario-based Learning platform and traditional teaching method?

1.7.2 To what extent are students with hearing impairment in STD-4 engaged while using AI-assisted Scenario-based Learning in mathematics?

1.7.3 What are teachers' perceptions toward using AI-assisted Scenario-based Learning in mathematics?

1.8 RESEARCH HYPOTHESIS:

There exists a significant difference in mathematical performance between STD-4 students with hearing impairment taught through AI-assisted Scenario-based Learning and traditional methods.

1.9 OPERATIONAL DEFINITION:

1.9.1 AI-Assisted Scenario-Based Learning (AI-SBL): AI-assisted Scenario-based Learning is an integrated approach of teaching, where the vivid AI-generated images, contexts, and scenes (which have been developed using various AI tools such as Gemini AI, MagicSchool AI, and MathGPT) meet realistic scenarios, which bridge the gap between theoretical knowledge and practical reality, enabling the learners to construct authentic knowledge with ease and in a sensible way.

1.9.2 Students with Hearing Impairment (SwHI): Students with hearing impairment are those aged 9–10 years with severe to profound hearing loss (≥ 60 dB in the better ear), including both “deaf” (≥ 70 dB) and “hard of hearing” (60–70 dB) individuals, as defined by the Rights of Persons with Disabilities Act, 2016, enrolled in primary-level special schools for the hearing impaired.

1.9.3 Mathematics: Mathematics involves selected 4th standard topics such as ‘Tangrams and Designs’, and ‘Solids’, which are used to develop mathematical skills such as spatial visualisation and reasoning, geometric composition and decomposition, classification and identification of properties, pattern recognition and tessellation among students with hearing impairment.

1.9.4 Teachers: In this context, teachers, as special educators, are trained and registered rehabilitation professionals recognised by The Rehabilitation Council of India, who instruct

and support students with hearing impairment to help them achieve their scholastic and non-scholastic development.

CHAPTER-II

REVIEW OF LITERATURE

A literature review is an evaluation of existing research on a specific academic topic, theme, or subject to identify gaps and propose a future research agenda (Chigbu et al. 2023). In this study, a review of the existing literature related to the mathematical knowledge and acquisition among students with hearing impairment, their classroom engagement, the concept of Scenario-Based Learning and its suitability in the field of Special Education, the role of Artificial Education in the field of Education and particularly in teaching mathematics and in special education, and the factors to be considered while assessing the perspectives of teachers towards, a novel emergent method of teaching was collected and consolidated.

2.1 THEORETICAL FOUNDATIONS OF MATHEMATICAL LEARNING

Making the lessons as active and varied as possible is one way to help pupils enjoy their lessons (**Chambers, 2008**), which requires the use of a dynamic teaching method to teach mathematics. The theory of constructivism is widely accepted as the theory that best describes the process by which students learn mathematics. The theory of constructivism was originally propounded by Jean Piaget. It considers learning as an active process, where new information is accommodated into previously understood meanings or mental images.

Mathematical knowledge is considered to form a part of a social culture both within the classroom and outside, the access to which comes through communication, directly focusing on the social constructivist theory, propounded by Lev Vygotsky. Besides highlighting the interplay of thought and language, Vygotsky also highlights the pivotal role played by the teacher in helping the pupils to learn. A teacher is encouraged to both establish and maintain a learning atmosphere wherein pupils are aware of the purpose of the lesson and to build relationships that are non-threatening in nature. The Constructivist learning theories suggest

that lessons can ideally be initiated from presentation, then move on to exploration, followed by reflection and culminate with consolidation.

Bruner's theory is based on the belief that the construction of knowledge happens through discovery. Bruner's Spiral Curriculum involves, three stages, the first stage being learning tangibly, through observation and by interacting with physical objects; the second stage being semi-sensory learning, where the concepts are taught through images, pictures, graphics, shapes, and the use of technology; and the third stage being the abstract stage, where the learner communicates with abstract concepts, such as mathematical symbols, using various modes of communication, by using the knowledge which was learnt through the previous two stages.

This theory is considered to be specifically suitable for mathematical learning among hearing impaired students, since, in the first stage of tangible learning, it encourages SwHI to learn using the senses which are available to them, by direct communication and by increasing the motivation among them to learn and discover facts. The second stage of semi-sensory learning involves the students drawing and understanding the concepts of shapes, fractions, and so on. The final stage of abstract concepts involves linking the concepts learned in the first two stages to mathematical symbols, using suitable modes of communication (Altakhynah, 2019).

2.2 MATHEMATICAL KNOWLEDGE OF STUDENTS WITH HEARING IMPAIRMENT

Mathematics is considered one of the most intimidating subjects for much of the student population, which is only a cliché, as the difficulty may arise from a lack of commensurate foundational knowledge or from a fixed mindset that mathematics is difficult.

A study titled ‘Identifying the Performance Numbering Skills in Mathematics among Children with Hearing Impairment’, conducted by **Pavitra & Shanti (2025)**, noted that the challenges faced by children with hearing impairment in mathematics are not necessarily due to their hearing impairment but due to their cognitive and language development issues. The study comprised 10 primary students, aged 9-11, with hearing impairment and used a descriptive survey research design. The study revealed that, although there was no significant difference by gender, older children performed better than younger ones, and that critical thinking skills are of utmost importance for understanding numerical concepts. Since parents and educators play an important role in supporting these children, there is a need for improved strategies and targeted interventions to bridge the gaps in numerical and mathematical skills to achieve independence and confidence.

Aftab et al. (2024), through their study titled ‘Mathematics without barriers: Empowering hearing-impaired students in numerical fluency’, studied the strategies to empower students with hearing impairment in mathematics by choosing a sample of 150 teachers, who were chosen using simple random selection under the quantitative research approach. The findings suggest the utilisation of inclusive policies, targeted training and initiatives involving collaborations to improve the mathematical education among children with hearing impairment. There was a recommendation of professional development to provide academic support to deaf students in mathematics, collaboration among all the stakeholders, and ensuring accessibility and resource distribution to all areas, including rural areas.

Also, there is a significant relationship between mathematics performance and visuo-spatial skills of hearing-impaired students (**Borgna et al. 2018**). As an extension of this study titled ‘Numerical and real-world estimation abilities of deaf and hearing college students’, it was found that hearing students, pursuing higher education, showed better numerical and real-world estimation skills than their deaf counterparts. The results of the study indicated that the

non-hearing students were better than their hearing peers with respect to visual analysis/synthesis skills and executive functioning associated with problem-solving, but were comparatively poorer in numerical estimation skills, visual examination, and comparison skills. When the numerical estimation skills among deaf and their hearing counterparts falling within the age range of 5-12 years were checked, it was found that the deaf children performed significantly poor on the comparison/estimation task, verbal working memory task, numerical operations and mathematical reasoning (**Bull et al. 2017**).

Witzel & Little (2016), through their book ‘Teaching Elementary Mathematics to Struggling Learners’, think that success or failure in mathematics depends on the curriculum that is being taught, how it is being taught in terms of instructions, and the learning styles of children, rather than the labels being affixed to it. In continuation, the importance of instructional approaches was discussed, stressing the need for the instructional and teaching approaches used by teachers to be research based, and should be varied in both complexity and differentiation to address the diverse learning needs and styles of students.

Some studies emphasise that the mathematical performance of both the deaf and the hearing students, are dependent on foundational skills such as mental calculation, speed of number comparison, and estimation skills, which are independent of language (**Bull, 2008**).

In the book ‘Learning Mathematics in Elementary and Middle School’, written by **Cathcart et al. (2000)**, they have focused on the incorporation of text, sound, graphics, photographs, motion picture, and animation into a learning package, while emphasizing on the fact that though this is not a replacement for doing an activity concretely, it could certainly be a powerful learning device at the iconic level. The book also accentuates that there is a paradigm shift to a multi-representational approach that includes the usage of language, concrete objects, pictures, real-life situations, and written symbols, though there is a continuous

considerable emphasis being placed on representing mathematical ideas with concrete materials.

The National Council of Teachers of Mathematics has highlighted the need for access and equity in mathematics education by underlining that the educators at all levels must focus to ensure that all students, access high-quality instruction, receive a challenging curriculum, have access to innovative technology, exciting extracurricular activities, and the differentiated supports and enrichments that are necessary to promote students' success (NCTM, 2014).

Hence, we can say that there is a need for commensurate integration of dynamic and innovative teaching methods, healthy and interactive learning environments, healthy teacher-student relationships, well-designed educational materials, a multi-representational approach, a challenging curriculum, innovative technology, and differentiated supports, to ensure access and equity for students with diverse needs.

Since students of standard-4 step into the preparatory stage from the foundational stage, there arises a pressing need to further strengthen and enhance their mathematical foundation by the usage of dynamic and effective teaching strategies, among which scenario-based learning is one.

2.3 SCENARIO-BASED LEARNING

In the book “Situated Learning: Legitimate peripheral participation”, **Wenger & Lave (1991)** have explained Situated Learning as a form of learning, the primary focus of which, is the relationship between learning and social situations and contexts in which it occurs. Scenario-based Learning is based on situated learning theory. Scenario-based learning is a form of learning that involves the use of various scenarios, which are typically in the form of real-life scenarios, with the help of which knowledge is imparted to students, ensuring that their learning is connected to their real-life surroundings. “The use of real-world scenarios enhanced

the academic performance and critical thinking skills by allowing the students to engage with the content more deeply and apply their knowledge in practical ways” (**Caballeda et al. 2025**). As an extension, it was also stated that the SBL method supports the development of higher-order thinking skills and encourages students to engage in discussions that are considered relevant to their day-to-day lives and future career paths.

The study conducted by **Guler (2025)** titled ‘The Impact of Scenario-Based Learning on the Scientific Creativity and Reflective Thinking Skills of Fourth-Grade Students in Primary Schools’, which consisted of an experimental group of 24 students and a control group of 22 students, who belonged to standard-4, who were given questionnaires and rating scales, tested their scientific creativity and reflective thinking skills. An independent samples t-test, along with a dependent samples t-test, was conducted to analyse the results of the experiment. The results obtained showed a clear indication of the beneficial effect of SBL in enhancing scientific creativity and reflective thinking skills, thus making it appropriate for science courses.

According to the study titled ‘Scenario-Based Learning: An Inclusive Methodology’, **Volpe (2024)**, Scenario-based Learning has emerged as “an effective response to the various challenges of school inclusion due to its ability to integrate experiential learning and active student engagement”. In continuation, it has also been mentioned that Scenario-based Learning offers concrete opportunities for participation, development of various transversal skills, flexibility and ability to personalise learning paths for learners. It is also a crucial resource for addressing the needs of students with special needs, by ensuring that every learner, regardless of diverse learning needs and styles, can regard themselves as active participants in their journey of learning. In addition to this, narration has also been given a greater prominence, as it is considered to play a pivotal role in helping students overcome cognitive and communicative barriers by creating motivating and accessible contexts. The ability of scenario-based learning to integrate subject-specific content with transversal skills and moulding

educational experiences that simulate real-life situations while conserving students' interest and motivation, makes it exceptional.

The various scenarios enable the educators to situate and contextualise learning. Also, the scenario itself becomes the prompt for meaningful and reflective discussion by students and facilitators by providing a context for authentic reflection, enabling the students to express their own experiences, expertise, and stories of related successes and failures. Learners practise decision-making and problem-solving skills by working through scenarios and preparing themselves for cognitive demands **(Hohaus, 2024)**. “Scenario-based Learning is intended to form a bridge between semantic(fact-based) knowledge and the practical application of learning, one of its strengths being the possibility of being implemented at scale, digitally, increasing the reach of training” **(Tiffin & Klassen, 2024)**.

The 5 main principles of scenario-based learning popularly known as the 5Cs of SBL are, Context, Challenge, Choices, Consequences, and Contemplate **(Mary & Prema, 2024)**. The principle of context is concerned with creating a circumstance, background or setting surrounding an event or a concept. The principle of challenge, deals with placing an issue inside the framework of the learning objectives. The principle of choices is related to the provision of alternatives among which the learner is supposed to choose any one alternative. The principle of consequences, which is like a sequel to the principle of alternatives, is concerned with the outcome of the alternatives chosen by the learner, ensuring that authentic information is learned by the learner. The principle of contemplation is the final principle where the learner reflects on their experience of learning.

By addressing learners' diverse needs, preferences and abilities, well-designed educational materials create a welcoming and nurturing environment **(Yadav. S, 2024)**. In this study titled ‘Assessing the Effectiveness of ‘Pragna’ Educational Materials in Catering to the Learning Needs of Students with Sensory Disabilities’, a total of 222 teachers were randomly

selected who were working in mainstream schools, and analysed using the descriptive survey method. Percentage, mean scores, 'z' test, and one-way Analysis of Variance were used to analyse the collected data. The result of the study suggested that the usage of educational materials prescribed under the 'Pragna' program, which was an activity-based learning program, by a majority of teachers, was highly suitable for students with sensory impairments, emphasising the need to develop and use varied educational materials in accordance with the learning needs and styles of the students with sensory disabilities.

Joaquin & Hermosa (2023) in their study, 'Scenario- Based Learning Approach for Enhancing the Critical Thinking Skills of Grade 9 Students in Araling Panlipunan', included 40 STD-9 students from an integrated school to study the impact of scenario-based learning in social science, the basis for evaluation of which was a descriptive quasi-experimental research design. Mean, standard deviation, t-test and Pearson-r correlation were used to analyse the results. The results indicated that students become more involved, motivated, and develop skills required for the real world, making it suitable for social science.

Through the study titled 'Scenario-based teaching in teaching algebra in gifted education', **Altıntaş et al. (2023)** analysed a group of 65 students of 6th and 7th standard, including 7 gifted students, with respect to understanding the effectiveness of the SBL method in algebra teaching. The experimental group comprised 33 students, including the 7 gifted students, and the control group consisted of 32 non-gifted students. The performance of these groups was analysed under the mixed-method research design. There was a significant improvement in the academic performance of the experimental group, who were taught algebra by using the Scenario-Based Learning method, when compared to the control group, who were taught the same concepts using the traditional method, indicating the effectiveness of Scenario-Based Learning in algebraic teaching and thus in mathematics.

Scenarios should be designed in such a way that the scenario-content should be suitable for the students' knowledge levels, in line with the teaching objectives and provides concepts that are blended with the students' knowledge (**Shaaban & Shaat, 2022**). This study consists of 24 female elementary student-teachers who were studying in their first year, the performance of whom was studied under the quasi-experimental approach, which suggested that there is a positive effect of using Scenario-based Learning on enhancing 'Teaching English as Foreign Language' in an inclusive educational classroom for grades 1-4. It was also discussed that the scenario context should be just like a realistic situation in which a sequence of teaching events is presented. Also, students should be provided opportunities, wherein fresh considerations surface, so that they make new decisions, which enhances their decision-making skills

The perspectives of the stakeholders, namely, teachers, principals and parents, towards teaching-learning methodology that gives importance to experiential and mastery level learning with respect to its suitability towards children with sensory disabilities had taken a bright side (**Yadav. S. D, 2020**). There has been a clear demonstration of increased learner interest and improved knowledge retention while the scenario-based learning approach was used and is hence considered to be a very effective pedagogical approach (**Mariappan et al. 2004**).

2.4 ARTIFICIAL INTELLIGENCE

A study titled 'Empowering Mathematics Education for Hearing Impaired Children Through Artificial Intelligence', by **Alahmari et al. (2024)** focuses on the fact that special methods are to be employed in teaching mathematics to deaf students as they learn differently, for which AI has emerged as a good alternative, by studying a group of 350 teachers from special educational institutions, who were analysed using the descriptive statistical measures such as mean and standard deviation, and inferential statistical measures such as t-test and ANALYSIS OF VARIANCE. In continuation, it has also been stated that with simulations and visualisations energised by AI, even the most intangible ideas will become concrete. Most of

the educators were of the opinion that with the help of AI, access is enhanced, and it becomes easier to understand math concepts. It also suggested the need to embrace AI as a method of fostering independent learning and eliminating dependence on traditional teaching tools. The study also suggested that AI would play a great role in enhancing the academic achievement of the hearing-impaired students, as respondents who were educators were assured that AI would help with better educational outcomes.

By providing AI tools that cater to diverse learning requirements, AI offers significant benefits for special needs education, the other benefits of artificial intelligence in education systems being personalised learning, intelligent tutoring systems, automated grading and assessment, enhanced student support, predictive analytics for student success, content creation and enhancement and language learning and translation (**Majumdar, 2024**).

In addition, **Bashir et al. (2024)** have opined that integrating technology into mathematics instruction can create a more inclusive and effective learning environment for children with hearing impairments.

Comprehensive support for auditory improvements is ensured through AI innovations coupled with traditional pedagogical practices (**Chakraborti & Sur, 2024**). In this study titled ‘Can AI Tools Provide an Effective Mechanism for Teaching Children with Auditory Impairment – An Exploratory Study’, 40 participants, including 10 educators, 10 parents, 10 healthcare professionals, and 10 technology experts, were selected by using the purposive sampling technique and their opinions were studied using the qualitative thematic analysis. This study suggested that AI tools improve access, engagement, and communication for children with hearing loss; educators and parents see strong potential but caution against over-reliance.

AI tools have shown promising potential in supporting children with disabilities, as it has been observed that AI holds much potential in strengthening the learning experiences of

differently abled students by providing them with personalised support and alleviating them from the difficulties that they face in reading, writing and learning a language with accuracy (Shivani et al. 2024). In this study titled ‘A systematic analysis of AI-empowered educational tools developed in India for disabled people’, it has also been stated that children with special needs can communicate in a better way, be receptive to an inclusive education, be mentally well prepared, and lead their lives with autonomy by using AI tools.

AI has the potential to improve inclusiveness, personalisation, and effectiveness of the learning environment for children with special needs by overcoming the shortcomings of traditional teaching models and to revolutionise special education by how instruction is both given and received (Yadav. M .K, 2023).

The four key aspects related to cognitive development in hearing-impaired students are language development, communication strategies, social interaction and educational accommodations (Rashtrapal & Kumar, 2023). As an extension, in this paper titled ‘Significance of Artificial Intelligence in Cognitive Development of Hearing-Impaired Students: A Systematic Review’, it has been mentioned that for hearing-impaired students, language acquisition is delayed or affected mainly due to limited access to spoken language, which can be developed through appropriate intervention. Language skills, such as thinking, problem-solving and reasoning, are considered to form the foundation for cognitive processes. The other aspect related to cognitive development in children with hearing impairment is the communication strategy used, which is usually in the form of sign language, lip reading, or written communication. This can significantly impact cognitive development as they influence how information is received, processed and understood. Social interaction, being the other aspect, plays a significant role in cognitive development, and children with hearing impairment may face challenges in this area due to communication barriers with the hearing world, which can be tackled by encouraging inclusive environments that promote effective communication

and foster social interaction, which in turn can positively impact their cognitive development. The last aspect, educational accommodation, which can include preferential seating, classroom amplification systems, captioned videos, visual aids, and note-taking assistance, is considered to be essential for supporting the cognitive development of students with hearing impairment. The above systematic review suggests that AI has the potential to enhance cognitive development by providing personalised learning experiences, facilitating communication and language acquisition, and improving accessibility and inclusivity, but several limitations and ethical considerations need to be addressed for effective and responsible integration of Artificial Intelligence in educational settings for hearing impaired students.

Mukabbir (2023) highlights the capacity of AI to empower students with hearing impairments and foster educational environments that are inclusive in nature. This study, with the title ‘AI-Based Solutions for Students with Hearing Impairments’, included 120 survey respondents, including educators, parents, and administrators, the opinions of whom were analysed using a mixed-method approach. It was found that 88% reported improved accessibility, 75% noted better communication, 40% increase in engagement, and 30% reduced barriers. According to **Sadiku et al. (2022)**, Artificial Intelligence is a key technology that is poised to transform education.

2.5 CLASSROOM ENGAGEMENT LEVELS OF STUDENTS WITH HEARING IMPAIRMENT

Student engagement is considered to be the active participation by the students in learning tasks, and covers certain aspects of commitment and involvement that students show towards the process of learning. The aspects of student engagement include behavioural engagement, cognitive engagement, emotional engagement, and agentic engagement (**Bizimana, 2025**). Behavioural engagement refers to the behaviours and actions that the students visibly exhibit during the learning process, such as regularly attending class, making

persistent efforts, finishing assignments within the given time, and actively participating in lessons. Cognitive engagement reflects students' psychological awareness of the effort put forth in learning activities, attention, concentration, and persistence. Emotional engagement is defined as "a student's sense of belonging in the classroom, appreciation of learning-related results, and lack of boredom, anger, and worries". Agentic engagement describes the proactive and mutually beneficial steps taken by the students to raise their academic standing and create a supportive learning environment for themselves.

The study titled 'Self-determination and Student Engagement among Deaf and Hard of Hearing Students', authored by **Cheng et al. (2025)**, which aimed at assessing the relationship between student engagement and their self-determination, involved a group of 214 DHH school students and revealed that there was a high correlation between the students' self-determination and engagement levels. Descriptive statistics and correlation were conducted to analyse the data. The recommendations of the study included the need for the administrators, counsellors and teachers to provide more opportunities to the students to exercise autonomy, and to deal with more complex and less structured activities.

Thus, we can say that while assessing the classroom engagement levels of SwHI, aspects such as the behavioural, cognitive, emotional and social engagement must be taken into consideration.

2.6 ASPECTS TO BE CONSIDERED WHILE ASSESSING THE PERSPECTIVES OF TEACHERS TOWARDS THE AI-ASSISTED SBL METHOD

When an emerging teaching method, such as the AI-assisted Scenario-Based Learning, is being implemented, it is not only the student test scores and their levels of engagement that have to be given importance, but the teachers' perceptions towards it also hold utmost importance, as it is the teachers who would be implementing the teaching methods.

A study titled ‘Development and factor structure of the teaching approach scale’, authored by **Reho et al. (2024)**, was conducted, and it was found that areas such as development of students’ autonomy, comparison and synergy in teachers’ group, development of student as a person, and standardisation of teaching had to be looked into in order to find a comprehensive measure to assess teachers’ perspectives on a novel teaching approach.

Gorai & Angadi (2023), through their study titled ‘Developing a Standardised Scale to Measure Teachers’ Perception and Attitude Towards Apprenticeship Embedded Degree Programme’, have developed the ‘Teachers’ Perception and Attitude Scale Towards Apprenticeship Program’(TPAS-TAP), using a 5-point rating scale, which was considered appropriate through the factorial validity and Split-half Technique. This developed tool is considered to be helpful for other researchers who wish to perform research and to make similar tools, as it provides a detailed account of the aspects to be taken into account while assessing teachers’ perspectives.

A thorough study of the above two papers provided an insight into factors such as the effectiveness of instructions, the level of student engagement and learning, ease of classroom implementation, overall feasibility and acceptance of the method by the teaching fraternity, which are to be considered while assessing the teachers’ perspectives towards the effectiveness of a novel emerging teaching method.

2.7 RESEARCH GAPS

Several studies investigating the mathematical capabilities of students with hearing impairment suggest that various factors, such as their language development, cognitive abilities, visuo-spatial skills, communication strategies, and instructional approaches, influence their mathematical performance and achievement (Borgna et al., 2018; Bull et al., 2017; Pavitra & Shanti, 2025). These studies have only looked into the nature of mathematical learning among SwHI with respect to mathematics, and have addressed the challenges that they

face and have suggested some of the broad and generic educational interventions for the same. However, experimental validation of specific innovative emergent pedagogical approaches in teaching mathematics to students with hearing impairment is not significantly portrayed.

The literature further indicates that Scenario-Based Learning has emerged as an effective pedagogical approach capable of promoting learner autonomy, motivation, experiential learning, and enhanced learning experiences among students and is also considered suitable for inclusive education (Smith et al., 2018; Volpe, 2024). Research studies have also showcased the efficiency of Scenario-Based Learning in disciplines such as science, social science, language education and algebraic education. Though there are documented advantages, the studies examining the effectiveness of Scenario-Based Learning in the field of mathematics are scarce, at the elementary school level, among SwHI.

In addition, AI has also emerged as an innovative technology in fostering a learning environment suitable for students with hearing impairment, through various visualisation tools, intelligent tutoring systems, communication support, and personalised instructional experiences (Alahmari et al., 2024; Majumdar, 2024; Mukabbir, 2023; Rashtrapal & Kumar, 2023). Most of these studies have focused on conceptual discussions, systematic reviews, stakeholder perceptions, and general applications of AI technologies, lacking an empirical examination involving the impact of AI on mathematical skills of students with hearing impairment.

Most importantly, the review of literature suggests a significant gap in the integration of Artificial Intelligence and Scenario-Based Learning as a combined method of teaching. Also, no substantial evidence has been found in assessing the effectiveness of AI-assisted Scenario-Based Learning in teaching mathematics to SwHI at the primary level, with a comprehensive account of their classroom engagement levels and teachers' perspectives towards this novel emergent method.

Thus, the present study seeks to narrow these research gaps by finding out the effectiveness of the blended approach involving both Artificial Intelligence and Scenario-Based Learning, in teaching an abstract subject like mathematics to hearing-impaired students. In addition, it also seeks to analyse the classroom engagement level of students with hearing impairment when this method was used in the classroom and the perception of teachers towards this unprecedented method of teaching.

The methodology followed for the current study has been discussed in the upcoming chapter.

CHAPTER-III

METHODOLOGY

Research methodology provides a comprehensive account of how the research was planned, executed and conducted. The current research was conducted to study the effect of an AI-assisted Scenario-based Learning Module on the mathematical skills of children with hearing impairment of STD-4, and to draw a comparison between its effectiveness in line with that of the traditional method.

The study also aimed at measuring the engagement levels of students while the AI-SBL Module was used, and to assess the teachers' perspectives towards the use of AI-SBL in teaching mathematics to children with hearing impairment in STD-4.

3.1 RESEARCH DESIGN OF THE STUDY

A quasi-experimental research design and a survey were selected for the current study by considering the aims and objectives of the study. A Pretest Post-test Non-equivalent Groups design, which falls under the quasi-experimental research design, was selected to conduct the research experiment.

A quasi-experimental research design is usually used to evaluate the causal effects of an intervention, where random assignment of participants is not possible. A Pre-test Post-test Non-equivalent Groups Design is a quasi-experimental design, where we can test the effectiveness of an intervention, but random assignment is not possible due to the pre-existing structure of the samples.

A Pre-test Post-test Non-equivalent Groups Design can be better understood by referring to Table 3.1, in which it has been represented:

Table 3.1 *Pre-test Post-test Non-equivalent Groups Design*

Group	Pre-test	Intervention	Post-test
Experimental Group	O ₁	X	O ₂
Control Group	O ₃	-	O ₄

Where,

O₁ = Pre-test administered on the Experimental Group

O₃ = Pre-test administered on the Control Group

X = Intervention using the AI-assisted Scenario-based Learning Module

O₂ = Post-test administered on the Experimental Group

O₄ = Post-test administered on the Control Group

3.2 SAMPLE AND SAMPLING PROCEDURE

(i) Sample size of Students with hearing impairment in STD-4

A total of 20 students with hearing impairment studying in STD-4, aged about 9-10 years, were selected for the study, from 2 special schools, where one school was located in Mysore and another in Mandya. This was split into 2 groups, namely: Group-1(Experimental Group) consisting of 10 students (n=10) and Group-2(Control Group) consisting of 10 students (n=10).

(ii) Teachers working with students with hearing impairment

A total of 13 teachers, who are special educators working with SwHI, were selected for the study, where 11 of them were from the special school in Mandya, and the remaining 2 were from the special school in Mysore.

3.3 SAMPLING

Students with hearing impairment studying in STD-4, aged about 9-10 years, and special educators were selected for the research study using the purposive sampling technique.

3.4 INCLUSION AND EXCLUSION CRITERIA

3.4.1 Inclusion Criteria

- Students with severe to profound hearing loss studying in STD-4 in a primary special school.
- The primary mode of communication of these SwHI in STD-4 has to be basic sign language and an aural-oral approach.
- The age of the students is 9-10 years.

3.4.2 Exclusion Criteria

- The students should not have additional disabilities.
- The students should not be typically developing.

3.5 DEVELOPMENT OF TOOLS

A Researcher-made AI-assisted Scenario-based Learning Module was developed, along with a Researcher-made Pre-test and Post-test to study and compare the effectiveness of AI-assisted Scenario-based Learning in acquiring mathematical skills among SwHI in STD-4 with that of those who were taught mathematics using the traditional method of teaching.

A Student-engagement checklist was developed to check the engagement levels of students, while using the AI-assisted Scenario-based Learning method to measure one of the objectives, which is related to studying the engagement levels of SwHI while using the AI-assisted Scenario-based Learning Module.

In addition to the above tools, a rating scale was developed to study the perspectives of teachers, who were special educators working with students with hearing impairment, towards the use of AI-assisted Scenario-based Learning in mathematics. The consolidated list of tools developed as a part of the current research study has been depicted in Table 3.2:

Table 3.2 *Consolidated list of tools developed*

Sl. No	Objectives	Tool	Source of data	Subjects	Method of Data Collection
1	To study and compare the performance in mathematics of a group of SwHI studying in STD-4 using the AI-SBL module against a control group using traditional teaching.	Researcher-made AI-SBL Module & Researcher-made Test (Pre-Test and Post-Test)	Primary Data	SwHI studying in STD-4, aged about 9-10 years	Testing
2	To study the engagement levels of SwHI studying in STD-4 with respect to the use of AI-SBL in the subject of mathematics.	Checklist	Primary data	SwHI studying in STD-4, aged about 9-10 years	Survey

Sl. No	Objectives	Tool	Source of data	Subjects	Method of Data Collection
3	To study the perspectives of special educators working with students with hearing impairment towards the use of AI-assisted scenario-based learning in mathematics.	Rating Scale	Primary Data	Special educators working with hearing-impaired students in a special school	Survey

3.5.1 PHASE-I: DEVELOPMENT OF AI-ASSISTED SCENARIO-BASED LEARNING MODULE AND RESEARCHER-MADE ACHIEVEMENT TESTS

The step-wise procedure involved in the planning and development of the AI-assisted Scenario-based Learning Module and researcher-made achievement tests has been explained as follows:

3.5.1.1 AI-assisted Scenario-based Learning Module

Step-1: Review of the general learning needs of students with hearing impairment

An initial review of the general learning needs of SwHI highlighted the need to use visually rich, context-specific materials (Bashir et al., 2024). This led to the use of narratives coupled with rich, vivid visuals.

Step-2: Review of the language development among students with hearing impairment

Review of literature with respect to the learning needs of hearing-impaired children provided insight into the language acquisition, which is usually delayed among children with hearing impairment and their receptive and expressive language, which is also delayed when compared to their hearing peers. This provided the input for the usage of simple sentences and avoidance of complex, vague or idiomatic sentences in the scenarios and in the module as a whole.

Step-3: Review of the acquisition of mathematical skills among students with hearing impairment

Mathematical skills, which are usually abstract in nature, can be learned through constructivism, which best describes how pupils learn mathematics (Chambers, 2008). This provided the foundation for creating context-specific content for better imparting mathematical knowledge.

Step-4: Utilisation of Artificial Intelligence

Artificial Intelligence, which has emerged as an innovative and effective catalyst for imparting education, has been proven to be effective in teaching mathematics as well, according to various research studies. In the current module, Artificial Intelligence tools such as Gemini AI, MagicSchool AI, and MathGPT were primarily used to generate images for the scenarios. Other emerging AI tools could not be used in the development of the current module due to time constraints and limited technological support in the local special schools in and around Mysore, which could pose a glitch in the implementation.

Step-5: Usage of scenario-based learning method

By considering the learning needs, language development, and the mathematical knowledge acquisition among children with hearing impairment, it was considered to choose 'Problem-based Scenario' as the best-suited format for teaching mathematics, by integrating

the theoretical knowledge with practical real-world examples, wherein we can integrate context and visuals in the form of narrative scenarios, which are also interactive in nature.

Step-6: Selection of chapters

Two chapters namely ‘Tangrams and Designs’ and ‘Solids’, from 4th standard Karnataka State Syllabus Mathematics Text book was chosen, as these chapters are aimed at developing mathematical skills such as spatial visualisation and reasoning, geometric composition and decomposition, classification and identification of properties, and pattern recognition and tessellation and as it was estimated that these two chapters would be taught during the end of the academic year which would coincide with the estimated data collection period, to ensure ease of implementation in line with the objectives of the study.

Step-7: Selection of scenarios

All the scenarios utilised in developing the module are problem-based scenarios, presented as narratives paired with vibrant visuals. Due care was taken to ensure that the context of the scenarios was indigenous and highly relatable to SwHI in the age range of 9-10 years. An outline of the learning objectives and domains covered under the AI-assisted Scenario-based Learning Module has been provided with the help of Table 3.3, which is as follows:

Table 3. 3 *Outline of AI-assisted Scenario-based Learning Module*

Sl.no	Description	Learning Objectives	Domains covered	Weightage
1. Tangrams and designs				
a	Introduction to Tangrams	To enable the students to: • Identify a 7-piece Tangram. • Explain the different components of a 7-piece tangram. • Identify the different shapes in a 7-piece tangram. • Determine the number of each of the shapes involved in a 7-piece tangram.	Cognitive Domain	13.33%
b	Various designs using Tangrams	To enable the students to: • Identify the use of a tangram. • Form various designs using tangrams. • Form their own creative designs using tangrams.	Cognitive Domain Psychomotor Domain	1.33% 5.33%

Sl.no	Description	Learning Objectives	Domains covered	Weightage
b	Cube	To enable the students to: - Identify the shape of a cube. - Identify the number of faces, edges and vertices of a cube. - Differentiate between a square and a cube. - Identify the objects that look like a cube.	Cognitive domain	13.33%
c	Cylinder	To enable the students to: - Identify the shape of a cylinder. - Draw a cylinder. - Identify objects that look like a cylinder.	Cognitive domain Psychomotor domain	5.33% 8%
d	Cone	To enable the students to: - Identify the shape of a cone. - Identify the objects that look like a cone.	Cognitive domain Psychomotor domain	5.33% 8%
e	Sphere	To enable the students to:	Cognitive domain	13.33%

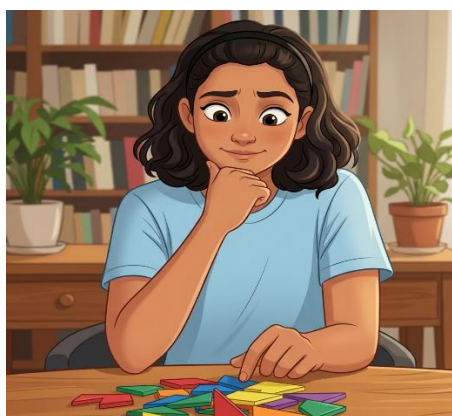
Sl.no	Description	Learning Objectives	Domains covered	Weightage
		- Identify the shape of a sphere. - Identify the objects that look like a sphere. - Differentiate between a circle and a sphere.		

A sample content used in the AI-assisted Scenario-based Learning Module has been depicted with the help of Figure 3.1:

Figure 3.1 *Sample of Content*

Scenario-1: Mehrin is thinking about what she can do with the various components of a tangram.

1



Mehrin is thinking about what she can do using a tangram.

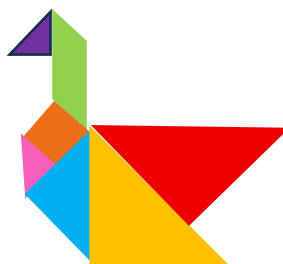
2



She gets ideas of the different designs she can make using tangrams.

Now, let us do some designs using the various shapes of a tangram!

First, let us make the design of a swan!



3.5.1.2 PRE-TEST:

Step-1: Ascertaining the domains to be measured

The first step in developing the pre-test was to determine the domains to be assessed. The primary domain to be focused on was the cognitive domain, with a significant focus on the knowledge and understanding level and a moderate focus on the application level. The other domain to be focused on was the psychomotor domain, with focus being primarily provided on the imitation and manipulation level, and the least focus on the precision level. The significance of focus was based on Bloom's Taxonomy.

Step-2: Determining the weightage to be allotted to the chapters

The weightage allotted to the chapters was based on their significance and volume, and has been depicted in Table 3.4 as below:

Table 3.4 *Weightage allotted to the chapters*

Unit	Weightage
Tangrams and Designs	40%
Solids	60%

Step-3: Allotment of marks based on the form of questions and on the weightage allotted to each of the chapters

The marks allotted based on the various forms of questions and on the weightage allotted to both the chapters have been depicted in Table 3.5, which is as follows:

Table 3.5 *Marks allotted based on the form of questions, along with weightage*

Sl.no	Unit	Form of questions	Marks	Weightage (in percentage)
1	Tangrams	Fill in the blanks	1	4%
	and	Match the following	3.5	14%
	Designs	Complete the following designs	5	20%
		Find the odd one out	0.5	2%
2	Solids	Name the following	10	40%
		Fill in the blanks	1.5	6%
		Match the following	1.5	6%
		Find the odd one out	2	8%
Total			25	100%

Step-4: Allotment of time

The time for the pre-test was allotted depending upon the weightage of marks, the type of questions involved, and the needs of hearing-impaired children. Thus, the total time allotted for the Pre-test was 60 minutes. Based on the steps followed for forming the pre-test, a blueprint was developed to form a roadmap for the pre-test, which has been depicted with the help of the tables, Table 3.6.1, Table 3.6.2, Table 3.6.3 & Table 3.6.4

Blueprint of Pre-Test

Table 3.6.1 *Blueprint of content weightage*

Sl.no	Unit	Sub-unit	Marks	Weightage (in percentage)
1	Tangrams and Designs	(a) Introduction to Tangrams	2.5	10%
		(b) Various designs using Tangrams	2.5	10%
		(c) Designs	5	20%
2	Solids	(a) Cuboid	4.5	18%
		(b) Cube	3	12%
		(c) Cylinder	1	4%
		(d) Cone	2.5	10%
		(e) Sphere	4	16%
Total			25	100%

Table 3.6.2 *Blueprint of weightage of objectives*

Sl.no	Unit	Sub-unit	Domain	Marks	Weightage (in percentage)
1	Tangrams	(a) Introduction to	Knowledge	2	8%
	and	Tangrams	Understanding	0.5	2%
	Designs	(b) Various designs using Tangrams	Skill	2.5	10%

Sl.no	Unit	Sub-unit	Domain	Marks	Weightage (in percentage)
		(c) Designs	Understanding	2	8%
			Application	2	8%
			Skill	1	4%
2	Solids	(a) Cuboid	Knowledge	4	16%
			Understanding	0.5	2%
		(b) Cube	Knowledge	2.5	10%
			Understanding	0.5	2%
		(c) Cylinder	Knowledge	1	4%
		(d) Cone	Knowledge	2	8%
			Understanding	0.5	2%
		(e) Sphere	Knowledge	3.5	14%
			Understanding	0.5	2%
Total				25	100%

Table 3.6.3 *Blueprint of form of questions*

Sl.no	Unit	Form of questions	Marks	Weightage (in percentage)
1	Tangrams	Fill in the blanks	1	4%
	and	Match the following	3.5	14%
	Designs	Complete the following designs	5	20%

Sl.no	Unit	Form of questions	Marks	Weightage (in percentage)
		Find the odd one out	0.5	2%
2	Solids	Name the following	10	40%
		Fill in the blanks	1.5	6%
		Match the following	1.5	6%
		Find the odd one out	2	8%
		Total	25	100%

Table 3.6.4 *Blueprint of level of difficulty*

Sl.no	Unit	Sub-unit	Difficulty Level	Marks	Weightage (in percentage)
1	Tangrams	(a) Introduction to	Easy	2	8%
	and	Tangrams	Moderate	0.5	2%
	Designs	(b) Various designs using	Difficult	2.5	10%
		Tangrams			
		(c) Designs	Moderate	3	12%
			Difficult	2	8%
2	Solids	(a) Cuboid	Easy	4	16%
			Moderate	0.5	2%
		(b) Cube	Easy	2.5	10%
			Moderate	0.5	2%

Sl.no	Unit	Sub-unit	Difficulty Level	Marks	Weightage (in percentage)
		(c) Cylinder	Easy	1	4%
		(d) Cone	Easy	2	8%
			Moderate	0.5	2%
		(e) Sphere	Easy	3.5	14%
			Moderate	0.5	2%
		Total		25	100%

3.5.1.3 Post-test

The post-test was developed following the same stages as the pre-test. However, minor changes were made to the 2 questions in the ‘fill-in-the-blanks with appropriate answers’ section, and to 1 question in the ‘complete the following designs’ section. This was done to further measure the effectiveness of the intervention.

3.5.2 PHASE-II: DEVELOPMENT OF ENGAGEMENT CHECKLIST

The stage-wise procedure involved in the planning and development of the engagement checklist for evaluating the participation of students with hearing impairment studying in STD-4 using AI-assisted Scenario-based Learning is as follows:

Step-1: Analysing the general foundations of student engagement

The theoretical frameworks suggest that there are some foundations for student engagement, namely, psychological, behavioural and psychosocial foundations. These foundations were studied thoroughly for forming the four sub-areas under the area ‘Student engagement’. The weightage allotted to the area ‘Student Engagement’ has been depicted with the help of Table 3.7:

Table 3.7 *Weightage of Area of Student Engagement*

Area	Number of Questions	Weightage
Perspectives of teachers toward the use of AI-assisted SBL	16	100%

Step-2: Forming Sub-areas for the formation of statements

Four sub-areas, namely ‘Behavioural engagement’, ‘Cognitive engagement’, ‘Emotional engagement’ and ‘Social-Interactive Engagement’ were formed, based on the theoretical foundations of student engagement. Equal weightage for each of the four sub-areas was given in order to form the engagement checklist. Hence, each sub-area carried 25% weightage. And each sub-area has 4 statements each, comprising a total of 16 statements. The weightage allotted to the sub-areas along with the number of statements in each of the sub-areas has been depicted in Table 3.8:

Table 3.8 *Sub-areas with weightage and number of statements under the Student Engagement Checklist*

Sl.no	Sub-area	Weightage	Number of Statements
1	Behavioural engagement	25%	4
2	Cognitive engagement	25%	4
3	Emotional engagement	25%	4
4	Social-Interactive engagement	25%	4
Total		100%	16

The following table, Table 3.9, provides a sample of the statements in each sub-area:

Table 3.9 *Sample of Statements in the Student Engagement Checklist*

Sl.no	Sub-area	Statements
1	Behavioural engagement	The student maintains visual attention towards the teacher during the lesson/activity.
2	Cognitive engagement	The student selects appropriate strategies or operations to solve the problem.
3	Emotional engagement	The student shows interest when the scenario is introduced.
4	Social-Interactive Engagement	The student interacts appropriately with peers during group activities.

3.5.3 PHASE-III: DEVELOPMENT OF A RATING SCALE FOR MEASURING TEACHERS' PERSPECTIVES

The following steps were involved in the planning, designing and development of a rating scale for measuring the perspectives of special educators working with SwHI on the use of the AI-SBL Module in teaching mathematics to students with hearing impairment studying in STD-4:

Step-1: Planning the different sub-areas for preparing the rating scale

To effectively measure the perspectives of special educators towards the use of AI-SBL in teaching mathematics to students with hearing impairment studying in STD-4, four sub-areas, namely, 'Instructional Effectiveness', 'Student Engagement & Learning', 'Classroom Implementation' and 'Feasibility and Professional Acceptance' were chosen under the area, 'Perspectives of teachers towards use of AI-assisted Scenario-based Learning for teaching mathematics to children with hearing impairment'.

Step-2: Framing questions under each sub-area

Five statements under each sub-area were formed to measure the perspectives of special educators towards the use of the AI-SBL module in teaching mathematics to students with hearing impairment in STD-4, towards its effectiveness, ability to engage students and aid in learning, usage in the classroom and its overall feasibility, forming 20 statements in total. The weightage allotted for each sub-area was 25%. Each sub-area consisted of four positive statements and one negative statement. This has been depicted with the help of Table 3.10:

Table 3.10 *Sub-areas for measuring Teachers' perspectives with weightage and number of questions*

Sl.no	Sub-area	Weightage (%)	Number of questions
1	Instructional Effectiveness	25%	5
2	Student Engagement & Learning	25%	5
3	Classroom Implementation	25%	5
4	Feasibility and Professional Acceptance	25%	5
Total		100%	20

Step-3: Usage of 5-point rating scale

The rating scale consisted of five indicators, namely, 'Strongly Agree', with 5 points, 'Agree', with 4 points, 'Neutral', with 3 points, 'Disagree', with 2 points and 'Strongly Disagree', with 1 point for positive statements. In case of negative statements, reverse scoring was done with 1 point for 'Strongly Agree', 2 points for 'Agree', 3 points for 'Neutral', 4 points for 'Disagree' and 5 points for 'Strongly Disagree'.

A sample of the rating scale measuring the teachers' perspectives towards AI-SBL has been depicted with the help of Table 3.11:

Table 3.11 *Sample of the rating scale measuring teachers' perspectives towards AI-assisted Scenario-based Learning*

Sl.no	Sub-area	Statement	Strongly Agree(5)	Agree(4)	Neutral(3)	Disagree(2)	Strongly Disagree(1)
1	Instructional Effectiveness	AI-assisted SBL improves students' understanding of mathematical concepts.					
2	Student Engagement & Learning	Students show higher engagement during AI-assisted SBL sessions.					
3	Classroom Implementation	Classroom management remains manageable while using this method.					
4	Feasibility and Professional Acceptance	AI-assisted SBL increases my professional satisfaction.					

3.6 Translation of the AI-assisted Scenario-Based Module, Pre-test, and Post-Test

The AI-assisted Scenario-Based Learning Module, Pre-Test, and Post-test were developed in both English and Kannada, in parallel, by referring to the textbooks available in both languages. The content validity of the same was checked with the help of validators who were experts in the Kannada language.

The translation was as per the WHO guidelines (WHO, 2005&2019), which are as follows:

- (i) Translation into the required language

- (ii) Back-translation into the original language used
- (iii) Comparison of the back-translation with the original
- (iv) Final recommendations for amendments to the tools

3.7 Establishing the validity of tools

Content validity of the AI-assisted Scenario-based Learning Module, researcher-made achievement test, checklist, and rating scale was assessed by 11 experts from the fields of Special Education, Audiology, Speech-Language Pathology, Psychology, Mathematics, and Technology. Most of the expert validators had a positive opinion towards the tools developed, and they also provided their valuable suggestions, the most significant of which were incorporated to make changes in all the tools, to ensure the authenticity and validity of the tools. Table 3.12 depicts the Validation format of the AI-assisted Scenario-based Learning Module given to validators:

Table 3.12 *Validation Format of AI-Assisted Scenario-Based Learning Module*

Sl.No	Parameters	Rate the parameter as						Remarks
		Highly Relevant	Moderately Relevant	Slightly Relevant	Not Relevant			
1	Appropriateness of selected chapters (Tangrams & Solids)							
2	Clarity of objectives							
3	Specific instructional objectives							
4	Relevance of AI integration in activities							
5	Alignment with STD-4 Mathematics curriculum							

Sl.No	Parameters	Rate the parameter as				Remarks
		Highly Relevant	Moderately Relevant	Slightly Relevant	Not Relevant	
6	Suitability for students with hearing impairment					
7	Clarity of instructions					
8	Language simplicity (verbal/manual/visual support)					
9	Age-appropriateness of activities					
10	Logical sequencing of content					
11	Usefulness of visual and AI-based resources					
12	Duration and length of module					
13	Overall impression					

The format given to validators to check the validity of pre-test and post-test is depicted in Table 3.13 as follows:

Table 3.13 *Validation Format of Pre-test and Post-test*

Sl.No	Parameters	Rate the parameter as				Remarks
		Highly Relevant	Moderately Relevant	Slightly Relevant	Not Relevant	
1	Alignment with objectives					
2	Coverage of content areas					
3	Clarity of questions					

Sl.No	Parameters	Rate the parameter as				Remarks
		Highly Relevant	Moderately Relevant	Slightly Relevant	Not Relevant	
4	Language used for the development of items					
5	Appropriateness of difficulty level					
6	Suitability for SwHI					
7	Clarity of scoring procedure					
8	Overall adequacy					

3.8 PILOT TESTING

A pilot test of the pre-test, post-test and AI-assisted Scenario-Based Learning Module was done on the same population of students due to the lack of a larger number of students. The pilot testing gave insights into increasing the size of shapes included in the ‘Find the odd one out’ section of the pre-test and post-test, as some of the students found it to be too small. Also, when a trial run of the AI-assisted Scenario-Based Learning Module was done, the responses from the students indicated that no further revisions were required in the AI-assisted Scenario-Based Learning Module.

3.9 ESTABLISHING THE RELIABILITY OF TOOLS

The reliability of all the tools, including the pre-test, post-test, student engagement checklist, and the rating scale measuring the teachers’ perspectives, was established using Cronbach’s alpha, with the help of which, the internal consistency of each of the tools was checked. The scores obtained while pilot testing were used to calculate Cronbach’s Alpha. In general, when

Cronbach's alpha is applied, the tool is considered to be acceptable and reliable if the value of alpha obtained is higher than 0.7. If the value of Cronbach's alpha is higher than 0.9, then the reliability is considered to be excellent; if it lies between 0.8 and 0.9, then it is considered good, and if it lies between 0.7 and 0.8, then the reliability is considered to be acceptable. The results of the Cronbach's alpha for each of the tools have been depicted in Table 3.14, Table 3.15, Table 3.16, and Table 3.17:

Table 3.14 *Results of Cronbach's alpha for the Pre-test*

Sl.no	Description	Cronbach's alpha
1	Name the following	0.793
2	Fill in the blanks	0.900
3	Complete the following	0.900
4	Match the following	0.967
5	Identify the following	0.755
6	Find the odd one out	0.720

The results of the Cronbach's Alpha used on the pre-test indicated that the tool was reliable, as the values of alpha were greater than 0.7.

Table 3.15 *Results of Cronbach's alpha for the Post-test*

Sl.no	Description	Cronbach's alpha
1	Name the following	0.908
2	Fill in the blanks	0.872
3	Complete the following	0.880
4	Match the following	0.957

Sl.no	Description	Cronbach's alpha
5	Identify the following	0.872
6	Find the odd one out	0.933

The result of the application of Cronbach's alpha on the post-test suggests that the post-test was reliable, as all the values of alpha were greater than 0.8.

Table 3.16 *Results of Cronbach's alpha for the Student Engagement Checklist*

Sl.no	Sub-areas	Cronbach's alpha
1	Behavioural engagement	0.794
2	Cognitive engagement	0.700
3	Emotional engagement	0.825
4	Social-Interactive engagement	0.876

The result of Cronbach's Alpha applied to the Student Engagement Checklist indicates that the Student Engagement Checklist was reliable, as all the values of alpha obtained under each sub-area were either equal to 0.7 or more than 0.7.

Table 3.17 *Results of Cronbach's alpha for the Rating Scale for measuring Teachers' perspectives*

Sl.no	Sub-areas	Cronbach's alpha
1	Instructional Effectiveness	0.794
2	Student Engagement and Learning	0.700
3	Classroom Implementation	0.825
4	Feasibility & Professional Acceptance	0.876

The results of the Cronbach's Alpha used on the Rating Scale measuring teachers' perspectives also recommend that it was reliable, as all the alpha values obtained were greater than or equal to 0.7.

3.10 DATA COLLECTION

3.10.1 Intervention using an AI-assisted Scenario-based Learning module in teaching Mathematics

Stage I: Purposive sampling

Students with hearing impairment studying in STD-4 from 2 different special schools were selected for the study. The sampling technique used was purposive sampling, by selecting a group of 20 students from two special schools, comprising 10 students who were hearing-impaired students studying in STD-4 from one special school for the hearing impaired and 10 students who were also hearing-impaired studying in STD-4 from another special school for the hearing impaired.

Stage II: Administration of pre-test

Both groups were administered the Researcher-Made Pretest to assess their current knowledge levels. The pre-test, which consisted of 25 marks, was administered to students with hearing impairments studying in STD-4 at both special schools. Based on marks scored in the pre-test, 2 groups were formed in each school, namely, Group 1 (Experimental group) and Group 2 (Control group). The student who scored the highest was put into Group-1, the student who scored the 2nd highest score was put into Group-2, the third highest scorer was put into Group-1, the 4th highest scorer was put into Group-2, until the allotment into the groups was complete using the matched pairs assignment, in both schools.

Stage III: Intervention/Treatment

The experiment group was intervened by teaching them two chapters of mathematics, namely, ‘Tangrams and Designs’ and ‘Solids’, using the AI-assisted Scenario-based Learning module. The control group was taught the aforementioned chapters using the traditional method. The mode of communication used for teaching both groups was aural-oral with basic sign language, as both groups consisted of hearing-impaired children with severe to profound hearing loss. The first chapter, ‘Tangrams and Designs’, was split into 3 sub-units and was taught as 3 separate classes, each class comprising 45 minutes each. The second chapter, ‘Solids’, was split into 5 sub-units, which were taught as 5 separate classes of 45 minutes each for each group, with the usage of the AI-SBL Module for the experimental group and by using the traditional method for the control group. A sub-unit test was given at the end of each class.

Stage-IV: Administration of Post-test

On the completion of the intervention of the experiment group using the AI-assisted Scenario-based Learning module, through 8 classes of 45 minutes each, a Researcher made Post-test was administered. The post-test was administered on both the experimental and the control groups. The post-test, which comprised 25 marks, had to be completed by the students within the allotted time of 60 minutes.

3.10.2 Completion of the Researcher-made Student Engagement Checklist

The engagement checklist was completed by the researcher on the basis of the observation of the level of engagement of students in the classroom. The scoring of the checklist involved a binary scale, wherein ‘0’ had to be given for non-engagement and ‘1’ had to be marked for engagement.

3.10.3 Completion of Researcher-made Rating Scale for Measuring Teachers' Perspectives

The rating scale measuring the perspectives of teachers (special educators working with students with hearing impairment) on AI-assisted Scenario-based Learning was given to a total of 13 special educators from both schools, who had observed the classes being conducted using the AI-assisted Scenario-based Learning method. They were oriented about the method in detail and the procedure that they had to follow to complete the rating scale.

3.11 Statistical Treatment

Statistical analysis was done using appropriate statistical methods. Tests of normality, paired t-test, and independent t-test were conducted for test scores of both the experimental and control groups, to check the normality of the groups, study them and compare them respectively. Descriptive statistics were used to analyse the data of the teachers' perspectives towards the use of the AI-assisted Scenario-based Learning module in teaching mathematics to students with hearing impairment studying in STD-4.

CHAPTER-IV

RESULTS AND DISCUSSION

The statistical analysis and interpretation are the most imperative segment of any research study, as they provide an in-depth exploration of the study's analysis and outcomes. The current chapter provides details of the various statistical analysis methods used in the study, its results, and the related discussion.

The Shapiro-Wilk Test, which is used to test the normality of a dataset, was used to test the normality of the scores of both the experimental and control groups, as the sample size was less than 50.

To study the performance of a group of students with hearing impairment studying in STD-4 in mathematics when using the AI-assisted Scenario-based Learning Module, and the performance of a similar group using the traditional teaching method, a paired t-test was conducted to perform the within-group analysis. Paired t-test, being a parametric test, was chosen since the same is considered to be suitable for a moderately sized, normally distributed dataset.

To draw a comparison between the performance of the experimental group and the control group, a between-group analysis, with the help of an independent t-test, was performed. An independent t-test, which is also a parametric test, was selected since it is suitable for a moderately sized, normally distributed dataset.

To study the engagement levels of SwHI in STD-4, with respect to the use of the AI-SBL Module in the subject of mathematics, a description of the engagement levels of students when taught using the AI-assisted Scenario-based Learning Module was inscribed based on the observations in the student engagement checklist.

The study of the teachers' perspectives towards the use of the AI-assisted Scenario-based Learning Module in teaching mathematics involved the usage of descriptive statistics.

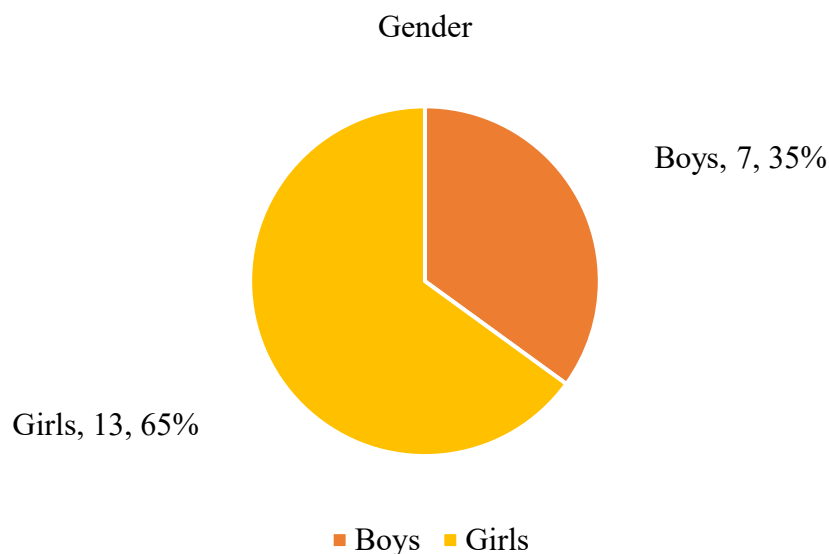
In this chapter, the demographic details about the participants of the study have been discussed initially, followed by the details about the various statistical techniques and methods that have been employed to study the four main objectives of the study, its results and related discussion. It included (i) a study of the effectiveness of AI-assisted Scenario-based Learning Module in teaching mathematics to students with hearing impairment studying in STD-4; (ii) a comparison between the effectiveness of AI-assisted Scenario-based Learning and traditional teaching methods; (iii) a study of the engagement levels of students in STD-4 with hearing impairment in classroom when they were taught mathematics using the AI-assisted Scenario-based Learning Module and (iv) the perspectives of teachers towards the usage of this method, with respect to its effectiveness and feasibility.

4.1 DEMOGRAPHIC DETAILS OF THE PARTICIPANTS

The demographic details of the participants of a study are not only a mandatory section of a research study, but the foundation that provides meaning to the data. The demographic details of the participants have been depicted in the form of diagrams and charts to provide a quick, comprehensive understanding of their characteristics.

4.1.1 Students with hearing impairment studying in STD-4

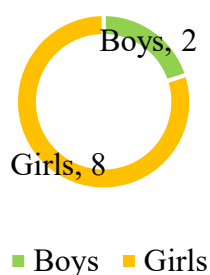
The gender of SwHI studying in STD-4 has been discussed with the help of Figure 4.1, Figure 4.2 & Figure 4.3, which have been depicted as follows:

Figure 4.1 *Gender of the SwHI in STD-4*

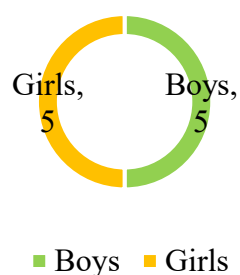
From the above Figure 4.1, it is clear that out of a total of 20 students with hearing impairment, studying in STD-4, 13 students were girls, constituting 65% of the total students, and seven of them were boys, forming the remaining 35% of the total students with hearing impairment

Figure 4.2 *Gender of SwHI in the experimental group*

Gender (Experimental Group)

**Figure 4.3** *Gender of SwHI in the control group*

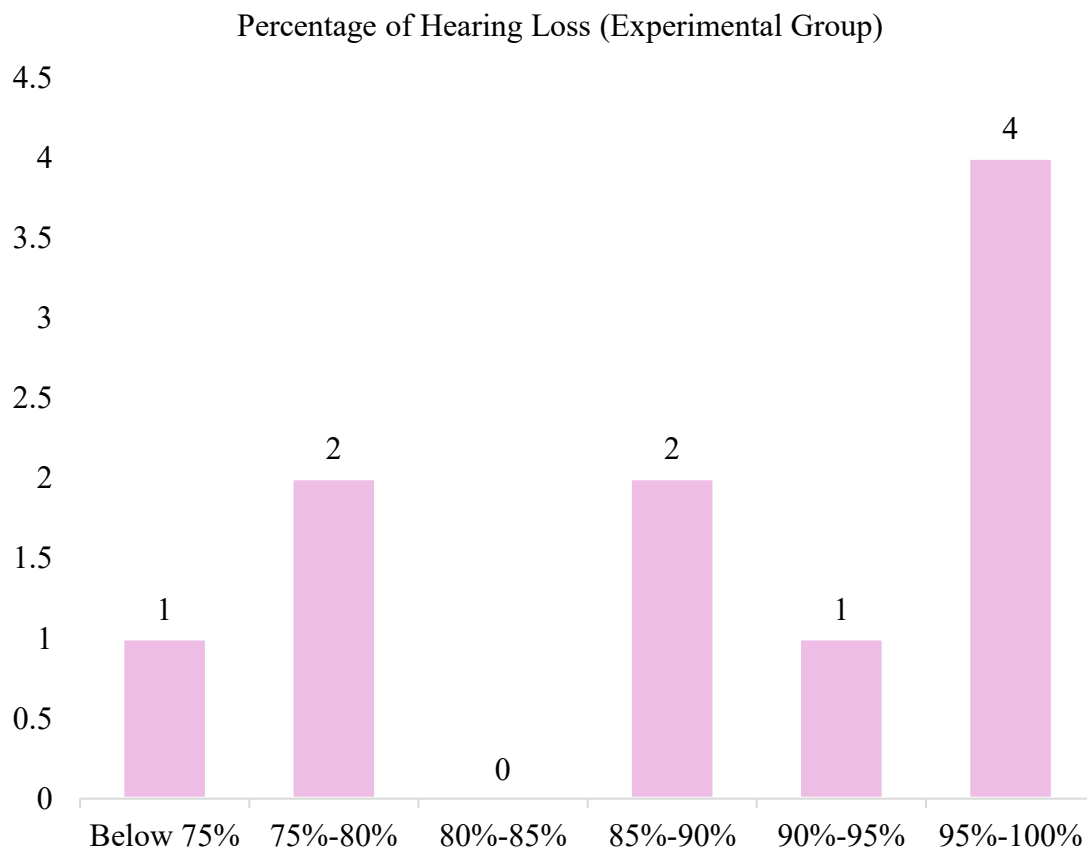
Gender (Control Group)



As Figure 4.2 suggests, the experimental group was a combination of eight girls, constituting 80% of the total experimental group and two boys, constituting 20% of the experimental group. Figure 4.3 suggests that the control group comprised five girls and five boys, constituting 50%

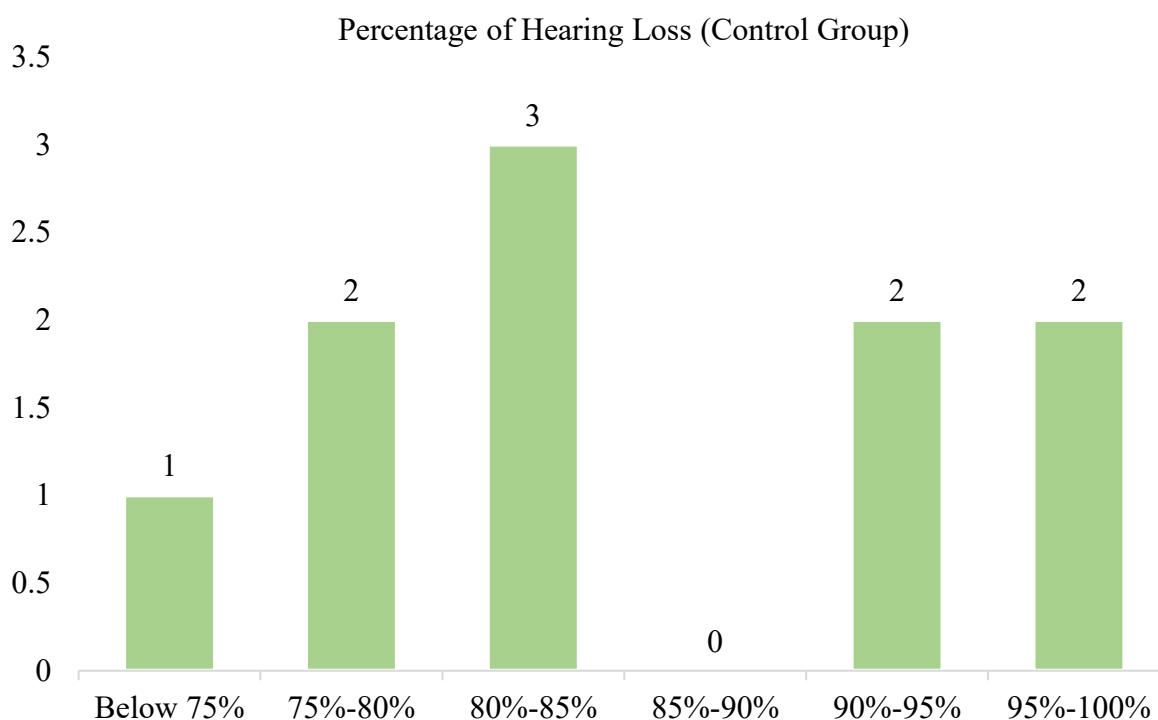
each of the total of 10 students in the control group. The matched pairs assignment technique of forming the experimental and control groups was followed to suit a pre-test post-test non-equivalent groups design. The details of the percentage of hearing loss among students in STD-4 with hearing impairment have been discussed with the help of Figures 4.4 and 4.5:

Figure 4.4 *Percentage of Hearing Loss among SwHI in the experimental group*



The aforementioned figure, Figure 4.4, provides a bird's-eye view of the percentage of hearing loss of the students in the experimental group. There was one student whose percentage of hearing loss was below 75%. There were two students whose percentage of hearing loss fell within the range of 75%-80%. There were no students whose percentage of hearing loss fell within the range of 80%-85%. Within the range of 85%-90% hearing loss, there were two students. Within the range of 90%-95% and 95%-100%, there were one and four students, respectively.

Figure 4.5 *Percentage of Hearing Loss among SwHI in the Control Group*

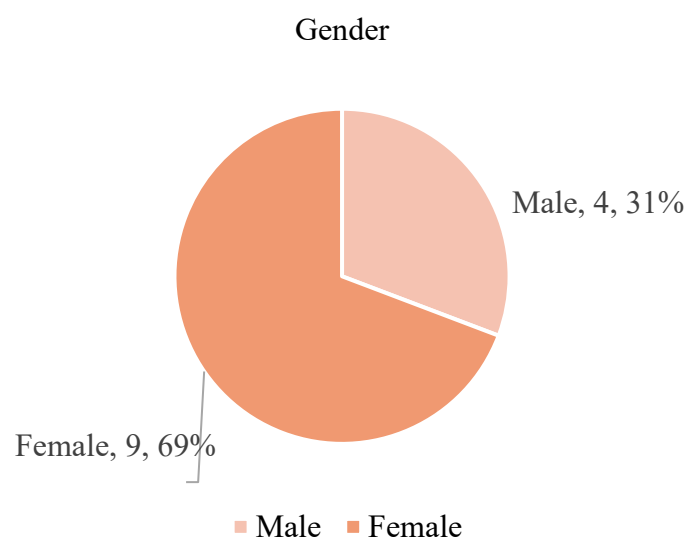


The aforementioned graphical representation, in Figure 4.5, which depicts data relating to the percentage of hearing loss of students of the control group, sheds light on the characteristics of hearing loss of these students. There was one student whose percentage of hearing loss was below 75%. There were two students whose percentage of hearing loss fell within the range of 75%-80%. There were three students whose percentage of hearing loss fell within the range of 80%-85%. Within the range of 85%-90% hearing loss, there were no students. Within the range of 90%-95% and 95%-100%, there were two students each. The information relating to the percentage of hearing loss of the students was taken from the UDID cards of the students. The demographic details of the teachers have been provided in the next sub-section.

4.1.2 Demographic details of the teachers (special educators) who work with students with hearing impairment

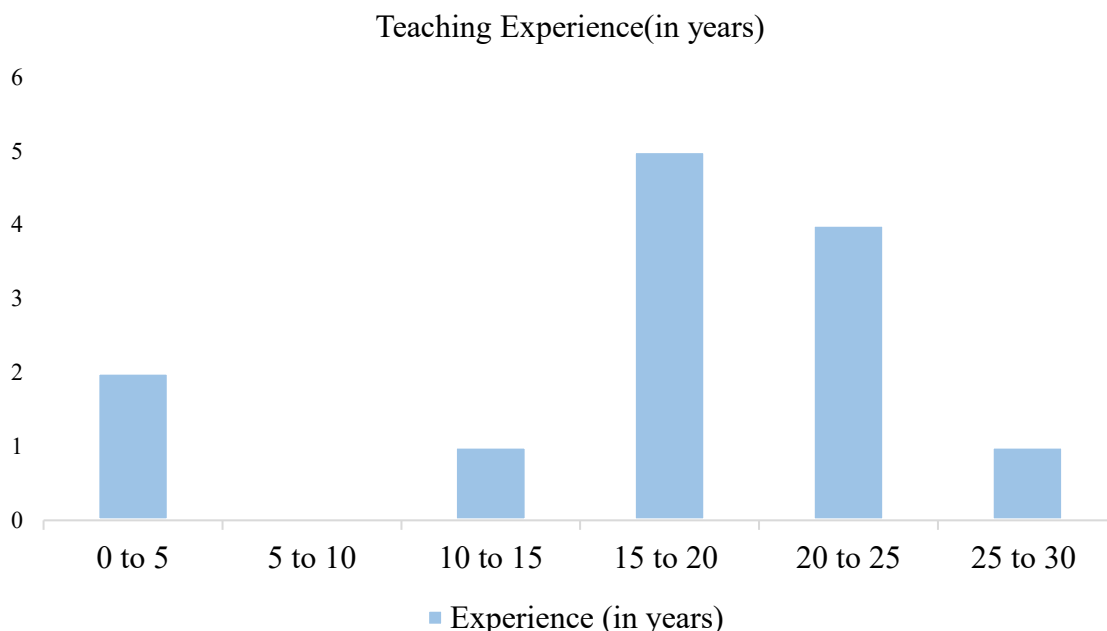
The demographic details of the teachers (special educators) who work with students with hearing impairment, such as their gender and teaching experience, have been depicted with the help of the following figures. The details about the gender of the special educators have been depicted with the help of Figure 4.6:

Figure 4.6 *Gender of Special Educators working with SwHI*



Out of the total 13 special educators working with SwHI selected for the study, Figure 4.6 shows that four of them were males, forming 31%, and the remaining nine of them were females, constituting the majority of 69%. The details of the teaching experience of special educators working with SwHI have been represented through Figure 4.7:

Figure 4.7 *Teaching Experience of Special Educators working with SwHI*



The above chart, depicted in Figure 4.7, explains the teaching experience (in years) of special educators teaching students with hearing impairment. Special educators with less than five years of experience included two of them, and there were no special educators with five to ten years of experience. There were five special educators with 15-20 years of experience. There were four special educators with experience between 20 and 25 years, and there was one special educator with experience between 25 and 30 years of teaching experience.

4.2 OBJECTIVE-1: To study the performance in mathematics of a group of students with hearing impairment studying in STD-4 using the AI-assisted Scenario-based Learning Module against a control group using traditional teaching.

The first objective of the current research study was to study the performance in mathematics of a group of SwHI, studying in STD-4, using the AI-assisted Scenario-based Learning Module, against a control group using the traditional teaching method, and its related

research question was “How is the mathematical performance of students with hearing impairment of STD-4, taught through an AI-assisted Scenario-Based Learning platform and traditional teaching method?”. To find the answer to the first research objective and its related research question, the normality tests were done, followed by descriptive statistical analysis and the use of a paired t-test. Normality tests are usually performed to assess whether a dataset is normally distributed.

The Shapiro-Wilk Test is usually used where the sample size is less than 50 ($n < 50$). Hence, for testing the normality of the current dataset, the Shapiro-Wilk Test was used since the sample size was 10 ($n = 10$) for each of the experimental and the control groups.

Table 4.1 *Test of Normality on the test scores of the experimental and control groups*

Description	Group	Shapiro-Wilk		
		Statistic	df	Sig.(p-value)
Pre-test	Experiment Group	0.971	10	0.900
	Control Group	0.926	10	0.406
Post-test	Experiment Group	0.967	10	0.861
	Control Group	0.982	10	0.973

By observing the above Table 4.1, we can find that the significant difference(p-value) of the pre-test scores of the experimental group was 0.900. Here, Sig. (p-value), $0.900 > 0.05$ denotes that the pre-test scores of the experimental group were normally distributed. Sig. (p-value) of the pre-test scores of the control group was 0.406 ($p\text{-value} = 0.406$). Since $0.406 > 0.05$, we can say that the pre-test scores of the control group were also normally distributed. Also, Sig. (p-value) of the post-test scores of the experimental and control groups were 0.861 and 0.973, respectively, both of which were greater than 0.05, which supported the fact that the

post-test scores of the experimental and control groups were normally distributed. The significant values obtained for the experimental and the control groups in both pre-test and post-test were greater than 0.05, which clearly indicates that the data were normally distributed. Since the assumption of normality was satisfied, parametric tests were chosen for further statistical analysis.

The requirement for a separate study of the effectiveness of the teaching methods of both the experimental and control groups made way for the use of the Paired t-test to do the within-group analysis. Before performing the Paired t-test, to study the characteristics of the data, descriptive statistical measures such as the mean, median, standard deviation and interquartile range were calculated.

Table 4.2 *Pre-test and Post-test scores of the experimental and control groups*

Description	Group							Interquartile
		Mean	Median	SD	Minimum	Maximum	Range	
Pre-test	Experiment Group	17.28	17.13	2.18	13.50	20.50	3.38	
	Control Group	15.75	15.00	3.49	8.75	20.25	4.75	
Post-test	Experiment Group	20.10	20.50	3.11	14.25	24.50	4.81	
	Control Group	17.13	16.63	4.32	10.50	24.50	6.63	

Table 4.2 provides details about the mean score of the pre-test in the experimental group, which

was 17.28, and the median score, which was 17.13, the proximity of which indicated that the data were approximately symmetrical and free from extreme skewness. The mean score of the pre-test in the control group was 15.75, with the median score of 15.00, which were also very proximate to each other, indicating the approximate symmetrical nature of the data and absence of extreme skewness.

The median scores of the post-test in the experimental and control groups were 20.50 and 16.63, respectively, which were very close to their respective mean scores, which were 20.10 and 17.13, respectively, which further indicated the approximate symmetry in distribution of scores.

In the post-test, the experimental group showed an improvement, with a mean score of 20.10 compared to the pre-test mean of 17.28. There was an improvement in the post-test mean score of 17.13 from the pre-test mean score of 15.75 in the control group. Hence, we can say that there was an improvement in the post-test mean scores compared to the pre-test mean scores in both the experimental and control groups. Further, the increase in mean score was greater in the experimental group, when compared to that of the control group, indicating better improvement in the experimental group after intervention.

When we take a look at the standard deviations in the pre-test scores of the experimental and control groups, the standard deviation of the experimental group, which was 2.18, was lower than that of the control group, which was 3.49, indicating a greater consistency in the scores of the experimental group when compared to the control group. The standard deviation of the post-test scores of the experimental and control groups revealed greater variability in the scores of the control group when compared to the experimental group, since the standard deviation of the experimental group was 3.11, which was lower than that of the control group, which was 4.32.

The interquartile range of the pre-test scores in the experimental group, which was 3.38, was slightly lower than that of the control group, which was 4.75, indicating a comparatively greater dispersion of scores among the control group pre-test scores. Similarly, the interquartile range of the post-test scores of the experimental group, being 4.81, was lower than that of the control group, which amounted to 6.63, which further indicated a comparatively greater dispersion in the control group post-test scores.

The increase in mean score was greater in the experimental group when compared to the control group, indicating an improvement in the mathematical performance among the SWHI, who were intervened using the AI-assisted Scenario-based Learning. Also, the value of standard deviation indicated a greater consistency in the pre-test and post-test scores of the experimental group. The interquartile range of the pre-test and post-test scores of the experimental group further indicated lesser dispersion among the test scores. This shows the positive impact of AI-assisted Scenario-based Learning on the mathematical performance of SWHI, studying at the preparatory level of STD-4. It also suggests that AI-assisted Scenario-based Learning, through the integration of AI-generated vibrant images and fascinating scenarios, yields better academic outcomes.

A paired t-test was performed to do the within-group analysis. Paired t-test, being a parametric test, was selected since the data were normally distributed and the size of the sample was moderate. The paired samples statistics for the test scores of the experimental group are shown in Table 4.3:

Table 4.3 *Paired Samples Statistics for test scores of the experimental group*

Description		Mean	N	SD	Std. Error Mean
Pair-1	Pre-test	17.28	10	2.18	0.69
	Post-test	20.10	10	3.11	0.98

Table 4.3 shows the increase in the mean score from 17.28 in the pre-test to 20.10 in the post-test in the experimental group, indicating an improvement in the performance of the students after intervention. However, the slight increase in the standard deviation of the post-test scores of 3.11 from that of the pre-test of 2.18 indicated a somewhat greater variability in post-test scores. Table 4.4 below shows the paired samples correlations of the test scores of the experimental Group:

Table 4.4 *Paired Samples Correlations of the test scores of the experimental Group*

Description		N	Correlation	Sig.
Pair-1	Pre-test & Post-test	10	0.721	0.019

In Table 4.4, the correlation coefficient, $r = 0.721$, indicated a strong positive relationship between pre-test and post-test scores. Also, since $p=0.019<0.05$, the relationship between the pre-test and post-test scores was statistically significant, which meant that the students who scored higher in the pre-test tended to score higher in the post-test as well. Table 4.5 below shows the result of the paired samples test for the test scores of the experimental group:

Table 4.5 *Paired Samples Test for the test scores of the experimental Group*

Description		t	df	Sig. (2-tailed)
Pair-1	Pretest – Post test	-4.141	9	0.003

Table 4.5 indicates that since $p=0.003<0.05$, the difference between the pre-test and post-test scores of the experimental group was statistically significant, which indicated that the intervention had a significant impact on improving the performance of the students. The negative t-value indicates that the post-test scores were higher than the pre-test scores.

The paired t-test performed on the experimental group suggests that the mathematical performance of SwHI in the experimental group, who were taught mathematics through the AI-SBL Module, had a significant improvement. This reflects the effectiveness of AI-assisted Scenario-based Learning in improving the mathematical abilities among SwHI, through its narrative and sequential nature, enhancing motivation among students. The paired samples statistics for the test scores of the control group have been depicted with the help of Table 4.6:

Table 4.6 *Paired Samples Statistics for the test scores of the control group*

Description		Mean	N	SD	Std. Error Mean
Pair-1	Pre test	15.75	10	3.49	1.11
	Post test	17.13	10	4.32	1.37

Table 4.6 depicts that there was a slight improvement in the mean scores in the post-test, which was 17.13, when compared to that of the pre-test, which was 15.75, indicating improvement in scores. However, the increase was not as much as in the experimental group. The correlation between the pre-test and post-test scores was established with the help of paired samples correlation, which has been represented through Table 4.7:

Table 4.7 *Paired Samples Correlations of the test scores of the control Group*

	Description	N	Correlation	Sig.
Pair 1	Pre-test & Post-test	10	-0.129	0.722

The above Table 4.7 depicts the paired samples correlations of the test scores of the control group, wherein the correlation coefficient, $r = -0.129$, was weak and negative, which indicated that the correlation was not significant, confirming that there was no meaningful relationship existing between the pre-test and post-test scores. A comparison between the pre-test and post-test scores was done using the paired samples test, which has been tabulated in Table 4.8:

Table 4.8 *Paired Samples Test for the test scores of the control Group*

	Description	t	df	Sig. (2-tailed)
Pair 1	Pretest – Post test	-0.737	9	0.480

The results of the paired samples test for the test scores of the control group have been shown in Table 4.8, where $p=0.480>0.05$, indicating that there was no significant difference between the pre-test and post-test scores of the control group, which suggests that the students of the control group did not show any improvement. Though there was a slight improvement in the mean test scores of the control group, it was not as much as the improvement seen in the experimental group. Also, there exists no meaningful relationship between the pre-test and post-test scores of the control group, and there was no significant difference between them, which indicated that there was no improvement in the control group, who were taught mathematics using the traditional method of teaching.

Overall, the findings suggest that the intervention provided to the experimental group was effective enough to improve the performance of the students in the experimental group, whereas there was no significant improvement in the performance of the students in the control group. This indicates that the AI-assisted Scenario-based Learning was comparatively more effective in imparting mathematical knowledge through its varied approach involving student-centric and experiential learning.

4.3 OBJECTIVE-2: To compare the performance in mathematics of a group of students with hearing impairment studying in STD-4, using the AI-assisted Scenario-Based Learning Module against a control group using traditional teaching.

To find out the result of the second research objective which was to compare the performance of the students with hearing impairment studying in STD-4 who were taught mathematics using AI-assisted Scenario-based Learning Module and those using the traditional method, to answer the first research question, which was to describe the performance of SwHI of STD-4, who were taught mathematics using the AI-assisted Scenario-based Module and those taught using the traditional method, and to test the Research Hypothesis “There exists a significant difference in mathematical performance between STD-4 students with hearing impairment taught through AI-assisted Scenario-Based Learning and traditional methods”, an independent t-test was chosen since it was a parametric test, the data were normally distributed, and the sample size was moderate. The following table, Table 4.9, provides the result of the Independent t-test done for comparing the performance of the experimental and the control groups:

Table 4.9 *Independent Samples Test for the test scores of the experimental and control Groups*

Description	t-test for Equality of Means		
	t	df	Sig. (2-tailed)
Pre test	1.169	18	0.257
Post test	1.767	18	0.094

Table 4.9 shows that when the pre-test scores of the experimental and control groups were compared, the significant value, $p=0.257>0.05$, indicated that there was no significant difference between the two groups in pre-test scores. This proves that both groups were approximately equal before the intervention, which was a good prerequisite for the intervention. When a comparison was drawn between the post-test scores of the experimental and control groups, there was no statistically significant difference between the post-test scores since $p=0.094>0.05$. However, since $p=0.094$ is closer to 0.05, we can say that there was a trend towards improvement, though there was no significant statistical difference.

To summarise the result of the first two research objectives and the first research question, we can say that there was an improvement in the mathematical performance of students with hearing impairment studying in STD-4, taught through the AI-assisted Scenario-based Learning Module as well as the traditional method. But the improvement in the students with hearing impairment taught employing the AI-assisted Scenario-based Learning Module was slightly higher than that using the traditional method. However, the improvement in performance due to the usage of the AI-assisted Scenario-based Learning method, when compared to the traditional method, was not significant, though the former method indicated a trend towards improvement in mathematical skills.

The above result leads to the rejection of the alternate research hypothesis, “There exists a significant difference in mathematics performance between students studying in STD-4 with hearing impairment taught through AI-assisted Scenario-based Learning and traditional methods.” Various barriers, such as a lack of adequate technological amenities at the local special schools for the hearing impaired, and probable communication between the SwHI in the experimental and control groups, must have led to the dissemination of the information about the concepts taught using the scenarios under the AI-assisted Scenario-based Learning Module, which must have had a significant impact on the test scores obtained by both groups.

In addition, the data collection period was very close to the final exams of the school, due to which the students may not have paid the required attention that they would have otherwise paid, due to anxiety related to exam preparation. These factors bear an impact on the overall test scores obtained by both groups, which eventually led to the rejection of the alternative hypothesis. It is also important to note that test scores alone cannot be considered as the sole criterion for assessing the effectiveness of a pedagogical approach

4.4 OBJECTIVE-3: To study the engagement levels of students with hearing impairment in STD-4 with respect to the use of AI-assisted Scenario-based Learning in the subject of mathematics.

The third research objective was to study the engagement levels of students with hearing impairment in STD-4 with respect to the use of AI-assisted Scenario-based learning in the subject of mathematics, with the related research question “To what extent are students with hearing impairment in STD-4 engaged while using Scenario-Based Learning in mathematics?”

The student engagement checklist was designed to measure the behavioural engagement, cognitive engagement, emotional engagement and the social-interactive engagement of the students with hearing impairment studying in STD-4, when they were taught

mathematics using the AI-assisted Scenario-based Learning Module. All students who were intervened using the AI-assisted Scenario-based Learning were found to pay visual attention towards the teacher and actively participated in the assigned scenario-based mathematics task. Most of them also followed the given visual or signed instructions properly and completed the assigned mathematical tasks within the given time, indicating a high level of attention in the behavioural engagement aspect. There was a high positive level of engagement shown by students who were intervened using AI SBL, in the cognitive engagement aspect, as all the students could connect the lessons being taught to them using the AI-assisted Scenario-based Learning Module, a vast majority of them could solve the mathematical problems independently and most of them could use appropriate strategies for solving the mathematical problems and justify their answers.

A similar considerable level of engagement was showcased by the students emotionally, as all the students, without the exception of even a single student, showed interest when the AI-assisted Scenario-based Learning Module was used in the classroom, were commensurately motivated and showed satisfaction upon completing the tasks assigned. The considerably high level of engagement could be observed in the social-interactive aspect, as most of the students interacted appropriately with their peers and positively responded to the feedback given by the teacher when the AI-assisted Scenario-based Learning was used in the classroom. Also, the majority of the students made efforts to clarify their doubts in the classroom. In addition to this, about half of the students also contributed their own ideas during group discussions during the teaching-learning process.

It was also observed that the students who were taught mathematics using the traditional method of teaching showed lower levels of behavioural engagement, cognitive engagement,

emotional engagement and social-interactive engagement when compared to those who were taught using the AI-assisted Scenario-based Learning Module.

4.5 OBJECTIVE-4: To study teachers' perspectives towards the use of AI-assisted Scenario-based Learning in mathematics.

The final objective of the current research study was to study the teachers' perspectives towards the use of AI-assisted Scenario-based Learning in mathematics, with the related research question being “What are teachers' perceptions toward using AI-assisted Scenario-based Learning in mathematics?”

To find out teachers' perceptions towards the use of AI-assisted Scenario-based Learning Module in teaching mathematics to students with hearing impairment studying in STD-4, descriptive statistics was used as it was considered to best describe the characteristics of the data depicting teachers' perspectives. The following table, Table 4.10, depicts the descriptive statistics of Teachers' Perspectives:

Table 4.10 *Descriptive Statistics of Teachers' Perspectives*

Description	N	Minimum	Maximum	Mean	Std. Deviation
Total Score assigned to each teacher	13	63.00	98.00	78.46	8.86

The descriptive statistics presented through Table 4.10 revealed that the average mean score of the teachers was 78.46 out of a total score of 100. The standard deviation of 8.86 indicated a moderate variability among teachers' scores. The score range of teachers ranged from a minimum score of 63 to a maximum score of 98. When expressed in percentage, the score range of teachers ranged from 63% to 98%. To categorise the perspectives of teachers on the AI-assisted Scenario-based Learning in teaching mathematics to students with hearing

impairment studying in STD-4, the total score of 100 was split into 3 categories, namely ‘Minimum score’ ranging from 0-33, ‘Moderate Score’ ranging from 34-66 and ‘High score’ ranging from 67-100. When the teachers were categorised on the basis of the aforementioned criteria, it was found that there were no teachers in the ‘Minimum score’ range; there was one teacher in the ‘Moderate score’ range, and there were 12 teachers in the ‘High score’ range. After categorising the teachers, descriptive statistics were applied, and the analysis was done based on the same. Table 4.11 shows the descriptive statistics of Teachers’ perspectives in the Moderate Score category:

Table 4.11 *Descriptive Statistics of Teachers’ perspectives in the Moderate Score category*

Description	N	Minimum	Maximum	Mean	SD
Total Score assigned to each teacher	1	63.00	63.00	63.00	0

Since there was only one observation in the moderate score category, the mean score amounts to 63, which is the same as the minimum and maximum score. Also, standard deviation cannot be computed for a single score and hence it amounts to 0. Table 4.12 highlights the descriptive statistics of the teachers’ perspectives in the High Score category:

Table 4.12 *Descriptive Statistics of Teachers’ perspectives in the High Score category*

Description	N	Minimum	Maximum	Mean	SD
Total Score assigned to each teacher	12	70.00	98.00	79.75	7.88

Table 4.12 shows that the mean score of the teachers of the ‘High Score Category’ was 79.75, with a moderate standard deviation of 7.88. The scores ranged from 70 to 98.

The above tables reveal that most of the teachers belonged to the High score category (n=12), while only one teacher belonged to the Moderate Score Category. Thus, we can say that a majority of special educators have a positive perspective towards the use of an AI-assisted

Scenario-based Learning Module in teaching mathematics to students with hearing impairment, studying in STD-4.

To summarise the aforementioned results, we can say that though there was no significant difference between the mathematical performance of the students of the experimental and the control groups, there was a clear indication of the possibility of improvement in mathematical performance in the students with hearing impairment who were taught using the AI-assisted Scenario-based Learning Module. Also, the increased engagement levels among those who were taught mathematics using the AI-assisted Scenario-based Learning Module make way for a possible reduction in math anxiety among students.

The optimistic approach of the teachers with varied pedagogical expertise and varied levels of teaching experience, with the majority of them having over 15 years of teaching experience in the field of special education, indicates not only the acceptance of this method as being effective, but also their readiness in taking up steps towards being educationally and technologically advanced in implementing this method in their classrooms.

CHAPTER V

SUMMARY AND CONCLUSION

The conclusion of a research study provides valuable insights into the important findings of the study, its implications and prospects of the study. Though a conclusion may seem like an ending, it necessarily isn't, as it offers revelations into the neatly woven sequence of research findings and provides prospects for future research.

5.1 SUMMARY OF THE STUDY

The current study involved a blend of an emerging teaching method, Scenario-based Learning, which amalgamates real-life scenarios with learning, Artificial Intelligence, a nascent technological evolution in the field of special education, and mathematics, a subject that is often presumed to be difficult and intimidating for a majority of the student population around the globe.

Scenario-based learning, which is rooted in situated learning, uses scenarios that arise on a day-to-day basis and integrates them with theoretical knowledge so that students don't find knowledge far-fetched and can easily connect knowledge to their real life, making them ready to meet the needs of the 21st century. Artificial Intelligence, an emerging technological innovation, has made tremendous breakthroughs in the field of special education. Blending the concept of Scenario-based Learning with Artificial Intelligence to teach an abstract subject like mathematics to students with hearing impairment was a novel, unexplored area of research in the field of special education.

Review of literature provided insights into the general learning needs and styles of students with hearing impairment, the way they acquire mathematical knowledge, a deep dive into the theoretical and conceptual framework of mathematical learning, Scenario-based Learning and its suitability towards fostering inclusive education, the role of artificial

intelligence in the current educational trends, engagement levels of students with hearing impairment, and the aspects to be considered while assessing the perspectives of teachers towards a nascent, emergent pedagogical approach.

The AI-assisted Scenario-based Learning Module was developed by considering the various learning needs and styles of students with hearing impairment, manoeuvring the different possibilities of Scenario-based learning blended with vivid AI-generated images and merging it with mathematical concepts. A pre-test and post-test were developed on the basis of the chosen mathematical concepts, in line with the objectives of the study. The student engagement checklist and the rating scale measuring the teachers' perspectives were also developed to check the overall suitability of the AI-assisted Scenario-based Learning in teaching mathematics to students with hearing impairment studying in STD-4.

The validity and suitability of the tools were checked with the help of validators having expertise in the field of special education, child pedagogy, mathematics, technology, audiology, speech language pathology and psychology. The reliability of the tools was established using Cronbach's Alpha, which showed commensurate reliability for the tools.

The data collection began with sampling, grouping, intervention, and measuring the results of the intervention. It concluded with the filling out of the student engagement checklist by the researcher and collecting the teachers' views on the AI-assisted Scenario-based Learning in teaching mathematics to STD-4 students with hearing impairment, through the rating scale measuring the teachers' perspectives.

The data obtained through the intervention, from the checklist and rating scale, were analysed using suitable statistical techniques and methods, which included descriptive statistical methods such as mean, median, standard deviation and interquartile deviation and inferential statistical measures such as the independent t-test and the paired t-test.

5.2 MAJOR FINDINGS OF THE STUDY

The results of the statistical findings suggested that though there was a slight improvement in the test scores of post-test, when compared to the pre-test of the students who were taught mathematics using the traditional method, it was not as much as those who were taught the same using the AI-assisted Scenario-based Learning method. So, we can say that the improvement in mathematical performance of students with hearing impairment, who were taught using the AI-assisted Scenario-based Learning Module, is slightly greater than that using the traditional method. Also, since there was no meaningful relationship existing between the pre-test and post-test scores of those on whom the traditional method was used to teach mathematics, we can say that there was no improvement in the performance of those who were taught mathematics using the traditional method.

The comparison between the mathematical performance of students with hearing impairment studying in STD-4, who were intervened using the AI-assisted Scenario-based Learning Module and the traditional method, provided interesting insights into the effectiveness of each of the pedagogical methods. There was no significant difference between the two methods. However, it was important to note that there was a trend towards improvement in mathematical performance among the students when the method of AI-assisted Scenario-based Learning was used to teach mathematical concepts.

The observations, recorded using the student engagement checklist, provided clarity on students' engagement levels. It showed that students with hearing impairments in STD-4 who were taught mathematics using AI-assisted Scenario-based Learning exhibited higher engagement in the behavioural, cognitive, emotional, and social-interactive areas, compared to those who were taught the same mathematical concepts using the traditional method.

The scores obtained on the rating scale measuring teachers' perspectives towards the use of AI-assisted Scenario-based Learning Module indicated that a majority of the teachers working with students with hearing impairment had a positive perspective towards the use of AI-assisted Scenario-based Learning Module in teaching mathematical concepts to children with hearing impairment. When the scores were further categorised, no one gave a minimum score, while only one teacher gave a moderate score, and all the others' scores were high. This indicates that the novel method of AI-assisted Scenario-based Learning was not only considered effective but the teachers also showed their readiness in its implementation.

The crux of the current research study was to study the effectiveness of the AI-assisted Scenario-based Learning in teaching Mathematics to students with hearing impairment, studying in STD-4. There was an improvement in the performance in mathematics among those students who were intervened using the AI-assisted Scenario-based Learning. But it was not significantly different from those who were taught using the traditional method. However, it was noteworthy that there was a trend for improvement among those who were taught using the AI-assisted Scenario-based Learning.

Also, there was better behavioural, cognitive, emotional, and social-interactive engagement among students taught the selected mathematical concepts using AI-assisted Scenario-based Learning, compared with students taught the same concepts using the traditional method. The special educators working with students with hearing impairments showed an overall positive perspective on the feasibility and acceptance of AI-assisted Scenario-based Learning in teaching mathematics to STD-4 students with hearing impairment.

5.3 IMPLICATIONS AND RECOMMENDATIONS OF THE STUDY

AI-assisted Scenario-based Learning, which serves as a cognitive bridge, bridging the gap between abstract mathematical concepts and real-world scenarios for hearing-impaired

students at the preparatory level, aids in reshaping the subject of mathematics into a more tangible one. In addition, the rich, explicit, resplendent images generated with the help of Artificial Intelligence also support visual learning among hearing-impaired students.

The AI-assisted Scenario-based Learning contributed to better behavioural, cognitive, emotional and social-interactive engagement among students, when compared to the traditional method. Since high engagement is a positive predictor of long-term retention, there is an implication that educational success should not completely depend on scores of test performance. **Educators should thus take steps to incorporate scenario-based learning in their classrooms to foster a better inclusive learning environment.**

The positive perspective of teachers towards this method indicates their acceptance towards the effectiveness of this method and also their readiness to adopt emergent innovative methods. This also creates a need for structured professional development, which requires the school administrators to provide training to special educators to successfully transition from traditional teaching methods to emergent, innovative and effective teaching methods such as the AI-assisted Scenario-based Learning method, by making them digitally literate, technologically driven.

This method also proves to be an impetus to curriculum designers to come up with educational materials that are in line with the UDL principles, making way for equitable and inclusive learning.

In addition to this, Educational policies should spur and fund research and development of cutting-edge teaching methods and technologies in the field of special education and also encourage and support the implementation of such educational cum technological breakthroughs.

5.4 LIMITATIONS OF THE STUDY

- i. The study was limited only to a small sample size of hearing-impaired students studying in STD-4.
- ii. The standardisation of the tool could not be done, limiting it only to validity and reliability.
- iii. Mathematical concepts that carried higher relevance could not be selected due to the non-coincidence of those chapters with the expected data collection period.
- iv. Sophisticated AI tools were not included in the module due to time constraints, and also due to practical and technological non-feasibility.

5.5 DELIMITATIONS OF THE STUDY

- i. The study was strictly delimited to students with hearing impairment studying in STD-4(preparatory level) only.
- ii. The study was confined to only two local special schools for the deaf.
- iii. The intervention was exclusively restricted to the subject of mathematics only.
- iv. The intervention was delimited to a specific time-frame for data collection.
- v. The technological aspect of this teaching method was restricted to generating vivid visuals only, and not incorporating other aspects of Artificial Intelligence.

5.6 SUGGESTIONS FOR FUTURE RESEARCH STUDIES

- The effectiveness of the method in mathematics can be tested in the foundational, middle and secondary levels, as the current study was restricted to the preparatory level only.
- The study can be conducted to find out its effectiveness across other disability groups, such as Intellectual Disability, Autism Spectrum Disorder, Specific Learning Disability, etc.

- This method can also be applied in other disciplines like science, social science, language learning, life skills, soft skills and others.
- Other sophisticated AI tools can be used along with Scenario-based Learning.
- The study may be conducted on a larger population.

5.7 CONCLUSION

Conclusion has been defined as the structural space where a researcher must pull all the separate parts of the study together to show how the original research objectives have been met, thereby establishing the final value and implications of the project(Walliman, 2021).

The current study, which was a study that delved into the effect of AI-assisted Scenario-based Learning, which was a fusion of an emergent teaching method with a cutting-edge technological advancement, in teaching mathematics, culminated in the conclusion of no significant difference between the AI-assisted Scenario-based Learning and the traditional method, though with a trend towards improvement in the mathematical performance in students with hearing impairment studying in STD-4, who were intervened using the AI-assisted Scenario-based Learning. Irrespective of the conclusion given alone by the quantitative test scores, a comprehensive look at the engagement levels of students intervened using the AI-assisted Scenario-based Learning, coupled with the favourable and optimistic perspective of teachers towards the use of AI-assisted Scenario-based Learning, in teaching mathematics to students with hearing impairment, signals the prospects of reducing math anxiety and gathers support from the teachers towards its effectiveness and acceptance.

In essence, this method surpasses the conventional teaching strategies, fostering an inclusive learning environment backed up by principles of Differentiated Instruction. Though there were sample size constraints, geographical restrictions and targeted selection of mathematical concepts, AI-assisted Scenario-based Learning proves that a suitable fusion of

real-life scenarios with striking, expressive AI-generated visuals, contexts, and scenes has the potential to turn an abstract subject like mathematics into an interesting, engaging and interactive subject. The present study is also an eye-opener, urging educators, curriculum designers and policy makers to commit towards the use of inclusive educational technologies that will enable the diverse learners to excel in the 21st century.

REFERENCES

- Adebiyi, A. I. (2019). Using Interactive Scenario as Educational Strategy to Support Effective Learning. *Challenges 2019: Desafios Da Inteligência Artificial, Artificial Intelligence Challenges*, 331–335. https://www.researchgate.net/profile/Adebayo-Adebiyi-2/publication/335432211_Using_Interactive_Scenario_as_Educational_Strategy_to_Support_Effective_Learning/links/5d6565e8a6fdccc32cd61495/Using-Interactive-Scenario-as-Educational-Strategy-to-Support-Effective-Learning.pdf
- Alahmari, A. A., Aftab, M. J., Batool, S., & Amjad, F. (2024). Empowering Mathematics Education for Hearing Impaired Children Through Artificial Intelligence. *Qualitative research journal*, 24(04), 31–45. https://www.researchgate.net/publication/387722363_Empowering_Mathematics_Education_for_Hearing_Impaired_Children_Through_Artificial_Intelligence
- Altakhynch, B. (2019). The Impact of Using Bruner's Approach, Supported by Total Communication, on the Mathematics Achievement of Students with Hearing Disabilities in Amman Schools. *International Journal of Learning, Teaching and Educational Research*, 18(12), 63–78.
- Aruna D Rashtrapal & Mr. Uttam Kumar. (2023). Significance of Artificial Intelligence in Cognitive Development of Hearing-Impaired Students: A Systematic Review. In Ravindra Kr Kushwaha, Pawan Kr Mishra, Chandan Singh & Santosh Kumar (Ed.), *Artificial Intelligence IoT and Blockchain for Rehabilitation Sciences* (pp. 91–108). https://www.google.co.in/books/edition/Artificial_Intelligence_IoT_and_Blockcha/Wo3UEAAAQBAJ?hl=en&gbpv=1

- Bizimana, E. (2025). Student engagement in learning: Exploring the role of perceived student cohesiveness, equity, teacher support, and teacher autonomy support under the framework of self-determination theory. *International Journal of Changes in Education*, 3(1), 49–60. <https://doi.org/10.47852/bonviewIJCE52024500>
- Borgna, G., Walton, D., Convertino, C., Marschark, M., & Trussell, J. (2018). Numerical and real-world estimation abilities of deaf and hearing college students. *Deafness & Education International: The Journal of the British Association of Teachers of the Deaf*, 20(2), 59–79. <https://doi.org/10.1080/14643154.2018.1437238>
- Bradley S. Witzel, M. E. L. (2016). *Teaching Elementary Mathematics to Struggling Learners*. https://www.google.co.in/books/edition/Teaching_Elementary_Mathematics_to_Struggling_Learners/t4bfCgAAQBAJ?hl=en&gbpv=1
- Bull R (2008). Deafness, numerical cognition, and mathematics In Marschark M, & Hauser P (Eds.), *Deaf cognition: Foundations and outcomes* (pp. 170–200). New York: Oxford University Press.
- Bull R, Marschark M, Nordmann E, Sapere P, and Skene WA (2017). The approximate number system and domain-general abilities as predictors of math ability in children with normal hearing and hearing loss. *British Journal of Developmental Psychology*. Advance online: doi:10.1111/bjdp. 12204
- Census of India. (2011). *Disabled population by type, age and sex, India (Tables C-20, C-30)*. Office of the Registrar General & Census Commissioner, India. Retrieved from <https://censusindia.gov.in>

Chakraborti, K. S. & D. (2024). Can AI tools provide an effective mechanism for teaching children with auditory impairment – an exploratory study. *Journal of Informatics Education and Research*, 4(3). <https://doi.org/10.52783/jier.v4i3.1803>

Chambers, P. (2008). *Teaching Mathematics*.
[https://www.google.co.in/books/edition/Teaching_Mathematics/bT4-wdMFBaoC?hl=en&gbpv=1&dq=teaching+mathematics:Developing+as+a+Reflective+Secondary+Teacher\(Paul+Chambers\)&printsec=frontcover](https://www.google.co.in/books/edition/Teaching_Mathematics/bT4-wdMFBaoC?hl=en&gbpv=1&dq=teaching+mathematics:Developing+as+a+Reflective+Secondary+Teacher(Paul+Chambers)&printsec=frontcover)

Dani Levine, Daniela Avelar, Roberta Michnick Golinkoff, Derek Houston & Kathy Hirsh-Pasek. (2020). Foundations of Language Development in Deaf and Hard-of-Hearing Infants. In M. & H. Knoors (Ed.), *The Oxford Handbook of Deaf Studies in Learning and Cognition* (pp. 21–32).
https://www.google.co.in/books/edition/The_Oxford_Handbook_of_Deaf_Studies_in_L/C7XjDwAAQBAJ?hl=en&gbpv=1&dq=cognitive+development+among+students+with+severe+to+profound+hearing+loss&pg=PA60&printsec=frontcover

David H. Allsopp, Maggie M. Kyger & LouAnn H. Lovin. (2007). *Teaching Mathematics Meaningfully: Solutions for Reaching Struggling Learners*.

Della Volpe, V. (2024). Scenario-based learning: An inclusive methodology. *IOSR Journal of Research & Method in Education*, 14(6), 1–5. <https://doi.org/10.9790/7388-1406060105>

Department of School Education and Literacy, Ministry of Education, Government of India. (2021). *NIPUN BHARATH Foundational Literacy and Numeracy*. Gov. In. <http://file:///E:/SBL%20Module/Review%20of%20Literature%20Folder/NIPUN-FLNMissionDocument9thApril2021.pdf>

- Esra Altıntaş, Ş. İ. A. C. E. (2023). Scenario-based teaching in teaching algebra in gifted education. *Journal of Gifted Education and Creativity*, 10(4), 345–361. <https://dergipark.org.tr/en/download/article-file/3562444>
- Google. (2025). Gemini (AI image generation tool) [Large language model and generative AI system]. <https://gemini.google.com/>
- Gorai, J., & Angadi, G. R. (2023). Developing a standardized scale to measure teachers' Perception and attitude towards Apprenticeship Embedded Degree Programme. *Voices of Teachers and Teacher Educators*, 12(1), 37–56. https://ejournals.ncert.gov.in/index.php/vtte/article/view/2047?utm_source=chatgpt.com
- Gottardis, L., Nunes, T., & Lunt, I. (2011). A synthesis of research on deaf and hearing children's mathematical achievement. *Deafness & Education International: The Journal of the British Association of Teachers of the Deaf*, 13(3), 131–150. <https://doi.org/10.1179/1557069x11y.00000000006>
- Guler, T. (2025). The impact of scenario-based learning on the scientific creativity and reflective thinking skills of fourth-grade students in primary school. *Journal of Baltic Science Education*, 24(2), 271–283. <https://doi.org/10.33225/jbse/25.24.271>
- Henry, C., & Mishkoff, D. S. D. W. R. (1986). *Understanding Artificial Intelligence* (B.P.B.Publications in arrangement with HOWARD W. SAMS, CO. INC., & U.S.A., Eds.). [https://www.google.co.in/books/edition/Understanding_Artificial_Intelligence/HA0Z_AQAAIAAJ?hl=en&gbpv=0&bsq=Understanding%20Artificial%20Intelligence%20\(1988\)](https://www.google.co.in/books/edition/Understanding_Artificial_Intelligence/HA0Z_AQAAIAAJ?hl=en&gbpv=0&bsq=Understanding%20Artificial%20Intelligence%20(1988))

- Holt, J.A. (1993). Stanford Achievement Test—8th Edition: Reading Comprehension Subgroup Results. *American Annals of the Deaf* 138(2), 172-175. <https://dx.doi.org/10.1353/aad.2012.0684>.
- Hohaus, P. (Ed.). (2024). *The Language of Digital Education: An Expanded Glossary of Key Terms and Concepts*. https://www.google.co.in/books/edition/The_Language_of_Digital_Education/Q9k3EQAAQBAJ?hl=en&gbpv=0
- Jawaharlal Mariappan, A. S. & P. G. S. (2004). *Use of Scenario-Based Learning Approach in Teaching Statics*. https://www.researchgate.net/profile/Mariappan-Jawaharlal/publication/237244689_Use_of_Scenario-Based_Learning_Approach_in_Teaching_Statics/links/57915d6608ae0831552f9ac3/Use-of-Scenario-Based-Learning-Approach-in-Teaching-Statics.pdf
- Jimenez, R. (2009). *Scenario-based Learning: Using Stories to Engage E-learners : Plus Dozens of Online Demos, Examples, Resources*. https://www.google.co.in/books/edition/Scenario_based_Learning/to8yAgAAQBAJ?hl=en&gbpv=0
- Joaquin, Lyn L., and Jherwin P. Hermosa (2023). "Scenario- Based Learning Approach for Enhancing the Critical Thinking Skills of Grade 9 Students in Araling Panlipunan." *International Journal of Multidisciplinary: Applied Business and Education Research*, vol. 4, no. 5, 2023, pp. 1708-1715, doi:[10.11594/ijmaber.04.05.31](https://doi.org/10.11594/ijmaber.04.05.31).
- Kumar, K., Prakash, A., & Singh, K. (2021). How National Education Policy 2020 can be a lodestar to transform future generation in India. *Journal of Public Affairs*, 21(3). <https://doi.org/10.1002/pa.2500>

- Majumdar, K. (2024). Role of Artificial Intelligence on Education in Digital Age. In (Dr.) Mita Banerjee, Prof. (Dr.) Sridipa Sinha, Dr. Pranay Pandey (Ed.), *Google.co.in* (pp. 320–326). <https://doi.org/10.25215/9358094575.35>
- Matthew Seren Smith, S. W. A. A. V. (2018). *Teaching and Learning in Higher Education Perspectives from UCL*. Ucl.ac.uk. <https://discovery.ucl.ac.uk/id/eprint/10059996/1/Davies%20&%20Pachler%202018.pdf>
- Muhammad Javed Aftab, N. I. & F. A. (2024). Mathematics without barriers: Empowering hearing-impaired students in numerical fluency. *Journal of Development and Social Sciences*, 633–647. <https://www.ojs.jdss.org.pk/journal/article/view/1022/963>
- Mukabbir, M. N. (2023). AI-Based Solutions for Students with Hearing Impairments. Neliti.com. <https://media.neliti.com/media/publications/591001-ai-based-solutions-for-students-with-hea-444ddca4.pdf>
- National Council of Teachers of Mathematics. (2014, April 18). *Access and Equity in Mathematics Education*. Nctm.org. https://www.nctm.org/uploadedFiles/Standards_and_Positions/Position_Statements/Access_and_Equity.pdf
- National Programme for Prevention & Control of deafness. (n.d.). Gov.In. <https://dghs.mohfw.gov.in/national-programme-for-prevention-and-control-of-deafness.php>
- NCERT. (2022). *National Curriculum Framework for Foundational Stage*. Nic. In. https://ncert.nic.in/pdf/NCF_for_Foundational_Stage_20_October_2022.pdf

- NCERT. (2023). *National Curriculum Framework for School Education*. Gov. In. https://dsel.education.gov.in/sites/default/files/guidelines/ncf_2023.pdf
- NEP. (2020). *National Education Policy 2020*. Government of India. Retrieved from https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf
- Okur, L. G. & M. (2023). View of artificial intelligence applications in open and distance education: A systematic review of the articles (2007-2021). *Asian Journal of Distance Education*, 18(1), 1–32. <http://www.asianjde.com/ojs/index.php/AsianJDE/article/view/665/392>
- Posamentier, A. S. (2009). *Problem solving in mathematics, grades 3-6: Powerful strategies to deepen understanding* (A. S. Posamentier & S. Krulik, Eds.). Corwin.
- P. Sagaya Mary & Dr. R. Ranjani Prema. (2024). Latest approaches to learning. In *Educational technology/Nursing Education* (pp. 53–58). https://www.google.co.in/books/edition/EDUCATIONAL_TECHNOLOGY_NURSING_EDUCATION/5dUHEQAAQBAJ?hl=en&gbpv=0
- Reho, M., Costa, S., Pirchio, S., Limone, P., Fuccio, R. D., & Gennaro, A. (2024). Development and factor structure of the teaching approach scale. *Frontiers in Education*, 9. <https://doi.org/10.3389/feduc.2024.1404326>
- Richburg, C. M., & Smiley, D. F. (2011). *School-based audiology*. Plural Publishing.
- RPWD. (2016). *Rights of Persons with Disabilities Act, 2016*. Nic.In. Retrieved from https://www.indiacode.nic.in/bitstream/123456789/15939/1/the_rights_of_persons_with_disabilities_act%2C_2016.pdf
- RTE Act. (2009). *The Right of Children to Free and Compulsory Education Act, 2009*. Ministry of Law and Justice. <https://legislative.gov.in>

- Rukhsana Bashir, A. B. A. F. A. (April-June 2024). Mathematical Problems faced by Hearing Impaired Students: Strategies for Enhancing Learning and Comprehension. *Journal of Development and Social Sciences*, 5(2), 83–99.
- Ruth Colvin Clark & Richard E. Mayer. (2012). *Scenario-based E-Learning: Evidence-Based Guidelines for Online Workforce Learning*.
https://www.google.co.in/books/edition/Scenario_based_e_Learning/oFm1jmhbgAIC?hl=en&gbpv=1&dq=scenario+based+learning&printsec=frontcover
- Saboowala, H. (2025). *ARTIFICIAL INTELLIGENCE. Origin, Evolution, and the Human–Machine Interface*.
https://www.google.co.in/books/edition/ARTIFICIAL_INTELLIGENCE_Origin_Evolution/YP-iEQAAQBAJ?hl=en&gbpv=1&dq=origin+of+artificial+intelligence&printsec=frontcover
- Sadiku, M. N., Musa, S. M., & Chukwu, U. C. (2022). *Artificial Intelligence in Education*.
https://www.google.co.in/books/edition/Artificial_Intelligence_in_Education/161cEAAQBAJ?hl=en&gbpv=1&dq=Artificial+Intelligence+in+Education&printsec=frontcover
- Sanyin Cheng, X. C. & L. D. (2025). Self-determination and Student Engagement among Deaf and Hard of Hearing Students. *International Journal of Disability, Development and Education*, 73(3), 537–549. <https://doi.org/10.1080/1034912X.2025.2528206>
- Shaaban, S. S. A., & Shaat, M. A. (2022). A scenario-based learning approach for enhancing Al-Azhar University-Gaza student-teachers' TEFL practices in inclusive education classes. *Journal of Language Teaching and Research*, 13(4), 740–748.
<https://doi.org/10.17507/jltr.1304.06>

- Shanthi, M. P. &. (2025). View of identifying the performance numbering skills in mathematics among children with hearing impairment. *JYANAVI Journal of the School of Social Sciences*, 1(1), 1–11. <https://www.jyanavispmvv.in/index.php/files/article/view/20/13>
- Shivani, Gupta, M., & Gupta, S. B. (2024). A systematic analysis of AI-empowered educational tools developed in India for disabled people. *Informacijni Tehnologij i Zasobi Navčannâ*, 100(2), 199–216. <https://doi.org/10.33407/itlt.v100i2.5501>
- Skipwith, S. S. B. &. (2021). *Best Practices in Engaging Online Learners Through Active and Experiential Learning Strategies*. United Kingdom: Routledge. https://www.google.co.in/books/edition/Best_Practices_in_Engaging_Online_Learne/v1EwEAAAQBAJ?hl=en&gbpv=1
- Sur, Kimaya, J.C. (2024). Can AI tools provide an effective mechanism for teaching children with auditory impairment – an exploratory study. *Journal of Informatics Education and Research*, 4(3). <https://doi.org/10.52783/jier.v4i3.1803>
- Tiffin PA, Klassen RM (2024). Scenario-based learning: How can it contribute to clinical education? *Clin Teach*. 2024; 21(6):e13805. <https://doi.org/10.1111/tct.13805>
- Traxler, C. B. (2000). The Stanford Achievement Test, 9th Edition: National Norming and Performance Standards for Deaf and Hard-of-Hearing Students. *Journal of Deaf Studies and Education*, 5(4). <https://doi.org/10.1093/deafed/5.4.337>
- Uchendu Eugene Chigbu, S. O. A. &. C. C. D. P. (2023). The Science of Literature Reviews: Searching, Identifying, Selecting, and Synthesising. *Multidisciplinary Digital Publishing Institute*, 11(1), 1–16. <https://doi.org/10.3390/publications11010002>
- UDISE+(2025). School Directory Management, & School Data Capture. Retrieved from <https://udiseplus.gov.in/#/en/page/publications>

UNCRPD. (2007). *United Nation Convention on Rights of Persons with Disabilities*.

Www.un.org. <https://www.un.org/disabilities/documents/convention/convoptprot-e.pdf>

Velica A. Caballeda, John Andrew R. Anonat , Genelyn R. Baluyos (Ed.). (2025). *Using Scenario-Based Learning as a Tool in Enhancing Students' Understanding of Economic Sectors: Vol. IX* (Issue VIII). IJRISS ISSN No. 2454-61861589.

<https://doi.org/10.18502/avr.v30i2.6098>

Walliman, N. (2021). *Research Methods: The Basics*. <https://doi.org/10.4324/9781003141693>

Wenger, J. L. &. (1991). *Situated Learning: Legitimate peripheral participation*.

https://www.google.co.in/books/edition/Situated_Learning/CAVIOwW3vYAC?hl=en&gbpv=1&dq=situated+learning&printsec=frontcover

W. George Cathcart, Yvonne M. Pothier, James H. Vance & Nadine S. Bezuk. (2000). *Learning Mathematics in Elementary and Middle Schools* (L. A. Montgomery, Ed.).

https://www.google.co.in/books/edition/_/D5YrAQAAMAAJ?hl=en&sa=X&ved=2ahUKEwj5-bfy4YOUAxWDSGwGHbCdOKsQ7_IDegQIDBAE

World Health Organisation. (2005). *WHODAS 2.0 TRANSLATION PACKAGE (VERSION 1.0) TRANSLATION AND LINGUISTIC EVALUATION PROTOCOL AND SUPPORTING MATERIAL*. Who.int.

<https://terrance.who.int/mediacentre/data/WHODAS/Guidelines/WHODAS%202.0%20Translation%20guidelines.pdf>

World hearing day 2023. (n.d.). Who.int. <https://www.who.int/india/campaigns/world-hearing-day-2023>

Yadav, M. K. (2023). Artificial Intelligence's Transformational Effect on the Special Education. In Ravindra Kumar Kushwaha, Pawan Kr Mishra, Chandan Singh & Santosh Kumar (Ed.), *Artificial Intelligence IoT and Blockchain for Rehabilitation Sciences* (pp. 81–90). https://www.google.co.in/books/edition/Artificial_Intelligence_IoT_and_Blockcha/Wo3UEAAAQBAJ?hl=en&gbpv=1

Yadav, S. (2024). Assessing the effectiveness of 'Pragna' educational materials in catering to the learning needs of students with sensory disabilities. *Innovative Thoughts*, 11(1). <https://itirjarchives.naspublishers.com/?p=642>

Yadav, Santosh Dinanath & Mathew, Suni M. (2020). *Evaluation of Pragna for primary education of students with sensory disabilities* [Doctoral dissertation, University of Mumbai]. <http://hdl.handle.net/10603/397541>



APPENDIX – A
AI-ASSISTED SCENARIO-BASED LEARNING



**AI-ASSISTED SCENARIO-BASED
LEARNING MODULE**

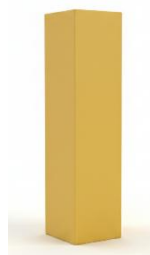
CHAPTERS:

(1)“TANGRAMS AND DESIGNS”

(2)“SOLIDS”

SUBJECT: MATHEMATICS

GRADE: 4



BLUEPRINT

Sl.no	Description	Learning Objectives	Domains covered
1. Tangrams and designs			
a	Introduction to Tangrams	To enable the students to:  Identify a 7-piece Tangram  Explain the different components of a 7-piece tangram  Identify the different shapes in a 7-piece tangram  Determine the number of each of the shapes involved in a 7-piece tangram.	 Cognitive Domain
b	Various designs using Tangrams	To enable the students to:  Identify the use of a tangram  Form various designs using tangrams  Form their own creative designs using tangrams	 Cognitive Domain  Psychomotor Domain
c	Designs	To enable the students to:  Complete various designs using triangular shapes.  Identify the shape of a hexagon.  Identify the number of sides of a hexagon.  Complete various designs using hexagonal shapes.	 Cognitive domain  Psychomotor domain
2. Solids			
a	Cuboid	To enable the students to:  Identify the shape of a cuboid.  Explain the concept of face, edge and vertex.  Identify the number of faces, edges and vertices of a cuboid.  Differentiate between a rectangle and a cuboid.  Identify the objects that look like a cuboid.	 Cognitive domain  Psychomotor domain
b	Cube	To enable the students to:  Identify the shape of a cube.  Identify the number of faces, edges and vertices of a cube  Differentiate between a square and a cube  Identify the objects that look like a cube	 Cognitive domain
c	Cylinder	To enable the students to:  Identify the shape of a cylinder.  Draw a cylinder.  Identify objects that look like a cylinder.	 Cognitive domain  Psychomotor domain
d	Cone	To enable the students to:  Identify the shape of a cone  Identify the objects that look like a cone	 Cognitive domain  Psychomotor domain
e	Sphere	To enable the students to:  Identify the shape of a sphere	 Cognitive domain

		 Identify the objects that look like a sphere	
		 Differentiate between a circle and a sphere	

BLUE PRINT OF ASSESSMENT

Blueprint of content weightage

Sl.no	Unit	Sub-unit	Marks	Weightage (in percentage)
1	Tangrams and Designs	(a) Introduction to Tangrams	10	13.33%
		(b) Various designs using Tangrams	5	6.67%
		(c) Designs	10	13.33%
2	Solids	(a) Cuboid	10	13.33%
		(b) Cube	10	13.33%
		(c) Cylinder	10	13.33%
		(d) Cone	10	13.33%
		(e) Sphere	10	13.33%
Total			75	100%

Blueprint of weightage of objectives

Sl.no	Unit	Sub-unit	Domain	Level	Marks	Weightage (in percentage)	
1	Tangrams and Designs	(a) Introduction to Tangrams	Cognitive	Knowledge	10	13.33%	
		(b) Various designs using Tangrams	Cognitive	Knowledge	1	1.33%	
			Psychomotor	Imitation	2	2.67%	
				Manipulation	2	2.67%	
		(c) Designs	Cognitive	Application	5	6.67%	
			Psychomotor	Imitation	5	6.67%	
2	Solids	(a) Cuboid	Cognitive	Knowledge	8	10.67%	
				Understanding	1	1.33%	
			Psychomotor	Imitation	1	1.33%	
		(b) Cube	Cognitive	Knowledge	4	5.33%%	
				Understanding	6	8%	
		(c) Cylinder	Cognitive	Knowledge	4	5.33%	
			Psychomotor	Imitation	3	4%	
				Precision	3	4%	
		(d) Cone	Cognitive	Knowledge	4	5.33%	
			Psychomotor	Imitation	3	4%	
				Precision	3	4%	
		(e) Sphere	Cognitive	Knowledge	5	6.67%	
				Understanding	5	6.67%	
		Total				75	100%

Form of questions:

Sl.no	Unit	Form of questions	Marks	Weightage (in percentage)
1	Tangrams and Designs	Name the following	1	1.33%
		Match the following	3	4%
		Choose the correct answer	3	4%
		Complete the following designs	15	20%
		Identify the following	3	4%
2	Solids	Name the following	17	22.67%
		Identify the following	20	26.67%
		Draw the following	13	17.33%
Total			75	100%

Level of difficulty:

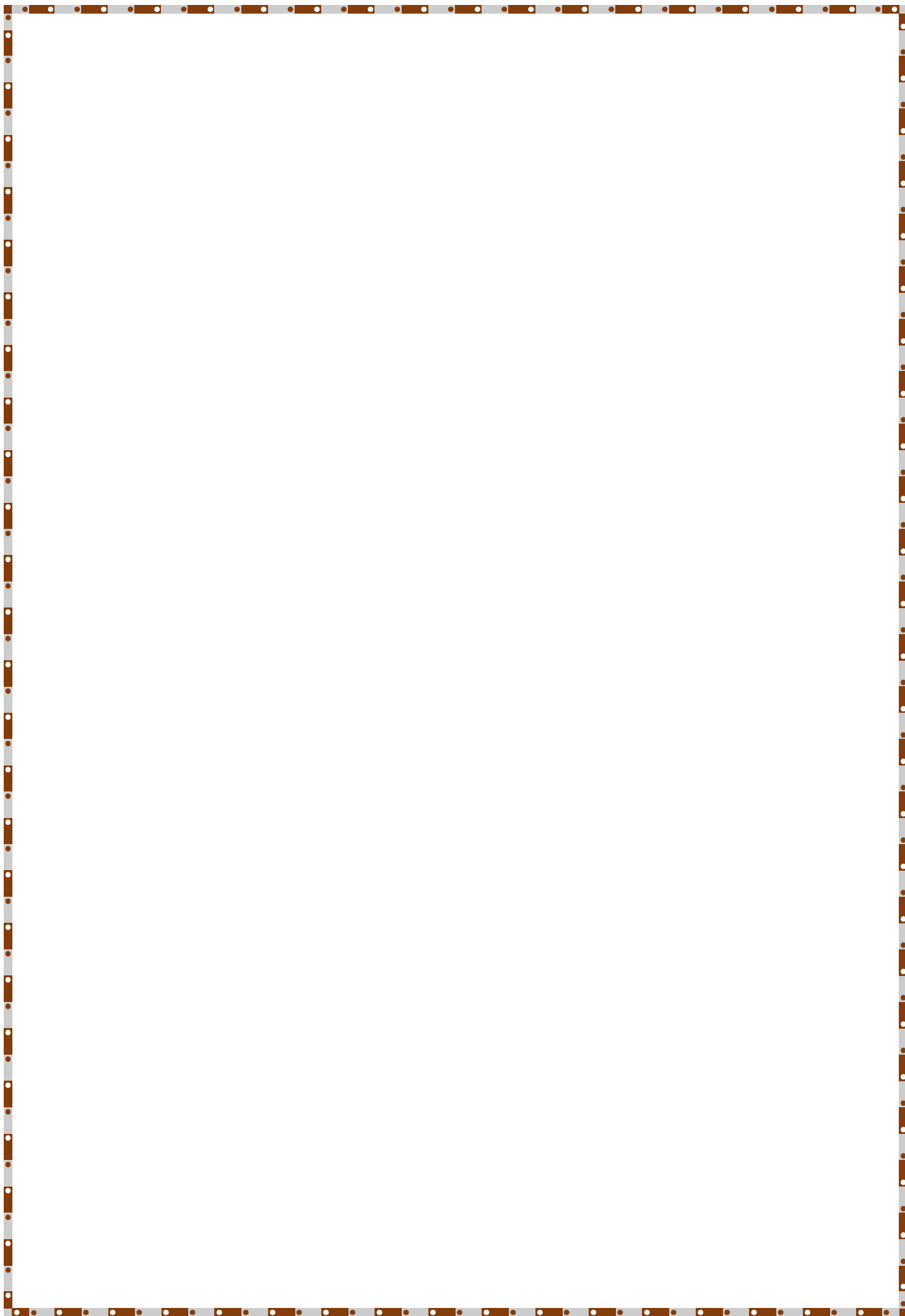
Sl.no	Unit	Sub-unit	Difficulty Level	Marks	Weightage (in percentage)
1	Tangrams and Designs	(a) Introduction to Tangrams	Easy	10	13.33%
		(b) Various designs using Tangrams	Moderate	5	6.67%
		(c) Designs	Moderate	4	5.33%
			Difficult	6	8%
2	Solids	(a) Cuboid	Easy	7	9.33%
			Moderate	3	4%
		(b) Cube	Easy	5	6.67%
			Moderate	5	6.67%
		(c) Cylinder	Easy	4	5.33%
			Moderate	6	8%
		(d) Cone	Easy	1	1.33%
			Difficult	9	12%
		(e) Sphere	Easy	5	6.67%
			Moderate	5	6.67%
Total				75	100%

3D Blueprint

Sl.No	Description	Marks Allotted						Total
		Cognitive Domain			Psychomotor Domain			
		Knowledge	Understanding	Application	Imitation	Manipulation	Precision	
1	Tangrams and Designs							
a	Introduction to Tangrams	10	-	-	-	-	-	10
b	Various designs using Tangrams	1	-	-	2	2	-	5
c	Designs	-	-	5	5	-	-	10
	Total(1)							25
2	Solids							
a	Cuboid	8	1	-	1	-	-	10
b	Cube	4	6	-	-	-	-	10
c	Cylinder	4	-	-	3	-	3	10
d	Cone	4	-	-	3	-	3	10
e	Sphere	5	5	-	-	-	-	10
	Total(2)							50
	Grand Total(1+2)	36	12	5	14	2	6	75

INDEX

Sl.No	Chapter	Page No.
1. Tangrams and Designs		
(a)	Introduction to Tangrams	1-11
(b)	Various designs using Tangrams	12-16
(c)	Designs	17-23
2. Solids		
(a)	Cuboid	24-34
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CHAPTER-1: TANGRAMS AND DESIGNS

Sub-unit (a): Introduction to Tangrams

Learning Objectives:

- To enable the students to identify a 7-piece tangram
- To enable the students to explain the different components of a 7-piece tangram
- To enable the students to identify the different shapes in a 7-piece tangram
- To enable the students to determine the number of each of the shapes involved in a 7-piece tangram.

Scenario-1: Chandan and his mother decide to go to a bakery to buy a cake.



Chandan, who loves cakes, goes to a bakery with his mother.



His mother asks him what he wants to buy.



He points towards a cake.



They buy it and bring it home.



This is how the cake looks like, ↑ when they open it.

What is the shape of this cake?



Yes! You are right! The shape of the square is 'Square'

6



His mother cuts the cake

She cuts the cake in the following way:

7



First, she cuts it into two halves as shown above.

Can you name the new shapes that have been formed after cutting the cake into two?



Yes! We get two triangles!

8



Now, she cuts one triangle into two equal parts.

9

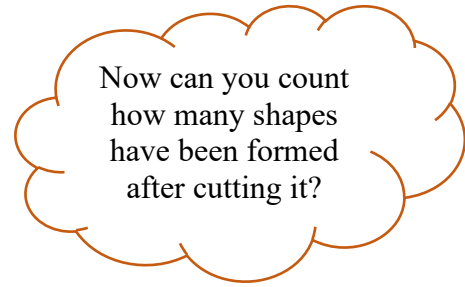


Then she cuts another small triangle from the remaining portion.

10



Finally, she cuts 2 small triangles and a small square from the remaining portion.

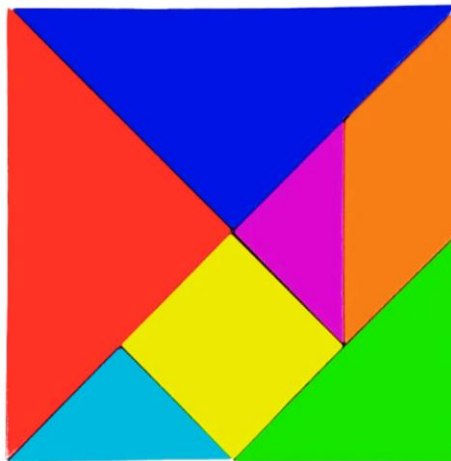


You are absolutely right!

There are 7 shapes.

This resembles the shape of a 7-piece tangram.

Yes! This is a Tangram!



Scenario-2: Chandan explores the different parts of a tangram in his room

1



Seeing this, Chandan starts exploring the tangram in his room

2



He finds 2 big triangles in it.

3



Later, he finds 2 small triangles.

Now compare the size of the triangle Chandan found at the end to the other triangles that he found earlier.

4



Then, he finds another triangle.



Isn't it smaller than the first 2 triangles, but bigger than the remaining 2 triangles?



Yes, this is smaller than first two big triangles, but bigger than the other 2 small triangles. Hence, this is a **medium-sized** triangle.

5

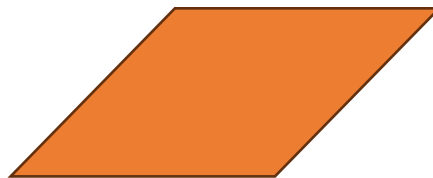


He also finds a square in it

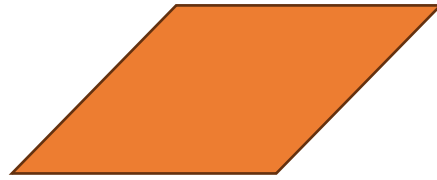
6



He finally finds a new shape in it.



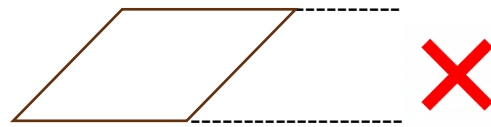
This is the new shape that he finds.



Now look carefully at the new shape.

If you carefully observe,
you can find that the
opposite sides of the new
shape, even if extended,
will not meet each other.

In other words, we can
say that the opposite
sides are parallel to each
other.

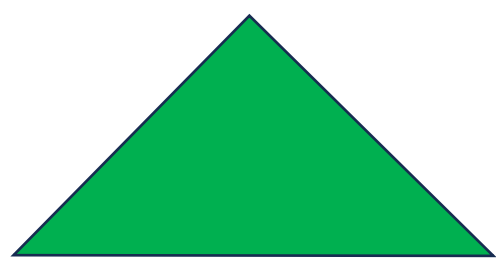
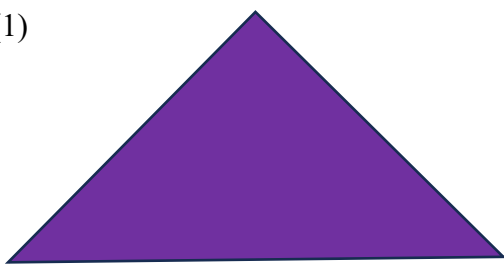


This new shape where the opposite sides are parallel to each other is called “**Parallelogram**”



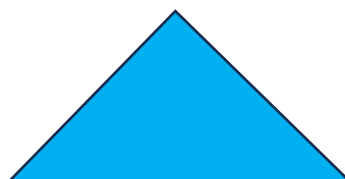
So now, let us look at the different shapes of a tangram one by one,

(1)



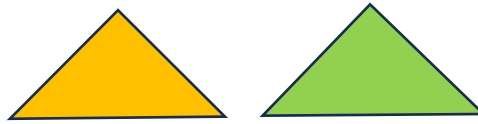
It has 2 big triangles

(2)



It has 1 medium-sized triangle

(3)



It has 2 small triangles

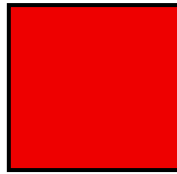


Now, can you count and guess the total number of triangles?



Yes! You are right!
There are 5 triangles in total.

(4)



It has one square.

(5)



It has one parallelogram.

List of suggested activities for better learning:

(1) Find the shape from the basket:

- In a basket, add all the shapes of a tangram namely, 2 big triangles, 1 medium sized triangle, 2 small triangles, 1 square and 1 parallelogram.
- Write the name of 1 shape on the board, for example, “Big triangle”, “Medium sized triangle”, “Small triangle”, “Square” or “Parallelogram”
- The student is expected to look at the name of the shape on the board and pick up the respective shape from the basket.
- Every student will be called one by one and they are supposed to pick up the respective shape from the basket which has been written on the board by the teacher.



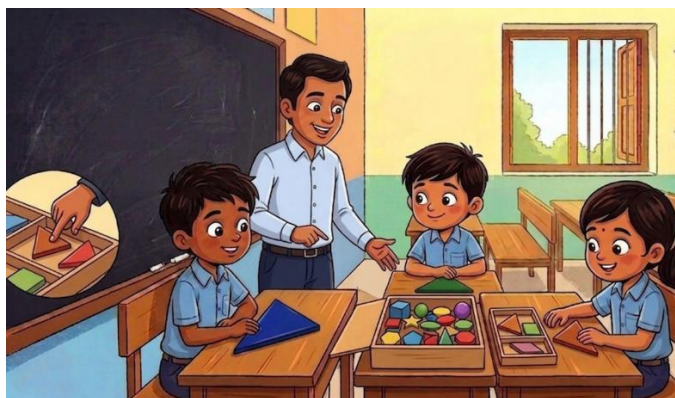
(2) Matching the shapes with their names

- One component of the 7-piece tangram should be given to the student. (It may be a big triangle or a medium sized triangle, small triangle, a square or a parallelogram)
- A box containing word cards of the names of the shapes namely, ‘Big Triangle’, ‘Medium sized Triangle’, ‘Small Triangle’, ‘Square’ and ‘Parallelogram’ should be given to the students.
- Students should pick the word card from the box, which matches with the shape that has been given to them by the teacher.



(3) Identifying the components of a tangram

- In a box add different shapes such as a triangle, circle, square, parallelogram, rectangle, star, oval, pentagon, hexagon, octagon, nonagon, etc. (3-Dimensional shapes such as cube, cuboid, sphere, cone, cylinder, etc may also be added)
- The student is expected to pick up all the shapes that are present in a tangram (i.e., the student has to pick up one triangle, one square and one parallelogram)



(4) Finding the missing parts of a tangram

- An empty square shaped frame has to be placed in front of the student.
- We can place one or more shapes, but not all the seven shapes in the empty square shaped tangram frame.
- The student has to pick up the remaining shapes of the tangram from a bag or a box in which there will be several different shapes such as a rectangle, triangle, square, circle, star, oval, etc, (3-Dimensional shapes such as cube, cuboid, sphere, cone, cylinder, prisms, etc may also be placed in the bag), and complete the tangram.



(5) Matching shapes with numbers

- A shape of the tangram, which maybe a big triangle, medium sized triangle, small triangle, square or a parallelogram or the word card containing the name of the any one shape of a tangram (Big triangle, medium sized triangle, small triangle, square or parallelogram) will be given to the student.

- Flash cards of numbers from 1-20 will be placed in a tray, within the reach of the student.
- The student should match the shape or the name of the shape which has been given to him/her, with its respective number in a tangram, by picking up the number flash card from the tray.



ASSESSMENT

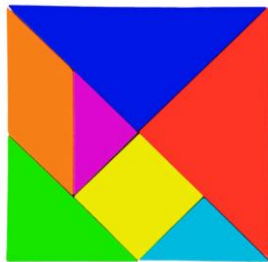
Total Marks: 10
Duration: 10 minutes

Instructions:

- Read all the questions carefully and answer all the questions.
- The total marks of this assessment is 10 marks and the total time allowed is 10 minutes.
- Attempt all the questions as per the directions of each question, whether you are required to write, match, tick or encircle as per the requirements of each question.

I. Name the following:

(1x1 Mark = 1)



This is a _____

II. Match the following shapes with their names:

(3x1 Mark = 3)

(1)



-

Square

(2)



-

Parallelogram

(3)



-

Triangle

III. Choose the correct number of the following shapes present in tangram:

(3x1 Mark = 3)

(1)



(a) 1 (b) 3 (c) 5 (d) 7

(2)



(a) 2 (b) 4 (c) 1 (d) 3

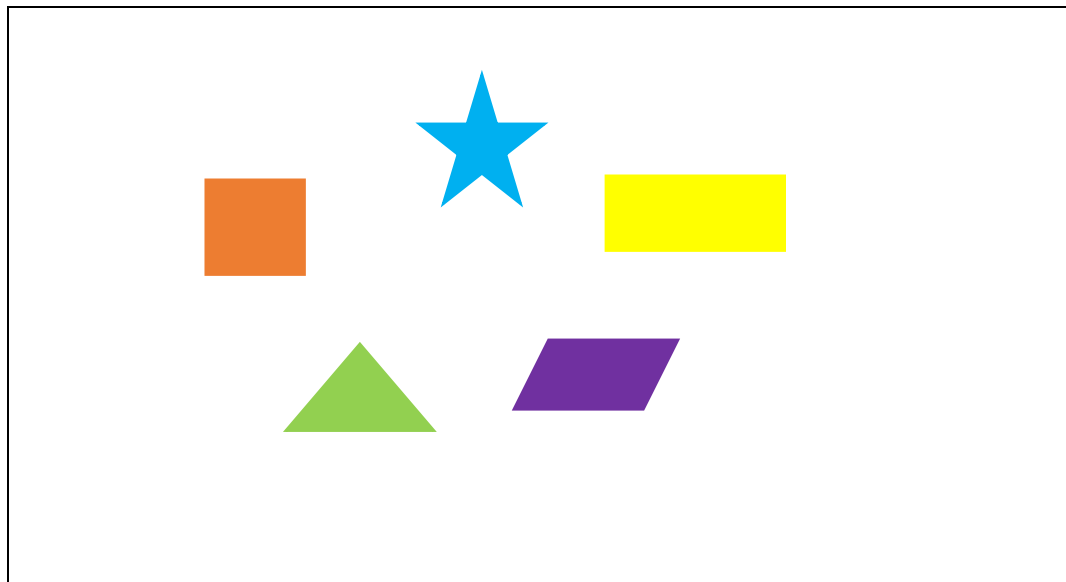
(3)



(a) 1 (b) 2 (c) 5 (d) 7

IV. Encircle the shapes that are present in a tangram:

(3 x 1 Mark = 3)



Sub-unit (b): Various designs using Tangrams

Learning Objectives:

- To enable the students to identify the use of a tangram
- To enable the students to form various designs using tangrams
- To enable the students to form their own creative designs using tangrams

Scenario-1 : Mehrin is thinking about what she can do with the various components of a tangram

1



Mehrin is thinking about what she can do using a tangram.

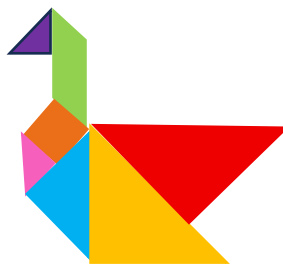
2



She gets ideas of different designs she can make using tangrams.

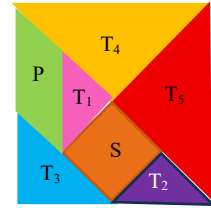
Now let us do some designs using the various shapes of a tangram!

First, let us make the design of a swan!



Let us first name the components of the tangram:

- Let 'T₁' and 'T₂' be the small triangles of the tangram.
- Let 'T₃' be the medium-sized triangle.
- Let 'T₄' and 'T₅' be the big triangles.
- Let 'S' be the square.
- Let 'P' be the parallelogram.



We must follow the following steps to create the design of a swan. So lets do it!

1. Step-1: Place 'T₁' as shown below:
2. Step-2: Place the 'P' next to 'T₁'.



3. Step-3: Now place the 'S' below 'P'.



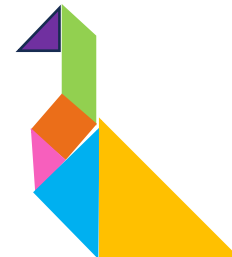
4. Step-4: Place 'T₂' to the left side of 'S'.



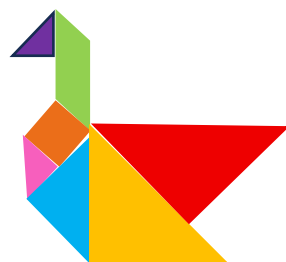
5. Step-5: Place 'T₃' to right of 'S' and 'T₂'.



6. Step-6: Place 'T₄' to the right of 'T₃'.



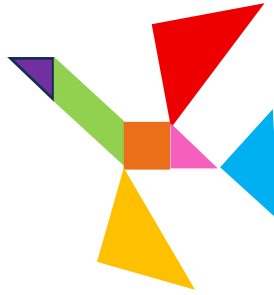
7. Step-7: Finally, place 'T₅' to the right of 'T₄'.



Here are some other designs that we can create using tangrams



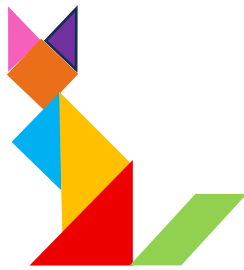
(1) Rabbit



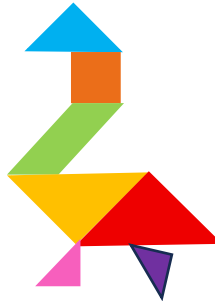
(2) Bird



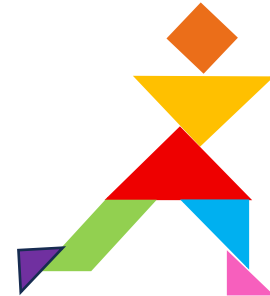
(3) Camel



(4) Cat



(5) Duck



(6) Person doing Exercise

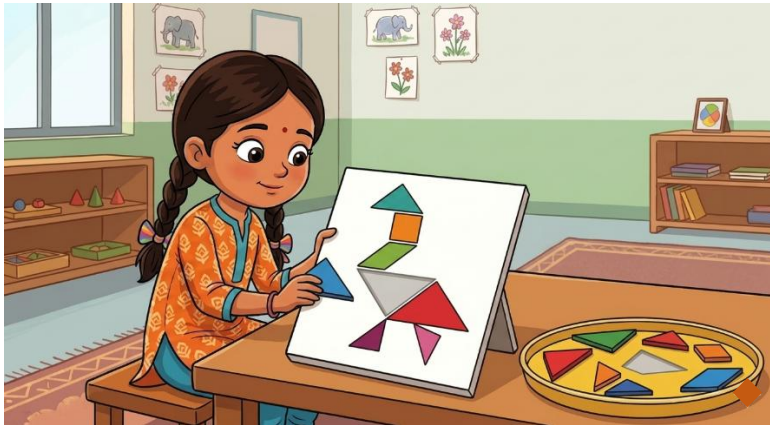


(7) Person dancing

List of suggested activities for better learning:

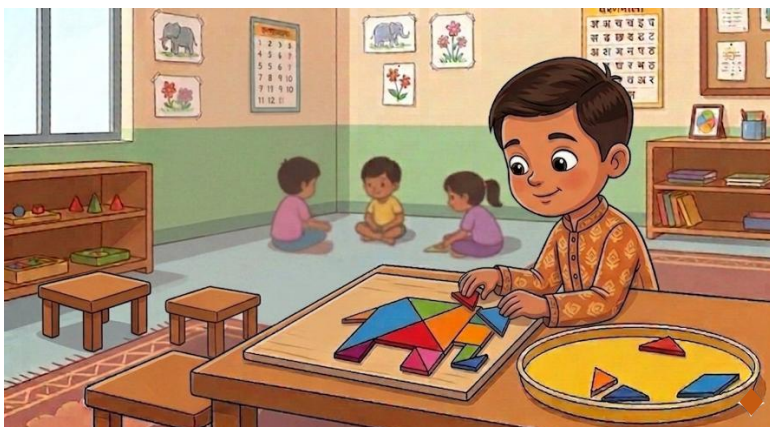
(1) Completing tangram designs

- A frame with the outline of various designs that can be formed using tangrams like the frame of a swan, rabbit, duck, person dancing, cat, bird, person doing exercise, camel, etc can be placed in front of the student.
- We can place few shapes of tangram in the frame. (This is optional)
- The student should complete the empty frame of design, by filling the empty spaces with appropriate shapes of a tangram, by picking up the shapes of a tangram from a tray containing the shapes of a tangram.



(2) Creating new designs

- The 7 pieces of a tangram have to be given to the student.
- The student should arrange it on a tangram board, and form a new design of the student's choice



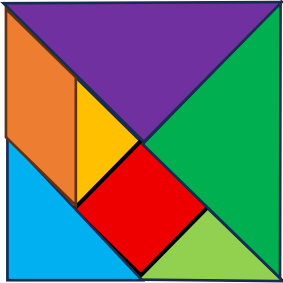
ASSESSMENT

Total Marks: 5

Time allotted: 10 minutes

Instructions:

- Read the question carefully and answer accordingly.
 - Total marks allotted is 5 marks and the total time allotted is 10 minutes.
 - Students should arrange the following shapes of a tangram and form a meaningful design.
- I. Use the 7 tangram pieces to prepare a design of: (1x5 Marks = 5)
- (a) A duck (or)
 - (b) A Rabbit (or)
 - (c) Any design of your choice

This is a tangram	These are the various shapes of a tangram:
	

Rubrics for marks:

Description	Marks
Creation of a design	4
Identifying the name of the design	1
Total	5

Sub-unit (c): Designs

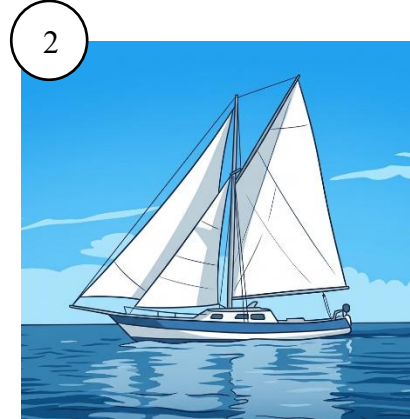
Learning Objectives:

- To enable the students to complete various designs using triangular shapes.
- To enable the students to identify the shape of a hexagon.
- To enable the students to identify the number of sides of a hexagon
- To enable the students to complete various designs using hexagonal shapes.

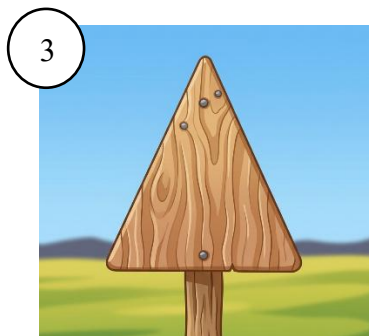
Scenario-1: Emily goes on a trip



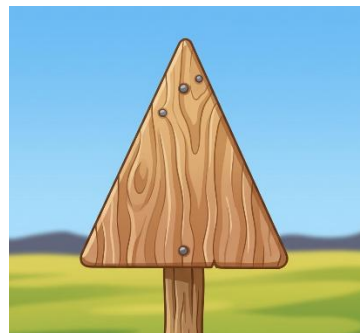
Emily goes on a trip



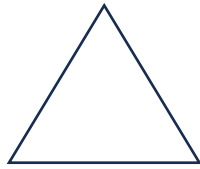
She travels on a boat



When she reaches the shore, she sees a sign board



Now look at these three images and guess the prominent shape that you see.....

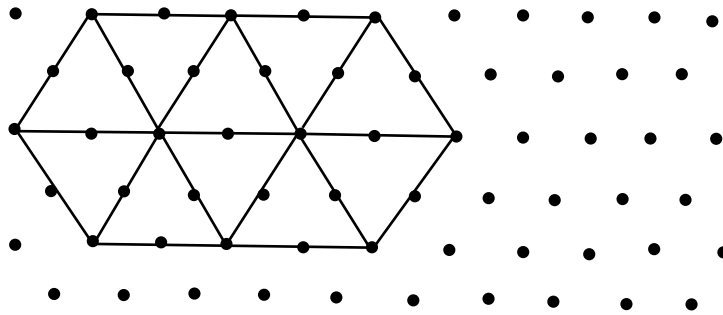


Yes! It is a triangle

Design: A design is a plan, drawing, or pattern that shows how to make something.

Now, using triangles, complete the following design:

(i)



Scenario-2: Beena goes to a garden and finds an empty beehive



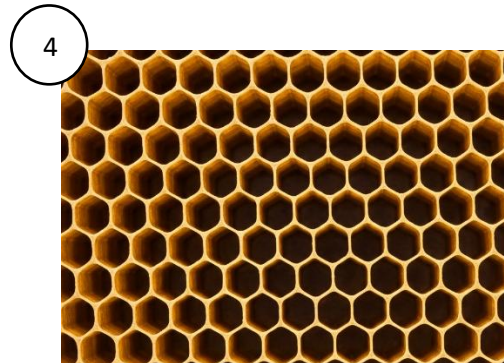
Beena goes to a garden.



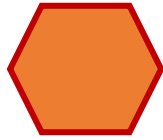
In the garden, she finds an empty beehive.



Then, she looks closer at the empty beehive.



When she looks closer at the beehive, she finds many honeycombs in it.



This is how each honeycomb looks like.

Now how many
sides can you
find in this
honeycomb?



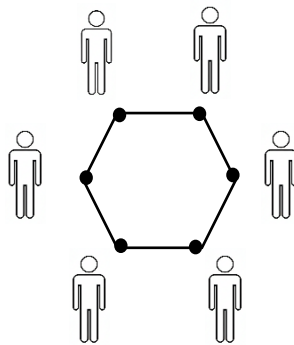
Yes! You are right!
There are 6 sides.

This new shape is called a '**Hexagon**'



A hexagon is a polygon which has 6 sides

Activity-1: To understand the concept of hexagon better, let us do an activity. Look at the following image and stand accordingly,

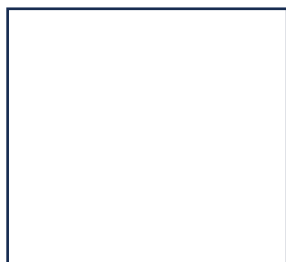


Then take a chalk piece and join the space between two consecutive people, by drawing straight lines as shown above. Now you are standing in the shape of a hexagon.

This is the shape of a hexagon!

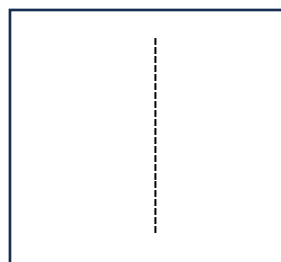
Activity-2: Let us make a hexagon!

1



Step-1: Take a rectangular-shaped piece of paper .

2



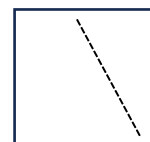
Step-2: Now fold the paper along the dotted lines

3



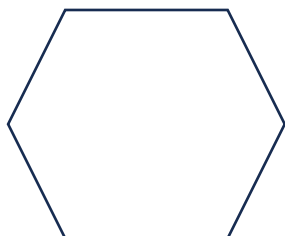
Step-3: After folding the paper as shown in step-2, now fold the paper along the dotted lines as shown above

4



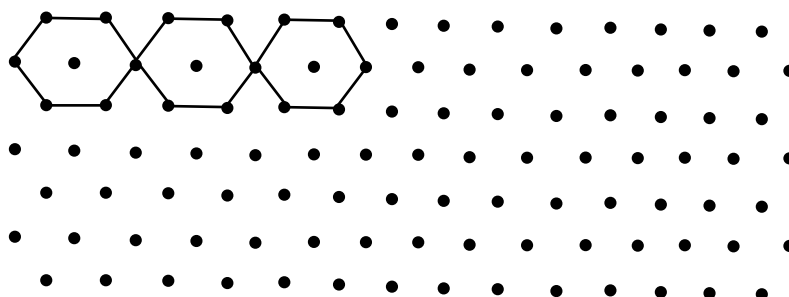
Step-4: Now cut the folded paper along the dotted lines

5



Step-5: Now when you open this paper, you can find the shape of a hexagon!

Using hexagonal shapes, complete the following design:



List of suggested activities:

(1) Colouring only the triangles:

- Provide worksheets in such a way that they contain patterns of hexagons and triangles.
- The students are expected to colour only the triangles, with specific colours.



(2) Colouring only the hexagons:

- Provide worksheets in such a way that they contain patterns of hexagons and triangles.
- The students are expected to colour the hexagons only.



(3) Making hexagons using triangles:

- Provide each student with six triangular shapes each
- Each student is expected to arrange these triangles in such a way that a hexagonal shape is formed



ASSESSMENT

Total Marks: 10

Time allotted: 15 minutes

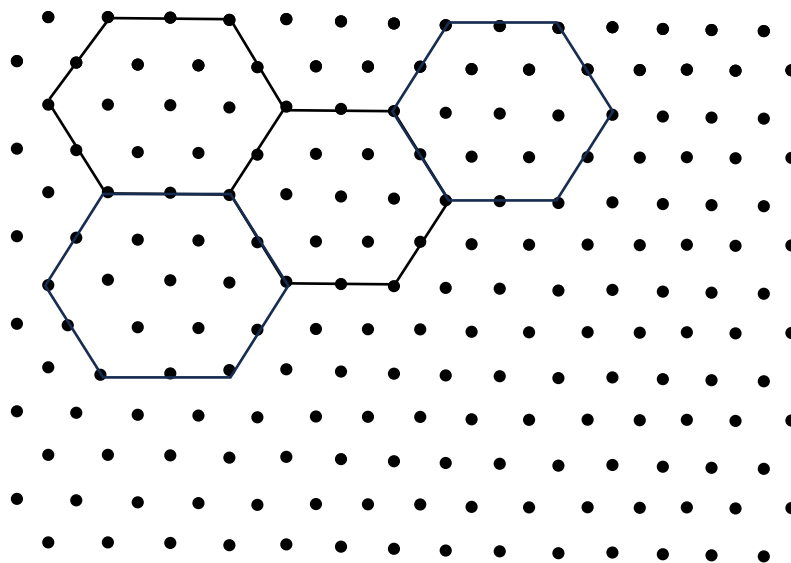
Instructions:

- Read all the questions carefully and answer all the questions.
- The total marks of this assessment is 10 marks and the total time allowed is 15 minutes.
- Attempt all the questions as per the directions of each question, and complete the following patterns.

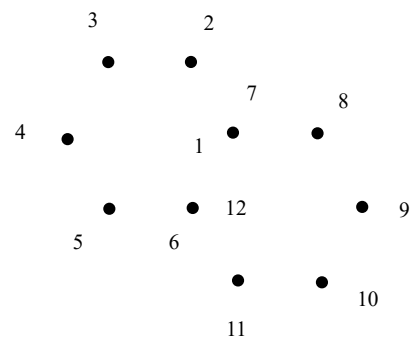
I. Complete the following designs and name the shape involved in each design:

(5x2 Marks = 10)

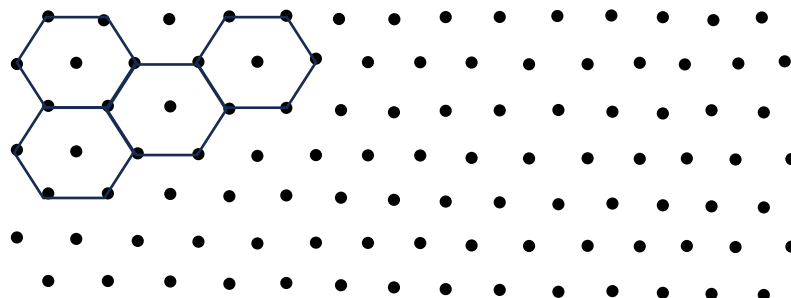
(1)



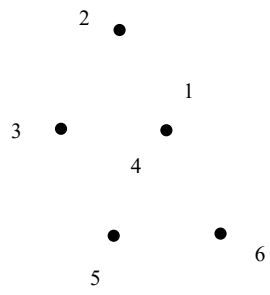
(1)



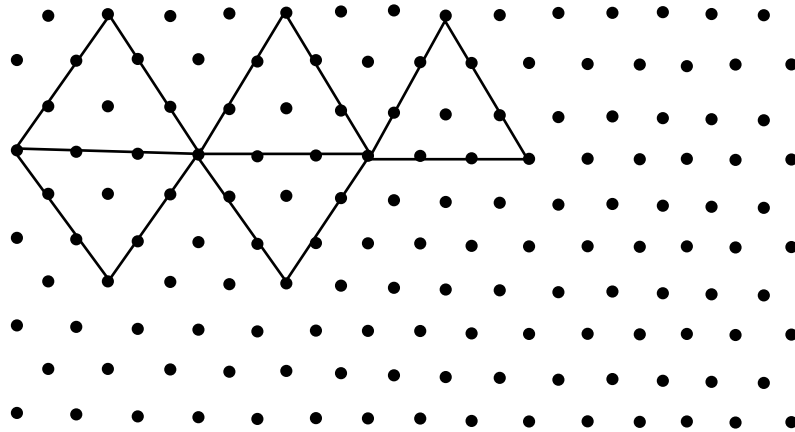
(3)



(4)



(5)



CHAPTER-2: SOLIDS

Sub-unit (a): Cuboid

Learning Objectives:

- To enable the students to identify the shape of a cuboid.
- To enable the student to explain the concept of face, edge and vertex.
- To enable the students to identify the number of faces, edges and vertices of a cuboid.
- To enable the students to differentiate between a rectangle and a cuboid.
- To enable the students to identify the objects that look like a cuboid.

Scenario-1: Ali is getting ready to go to school

1



Mother hands over a tiffin box to Ali, when he goes to school.

2



He looks at his school bus after collecting lunch from his mother.

3



Then, he sits inside the school bus and goes to school.

4



On the way, he sees a mason holding a brick.

5



He also sees a delivery boy delivering something in a Carton box

6



After coming home, he notices the shape of the fridge.

7



Ali then thinks deeply about the shapes of the various things he saw.

1



The shape of the tiffin-box.

2



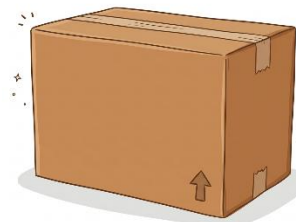
The shape of the school-bus

3



The shape of the brick

4



The shape of the carton-box.

5



The shape of the refrigerator

He then thinks.....



What do you think?

Is there a similarity between the shape of all these objects?



8

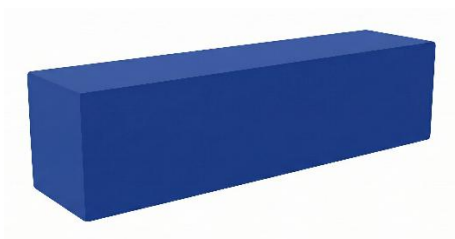


The next day, he goes to school and asks his teacher whether there is a similarity between the shapes of the tiffin box, school bus, brick, carton box and refrigerator.

9



The teacher tells him that they all have the same shape called '**cuboid**'

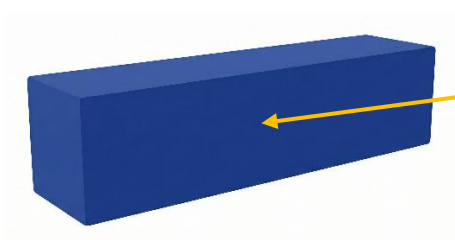


This is a cuboid

Faces, Edges and Vertices

(i) Face

A face is a flat or curved surface of a solid shape

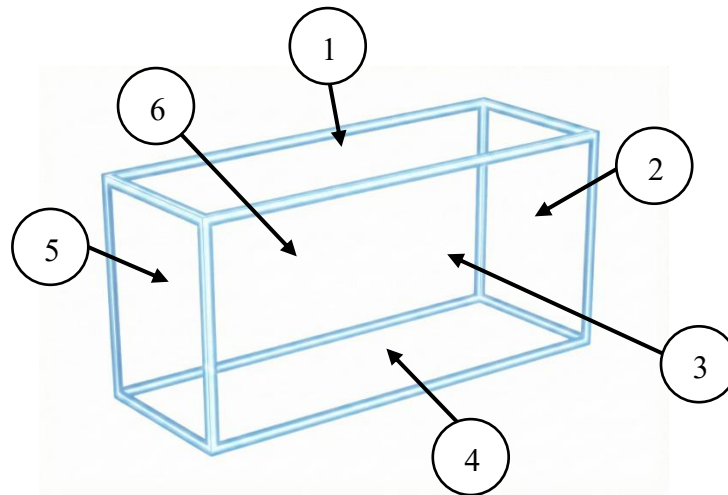


Face

Now count the number of faces on a cuboid and guess how many faces it has.



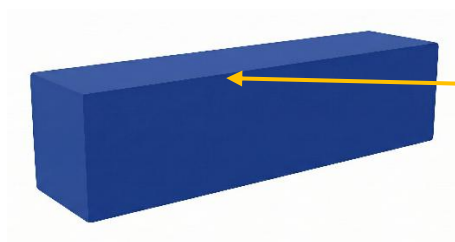
Yes, you are right! There are six faces



A cuboid has 6 faces.

(ii)Edge

An edge is the line segment where two faces of a solid shape meet

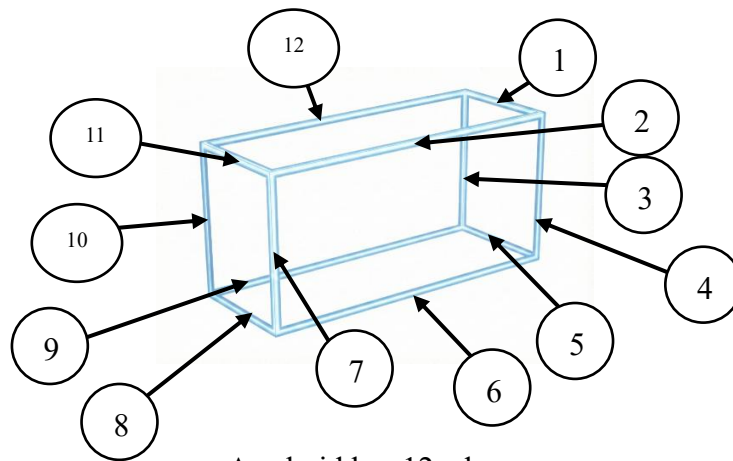


Edge

Now count the number of edges of a cuboid and guess how many edges it has.



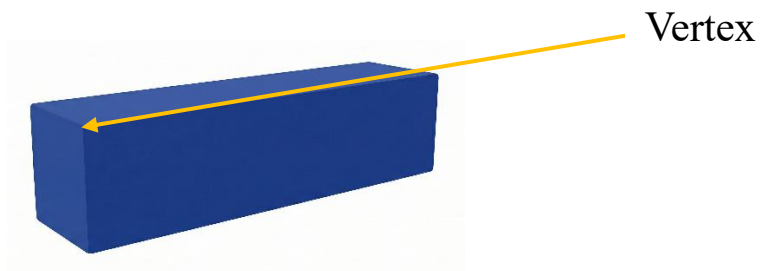
Yes, you are right! There are 12 edges.



A cuboid has 12 edges.

(iii) Vertices

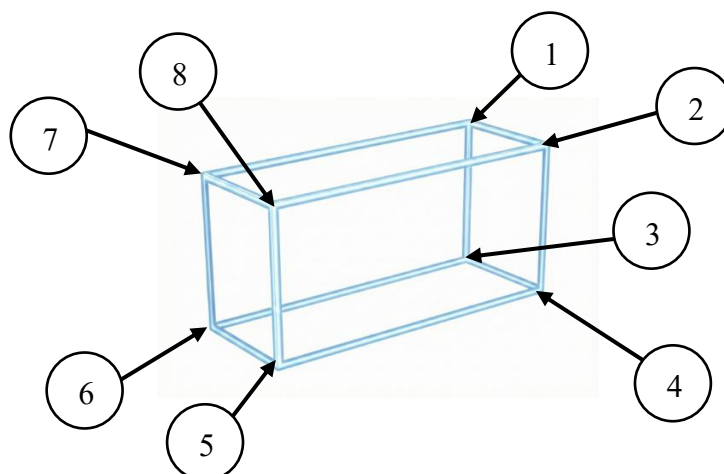
A vertex of a solid is a **corner point** where two or more edges of the solid meet



Can you count the number of vertices of a cuboid and guess how many vertices it has?



Yes, you are right! There are 8 vertices.



Cuboid has 8 vertices

Difference between a rectangle and a cuboid

Scenario-2: Aman who is in his classroom observes certain objects in his classroom.



Aman is looking at a rectangular blackboard



Now, he looks at the cuboid-shaped duster



He then thinks, “They look similar, but are they the same?”



Aman goes and asks his teacher whether there is a similarity between the shape of the blackboard and the duster.



The teacher clarifies that they are not the same, because a **blackboard's shape is rectangle** whereas the **duster's shape is cuboid**.



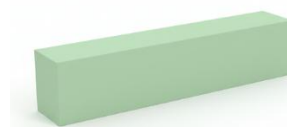
Blackboard



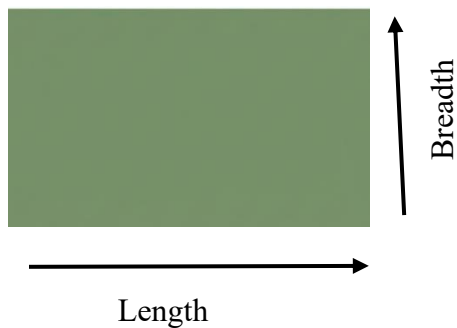
Rectangle



Duster

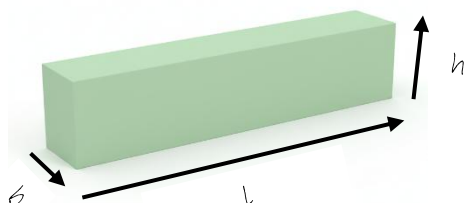


Cuboid



A rectangle has 2 dimensions:

- (a) Length
- (b) Breadth



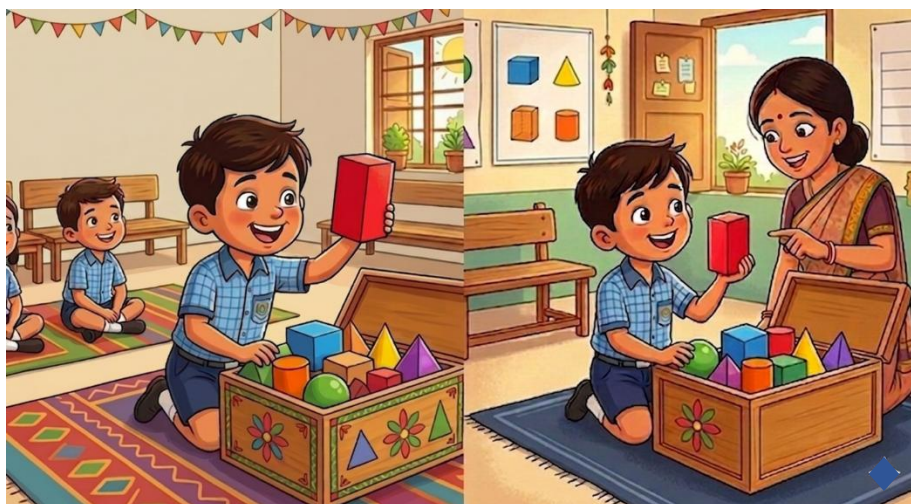
A cuboid has 3 dimensions:

- (a) l = Length
- (b) b = Breadth
- (c) h = Height

List of suggested activities:

(1) Pick the cuboid from the box

- In a box, add various 3-dimensional shapes such as cube, cuboid, sphere, cone, prism, cylinder, etc.
- The student is expected to pick up the cuboid from the shapes available in the box and hand it over to the teacher.



(2) Identifying the objects that look like a cuboid

- On a table spread various objects
- Among the objects which have been spread on the table, the student is expected to pick up the objects that possess the shape of a cuboid



(3) Differentiating between a cuboid and rectangle.

- In a bag, add 4-5 objects that possess the shape of a cuboid and 4-5 other objects that possess the shape of a rectangle have to be placed.
- On a table, 2 empty trays have to be placed, wherein one tray should contain a name board named 'Cuboid' and the other tray should contain a name board named 'Rectangle'
- Each student is expected to pick up objects from the bag and place the objects that possess the shape of a cuboid into the empty tray containing the name board

‘Cuboid’ and the objects that possess the shape of a rectangle into the empty tray containing the name board ‘Rectangle’



ASSESSMENT

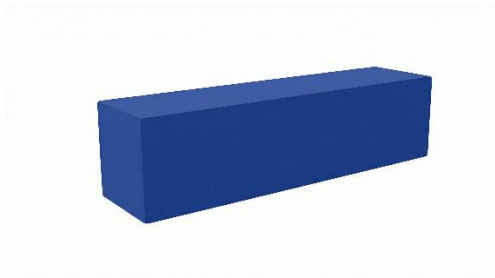
Total Marks: 10
Duration: 10 minutes

Instructions:

- Read all the questions carefully and answer all the questions.
- The total marks of this assessment are 10 marks and the total time allowed is 10 minutes.
- Attempt all the questions as per the directions of each question, and name or state the number as required.

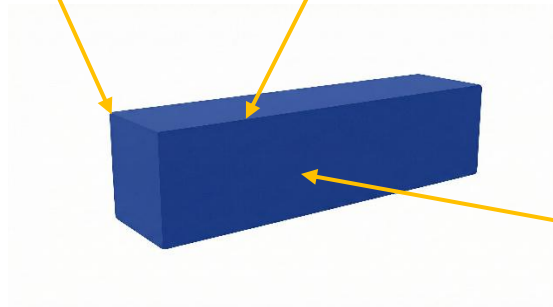
I. Name the following:

(1x1 Mark = 1)



II. Label the following:

(3x1 Marks = 3)



III. State the number of each of the following in a cuboid:

(3x1 Mark = 3)

Faces



Edges



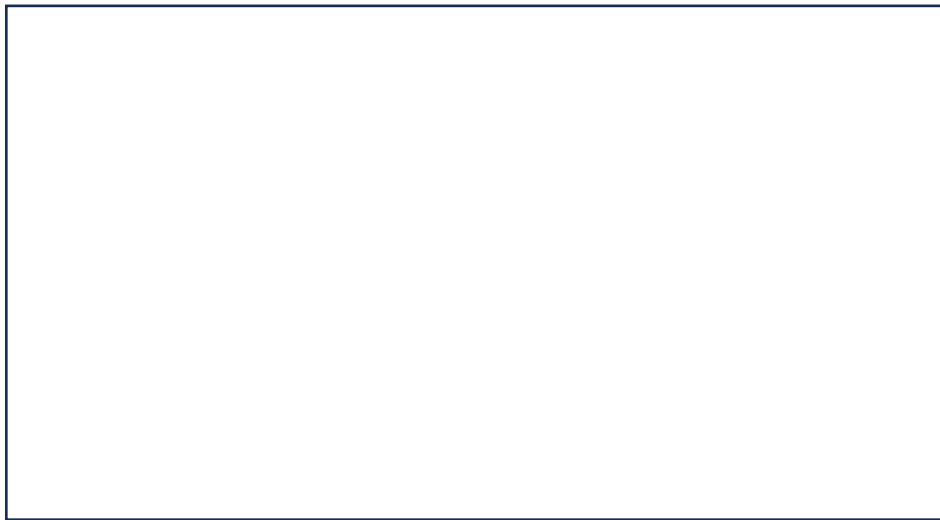
Vertices



- IV. Identify the **shape** of the following object from the given scenario: (1 x 1 = 1)



- V. Draw a picture of a cuboid and label its face, edge, and vertex: (2 x 1 = 2)



Sub-unit (b): Cube

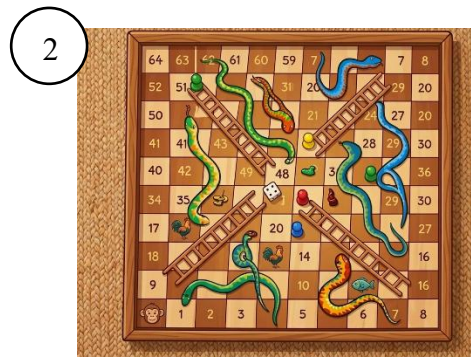
Learning Objectives:

- To enable the students to identify the shape of a cube.
- To enable the students to identify the number of faces, edges and vertices of a cube
- To enable the students to differentiate between a square and a cube
- To enable the students to identify the objects that look like a cube

Scenario-1: This is Anita, who is playing the snake and ladders game



Anita is playing snake and ladder



She looks at the shape of the game board



Then she looks at the dice



Then she thinks whether they are the same, since they look similar



Are these two shapes the same?



Think about it



This is a square



This is a cube

So, they are not the same

The shape of a Snakes and Ladders board is **square**



Snakes and Ladders board



Square

The shape of a dice is **cube**

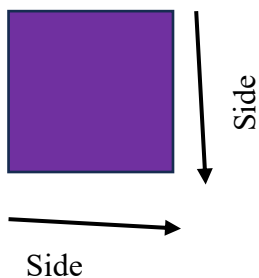


Dice

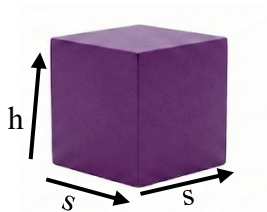


Cube

Difference between a square and cube

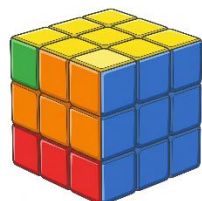


A square has 2 dimensions: 2 equal sized “sides”



A cube has 3 dimensions: 2 equal sized “sides” and “h=height”

Things that look like a cube:



Rubik's Cube



Ice-cube

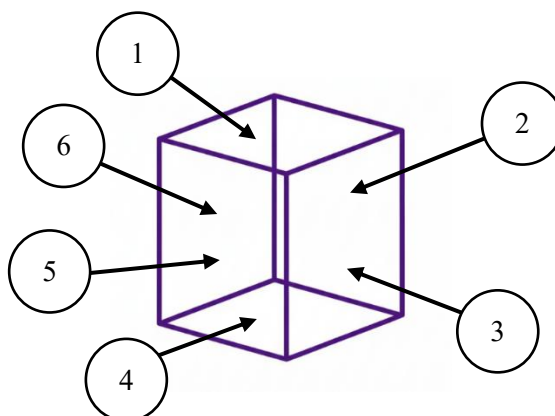


Dice

Now let us learn about the faces, edges and vertices of a square

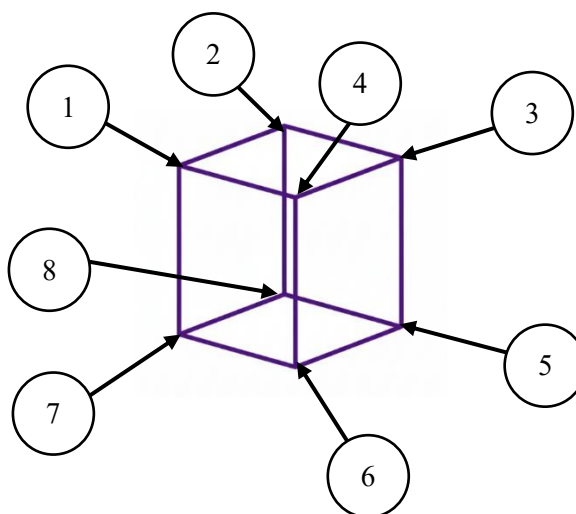
Faces, edges and vertices of a square

Now, let us count the number of faces of a cube



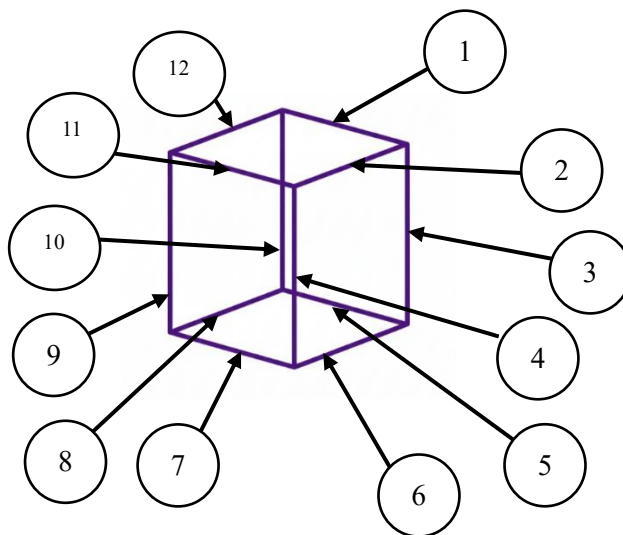
A cube has 6 faces.

Now, let us count the number of vertices of a cube



A cube has 8 vertices

Now, let us count
the number of
edges of a cube



A cube has 12 edges

List of suggested activities:

(1) Identifying the cube

- Spread around 10 objects that possess various shapes, among which 4-5 objects possess the shape of a cube.
- Each student is expected to hand over the objects that possess the shape of a cube to the teacher.



(2) Separating the cubes and cuboids

- In a container, add 4-5 objects that possess the shape of a cube and 4-5 objects that possess the shape of a cuboid.
- Place a bag with the name 'cube' on it and another bag containing the name 'cuboid' on it.
- Each student is expected to place the objects that possess the shape of the cube in the bag containing the name 'cube' on it and place the objects that possess the shape of cuboid in the bag containing the name 'cuboid' on it.



ASSESSMENT

Total Marks = 10 Marks
Time Duration = 10 Minutes

Instructions:

- Read all the questions carefully and answer all the questions.
- The total marks of this assessment is 10 marks and the total time allowed is 10 minutes.
- Attempt all the questions as per the directions of each question, and name or state the number or encircle or tick as per the requirements.

I. Name the following:

(1x1 Marks = 1)



This is a _____

II. State the number of the following:

(3x1 Mark = 3)



Number of faces _____

Number of edges _____

Number of vertices _____

III. Look at the following scene and identify the shape of the encircled **object**:
(1 x 1 Mark = 1)

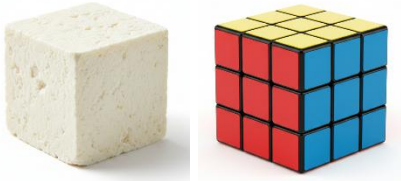


Shape of the object: _____

- IV. Look at the following scene of a small boy playing at home and identify the objects that look like a cube by encircling it:
(2 x 1 Mark = 2)



- V. Identify the blocks with all the objects that look like a cube by ticking the space provided under each block:
(3 x 1 Mark = 3)

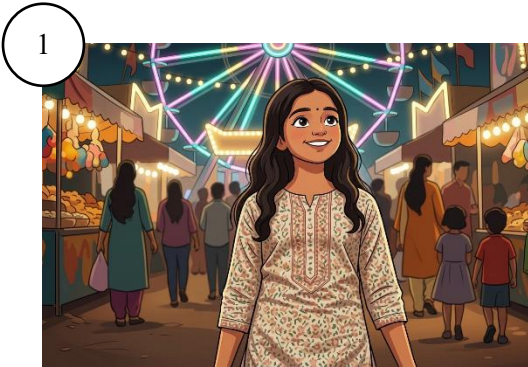
 ☐	 ☐
 ☐	 ☐
 ☐	 ☐

Sub-unit (c): Cylinder

Learning Objectives:

- To enable the students to identify the shape of a cylinder.
- To enable the students to draw a cylinder.
- To enable the students to identify objects that look like a cylinder

Scenario-1: Akshatha goes to a fair



Akshatha goes to a fair



She drank juice from a can



Akshatha puts the juice can into a dustbin

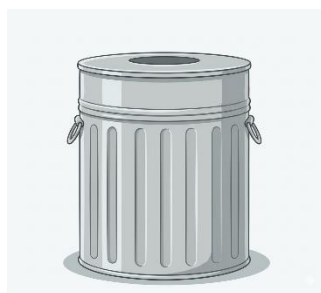


After coming home, she observes the gas cylinder at home.

Now look at all these objects



Juice Can



Dustbin



Gas Cylinder

Is there any similarity between these three objects?

Think about it



If you look carefully, you can find that they have a similar shape.

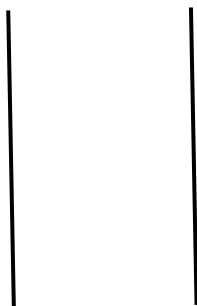
The shape of the above juice can, dustbin and gas cylinder is called '**Cylinder**'



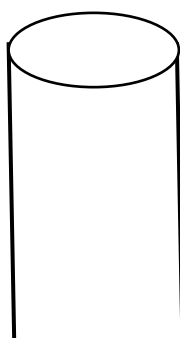
This is a cylinder

Come, let us learn to draw a cylinder step by step!

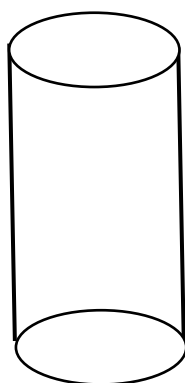
Step-1: Draw 2 vertical parallel lines.



Step-2: Draw one oval joining the top of the two lines.



Step-3: Draw another oval joining the bottom of the two lines.



List of suggested activities:

(1) Separating cylinder from other shapes

- In a small gunny bag, add objects having various shapes, including objects with cylindrical shape
- Place a cylindrical shaped container and another box on a table in front of the student.
- Each student is expected to pick the objects from the small gunny bag and put cylindrical shaped objects into the cylindrical shaped container and the other objects into the box.



(2) Forming cylinder

- Give a mould of cylinder to each student
- Appropriate amount of clay has to be given to each child
- The students are expected to form cylindrical models, by using the clay and clay moulds.



ASSESSMENT

Total Marks: 10
Time Duration: 10 minutes

Instructions:

- Read all the questions carefully and answer all the questions.
- The total marks of this assessment is 10 marks, and the total time allowed is 10 minutes.
- Attempt all the questions as per the directions of each question, and name or draw as per the requirements.

I. Name the shape of the following object: (1x1 Mark=1)



Shape of this crayon is _____

II. Write the names of objects that look like a cylinder: (3 x 1 Mark = 3)

- 1.
- 2.
- 3.

III. Draw the shape of a cylinder: (1 x 6 Marks = 6)



Sub-unit (d): Cone

Learning Objectives:

- To enable the students to identify the shape of a cone
- To enable the students to identify the objects that look like a cone

Scenario-1: Kethan goes to attend his friend's birthday in his neighbourhood



Kethan went to his friend's birthday



The birthday girl was wearing a cap



At the birthday party, he ate an ice-cream



While coming back home, he saw a traffic cone on the road



Kethan then thinks that.....



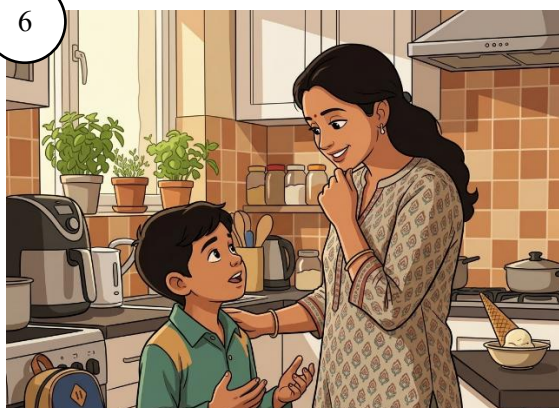
.....the shapes of the birthday hat, ice cream cone, and traffic cone are similar.



What do you think?

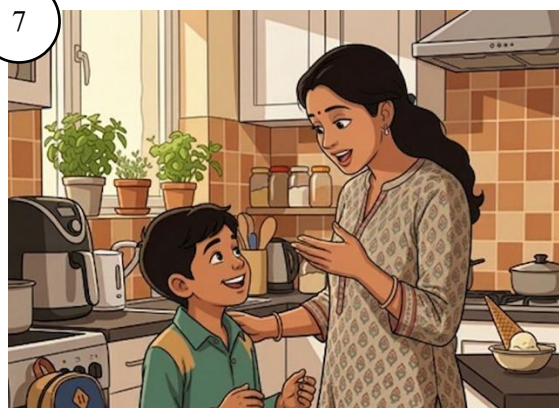
Is there a similarity between these shapes?

6



After coming home, he asks his mother about the similarity in the shape of the birthday hat, ice-cream cone and the traffic cone.

7



His mother says that the shapes of all these objects are the same, and that the shape is called a **cone**.

This is a '**Cone**'!



The base of a cone is "circular"

Fun Activity: Help the boy reach the apple by encircling the objects that look like cone on the way:



List of suggested activities:

(1) Identifying the shape of the object formed

- On a table, pour sand from a single point such that the sand forms a conical pile. (This can be done either by the teacher or by supervising the students to form a pile themselves)
- In a tray placed next to the pile, add the word cards containing the names of various shapes, such as cone, cylinder, cube, cuboid, rectangle, square, circle, triangle, etc.
- Now, looking at the pile, the student should identify the shape of the pile as cone, and pick up the word card containing the name of cone.



(2) Forming a cone, using paper

- Take a semicircular paper
- Fold it as shown in the image
- Stick a circular paper at the bottom as base
- Now a cone has been formed using paper



ASSESSMENT

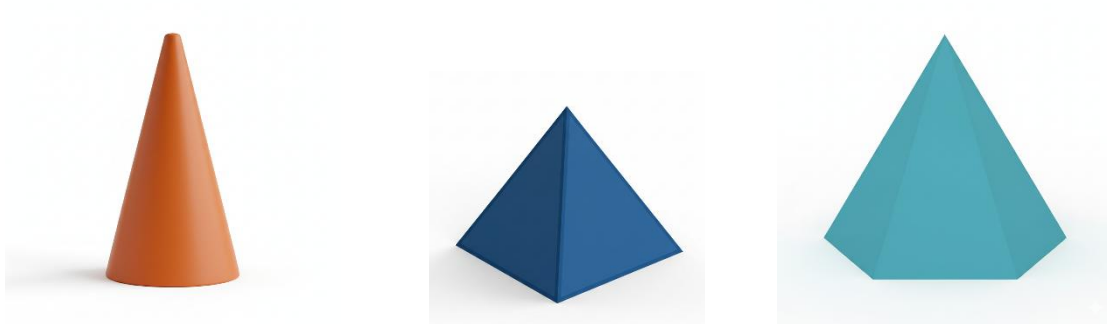
Total Marks: 10

Time duration: 15 minutes

Instructions:

- Read all the questions carefully and answer all the questions.
- The total marks of this assessment is 10 marks, and the total time allowed is 15 minutes.
- Attempt all the questions as per the directions of each question, and encircle or draw as per the requirements.

I. Which among the following is cone shape? (Encircle it) (1x1 Mark =1)



II. Draw and write the names of any 3 objects that look like a cone: (3x3 Marks = 9)

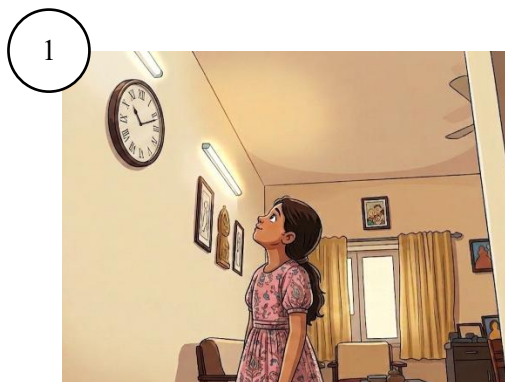
1. _____	2. _____	3. _____
---------------------	---------------------	---------------------

Sub-unit (e): Sphere

Learning Objectives:

- To enable the students to identify the shape of a sphere
- To enable the students to identify the objects that look like a sphere
- To enable the students to differentiate between a circle and a sphere

Scenario-1: Riya looks at certain objects in her house



Riya looks at the wall and finds a circular-shaped clock



On the floor she finds a red ball



Then she thinks,



What do you think?
Are they the same or are they
different?

4



She asks her father whether the shape of the clock and the shape of the ball are the same

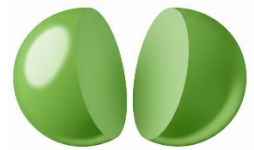
5



Her father says that they are not the same



The shape of a clock is **'circle'**



The shape of a ball is **'sphere'**

A sphere is round in shape.

Let us have a look at some of the objects that look like a sphere

1.



The Earth

2.



Bubble

3.



The Sun

4.



The Moon

List of suggested activities:

(1) Making a sphere

- Give clay dough to each child
- The teacher has to show how to make a sphere using the clay dough, employing both the hands, rolling it into a sphere, in between her palms.
- The students are expected to make the sphere out of clay dough, as per the guidance of the teacher.



(2) Blowing bubbles and identifying the shape

- The teacher should blow bubbles or he/she can make the students blow the bubbles.
- Now, the students are expected to identify the shape of the bubble, by picking up the word card of 'sphere', from the various word cards containing names of other shapes such as cube, cuboid, cylinder, cone, triangle, square, rectangle, pentagon, hexagon, etc.



(3) Identifying the sphere

- In a container add objects possessing the shapes of cube, cuboid, cone, cylinder and sphere
- Keep 5 different boxes containing the names cube, cuboid, cone, cylinder and sphere.

- Each student is expected to pick up each object and put them in the boxes containing their respective name of shape



ASSESSMENT

Total marks: 10

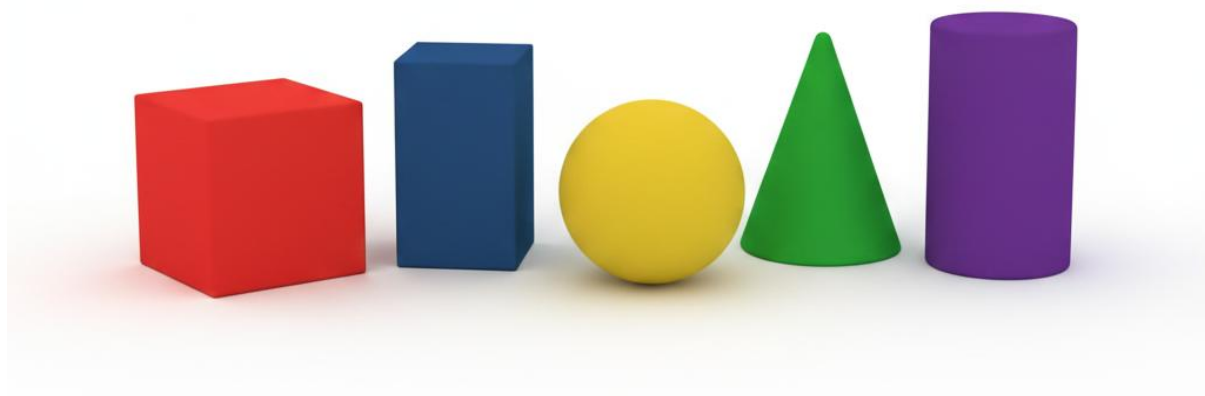
Time allotted: 10 minutes

Instructions:

- Read all the questions carefully and answer all the questions.
- The total marks of this assessment is 5 marks, and the total time allowed is 5 minutes.
- Attempt all the questions as per the directions of each question, and encircle or write as per the requirements.

I. Identify the “sphere” shape: (Encircle it)

(1x1 Mark = 1)



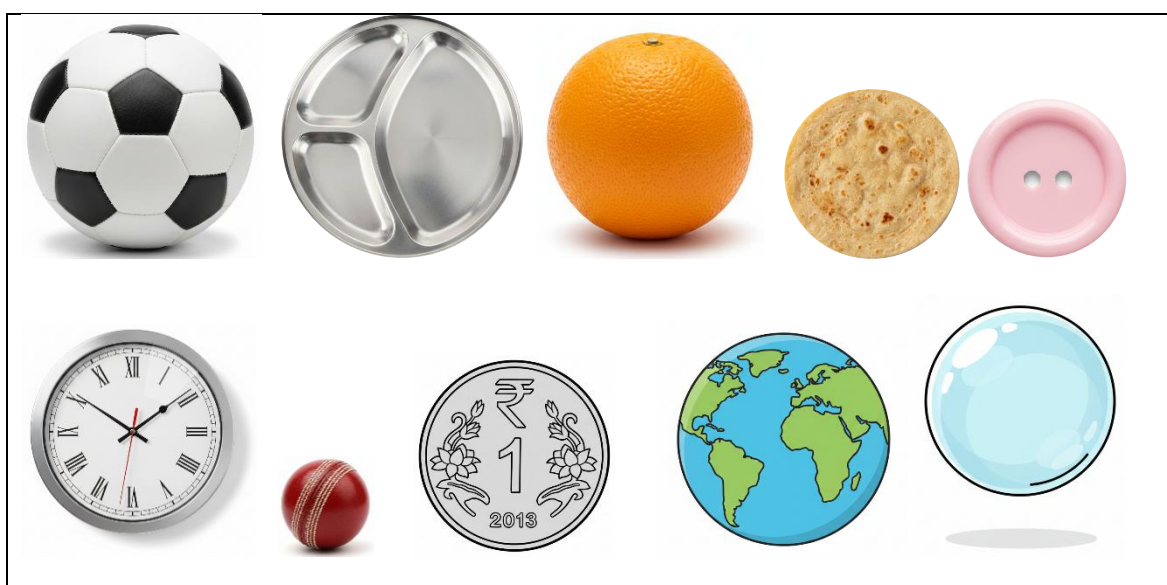
II. Write the names of any 4 objects which look like sphere:

(4x1 Mark = 4)

- 1.
- 2.
- 3.
- 4.

III. Identify the objects that look like a sphere by encircling it:

(5x1 mark = 5)

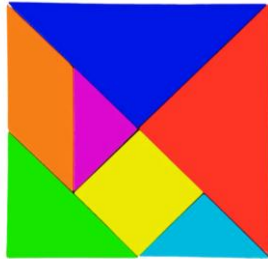


Solutions

Chapter-1: Tangrams and Designs

Sub-unit (a): Introduction to Tangrams

- I. Name the following: (1x1 Mark = 1)



This is a Tangram

- II. Match the following shapes with their names: (3x1 Mark = 3)

(1)



-

Triangle

(2)



-

Square

(3)



-

Parallelogram

- III. Choose the correct number of the following shapes present in tangram: (3x1 Mark = 3)

(1)



(b) 1 (b) 3 (c) 5 (d) 7

(2)



(b) 2 (b) 4 (c) 1 (d) 3

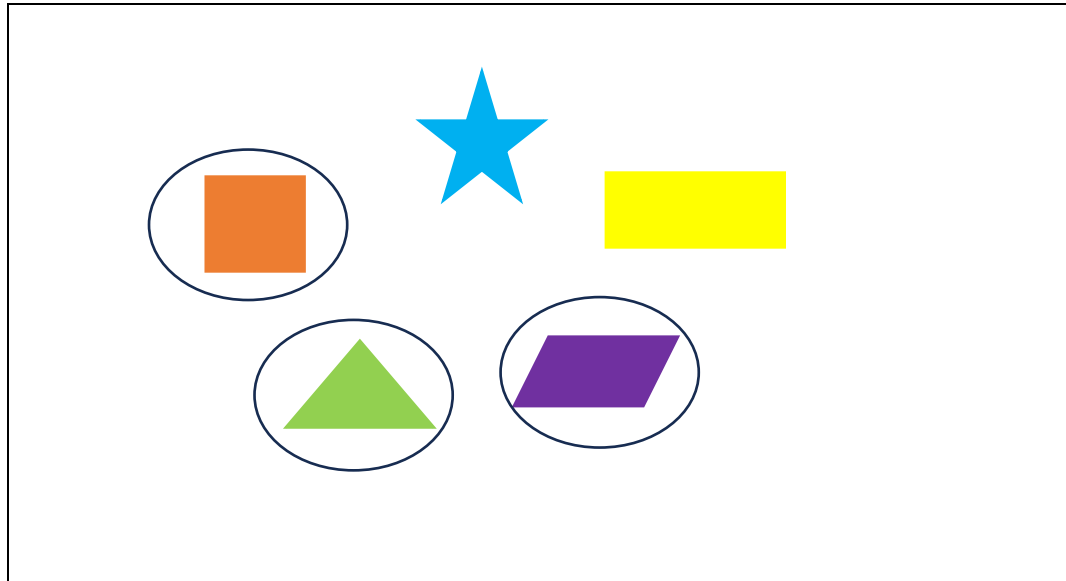
(3)



(b) 1 (b) 2 (c) 5 (d) 7

IV. Encircle the shapes that are present in a tangram:

(3 x 1 Mark = 3)

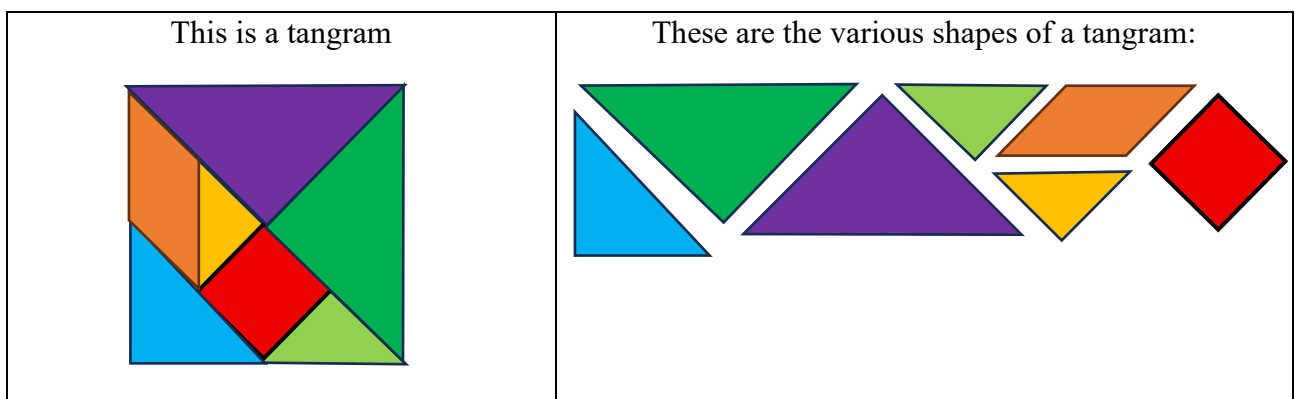


Sub-unit (b): Various designs using Tangrams

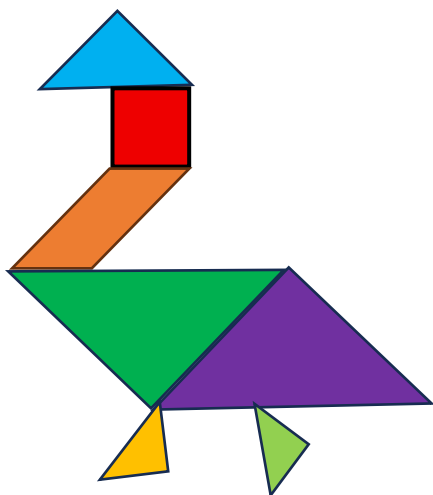
I. Use the 7 tangram pieces to prepare a design of:

(1x5 Marks = 5)

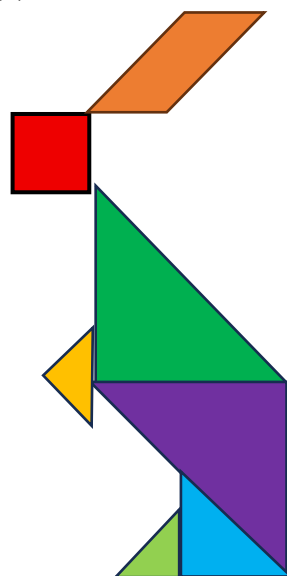
- (d) A duck (or)
- (e) A Rabbit (or)
- (f) Any design of your choice



(a) Duck



(b) Rabbit

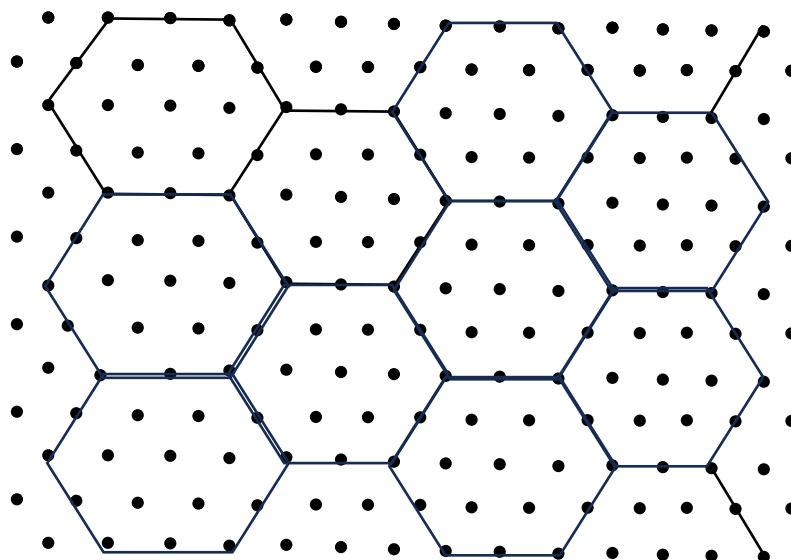


(c) Any design of the student's choice

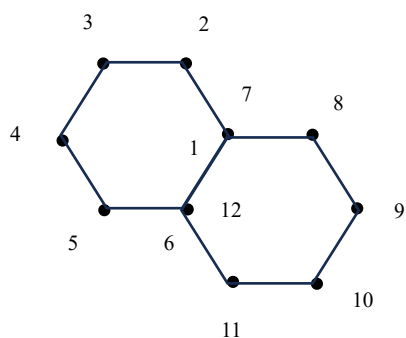
Sub-unit(c): Designs

- I. Complete the following designs and name the shape involved in each design:
(5x2 Marks = 10)

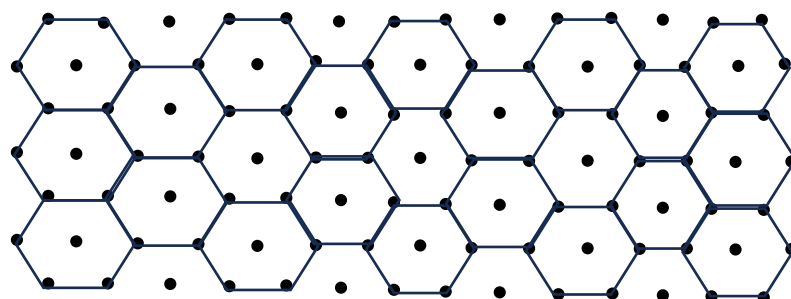
(1)



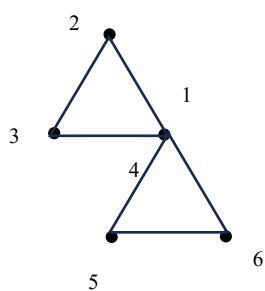
(2)



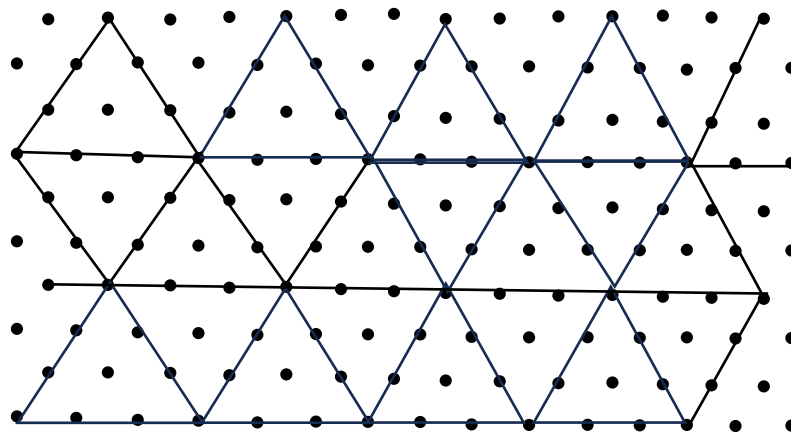
(3)



(4)



(5)

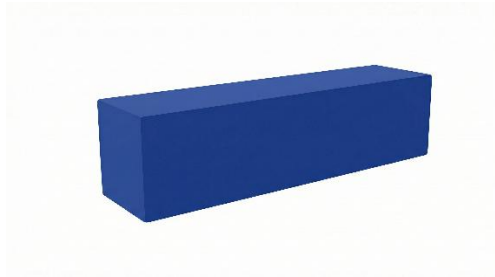


Chapter-2: Solids

Sub-unit(a): Cuboid

I. Name the following:

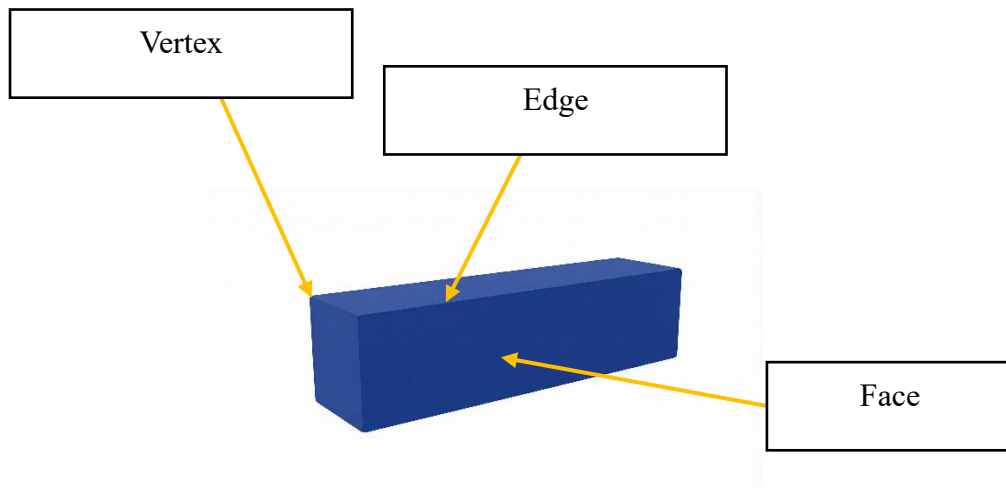
(1x1 Mark = 1)



Cuboid

II. Label the following:

(3x1 Marks = 3)



III. State the number of each of the following in a cuboid:

(3x1 Mark = 3)

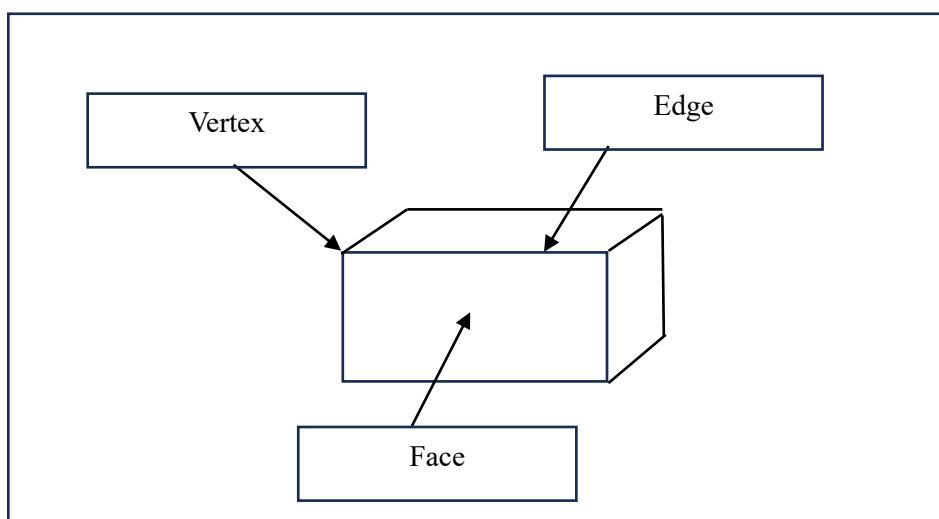
Faces	→	6
Edges	→	12
Vertices	→	8

IV. Identify the **shape** of the following object from the given scenario: (1 x 1 = 1)



Cuboid

V. Draw a picture of a cuboid and label its face, edge, and vertex: (2 x 1 = 2)



Sub-unit(b): Cube

I. Name the following:

(1x1 Marks = 1)



This is a Cube

II. State the number of the following:

(3x1 Mark = 3)



Number of faces 6

Number of edges 12

Number of vertices 8

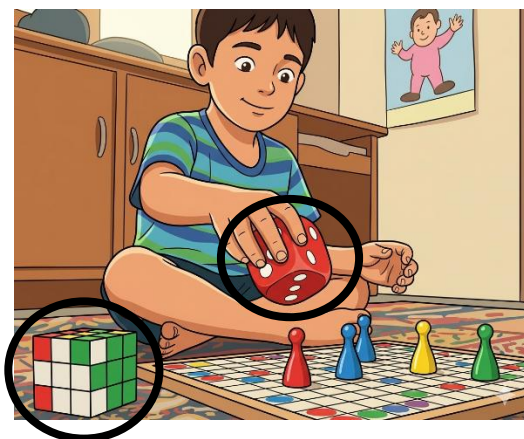
III. Look at the following scene and identify the shape of the encircled **object**:
(1 x 1 Mark = 1)



Shape of the object: Cube

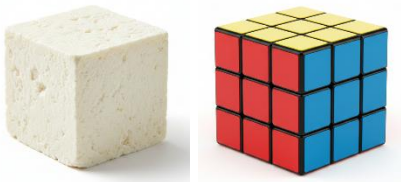
IV. Look at the following scene of a small boy playing at home and identify the objects that look like a cube by encircling it:

(2 x1 Mark = 2)



V. Identify the blocks with all the objects that look like a cube by ticking the space provided under each block:

(3 x 1 Mark = 3)

 ☒	 ☐
 ☒	 ☐
 ☐	 ☒

Sub-unit(c): Cylinder

I. Name the shape of the following object:

(1x1 Mark=1)



Shape of this crayon is Cylinder

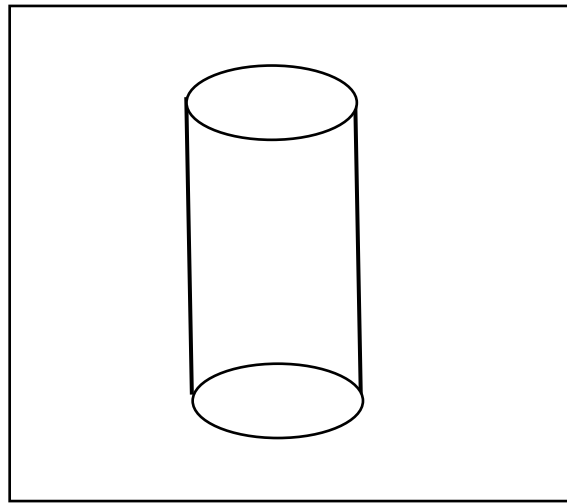
II. Write the names of objects that look like a cylinder:

(3 x 1 Mark = 3)

1. Gas Cylinder
2. Dustbin (Cylindrical Dustbin)
3. Juice can (Cylindrical Juice can)

III. Draw the shape of a cylinder:

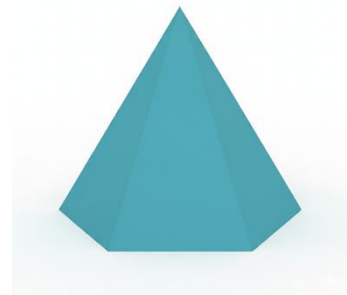
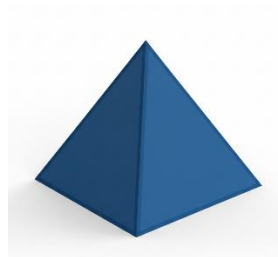
(1 x 6 Marks = 6)



Sub-unit(d): Cone

I. Which among the following is cone shape? (Encircle it)

(1x1 Mark =1)

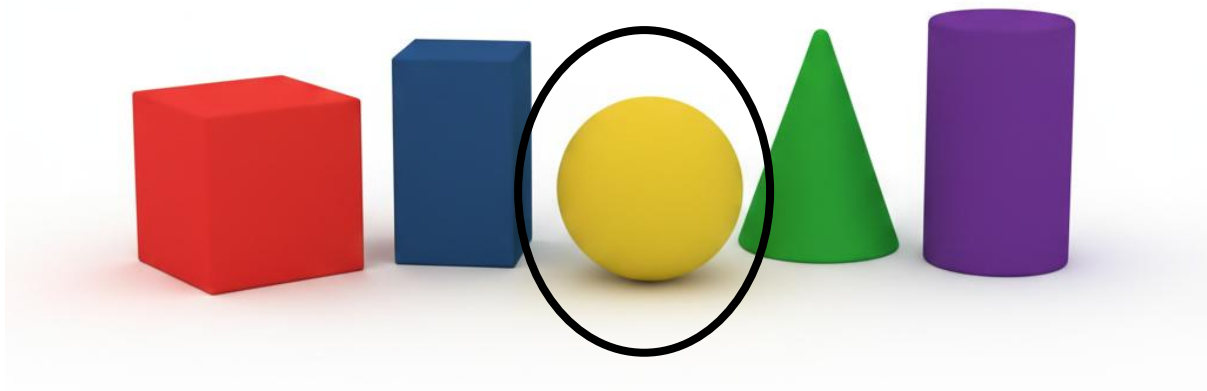


II. Draw and write the names of any 3 objects that look like a cone: (3x3 Marks = 9)

		
1. Birthday Hat	2. Ice-cream Cone	3. Traffic Cone

Sub-unit(e): Sphere

I. Identify the “sphere” shape: (Encircle it) (1x1 Mark = 1)

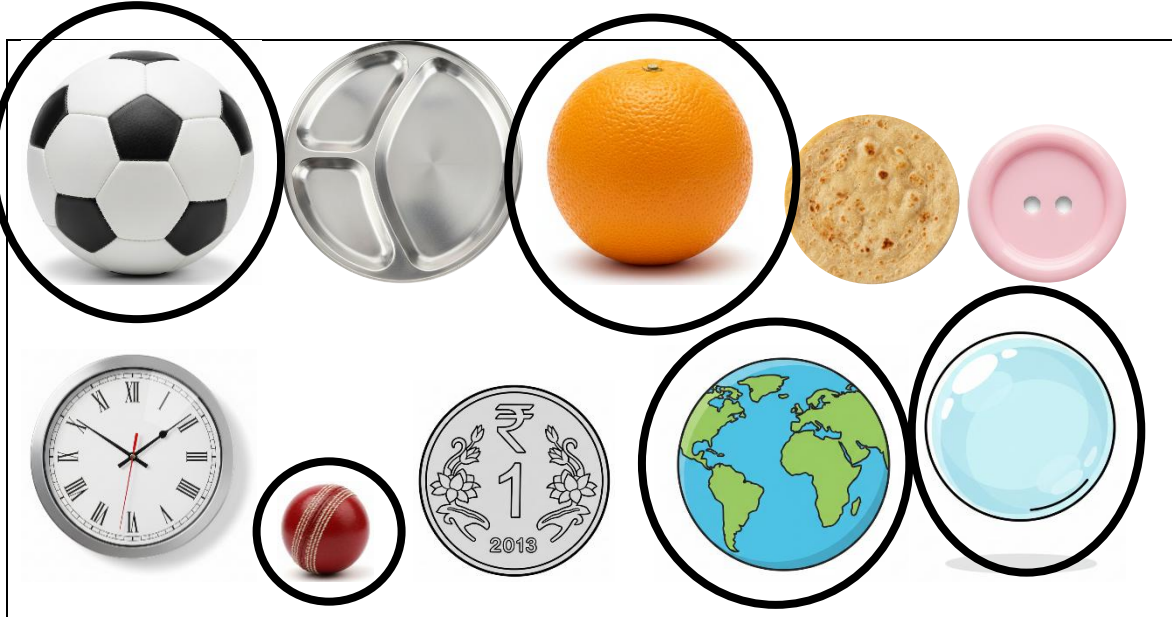


II. Write the names of any 4 objects which look like sphere: (4x1 Mark = 4)

1. Earth
2. Bubble
3. Sun
4. Moon

III. Identify the objects that look like a sphere by encircling it:

(5x1 mark = 5)



Pre-Test

Respondent No. _____

APPENDIX – B
RESEARCHER MADE PRE-TEST
Researcher Made Achievement Test
STD: 4th

Subject: Mathematics
Chapters: Tangrams and Designs & Solids

Time: 1 hour

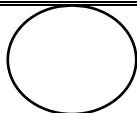
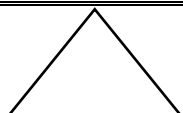
Maximum Marks: 25

Name of the Student: Roll No:

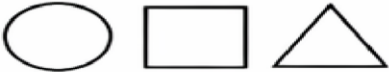
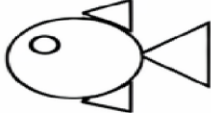
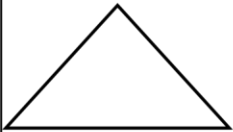
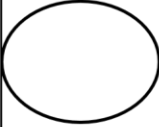
Name of the School: Category of Disability:

Instructions: All questions are compulsory. You can attempt in any order.

Q. 1	Name the following:			½ Mark x 10 = 05 Marks
				
	i.	ii.	iii.	iv.
				
	v.	vi.	vii.	viii.
				
	ix.	x.		

Q. 2	Fill in the blanks with the correct name of the shape					½ Mark x 5 = 2 ½ Marks
	Instruction: Choose the correct answer from the options given in the box and write it in the blank.					
						
	Circle	Square	Triangle	Rectangle	Star	

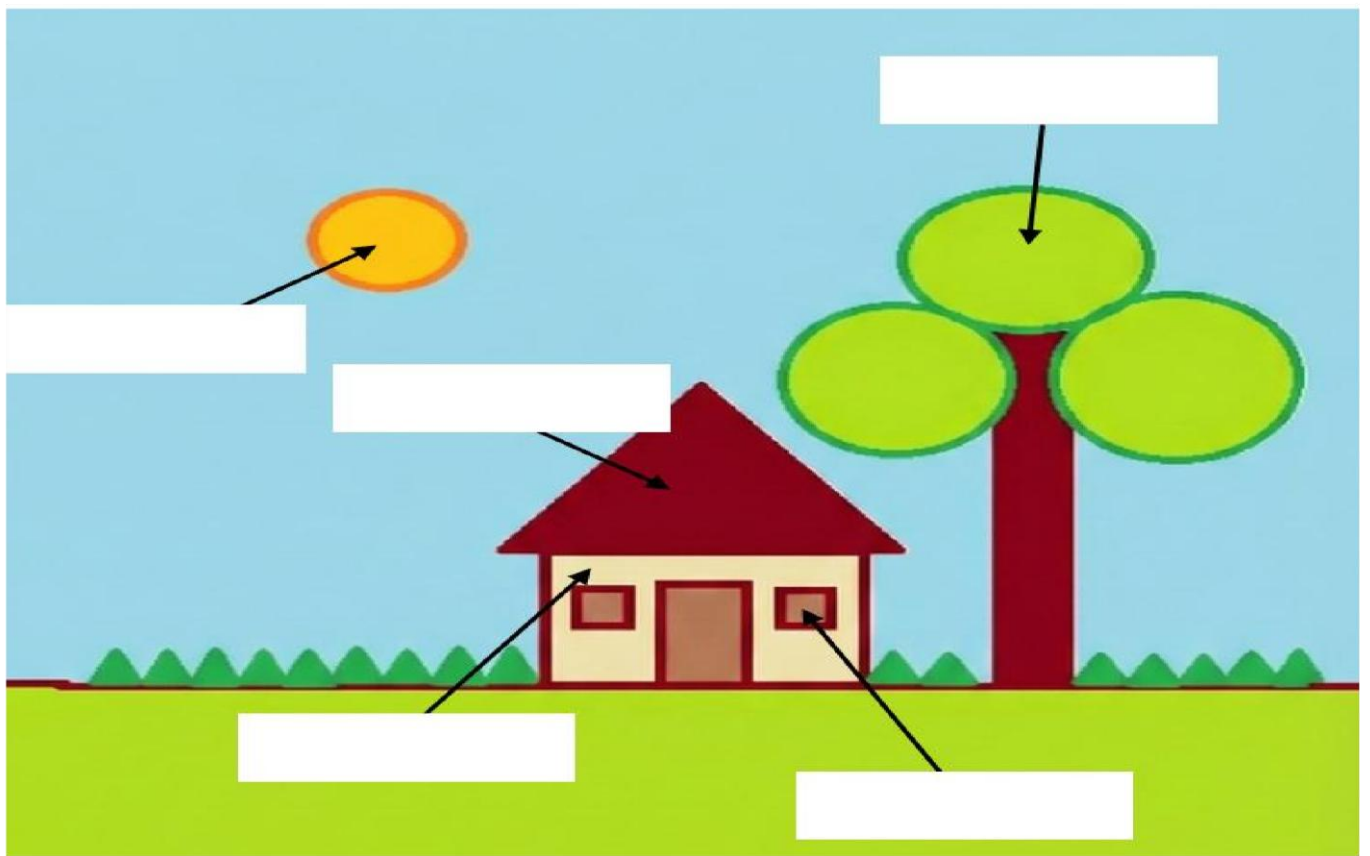
	i	A shape with three sides is called a _____.
	ii	A round shape with no corners is called a _____.
	iii	A shape with four equal sides is called a _____.
	iv	A shape with four sides but opposite sides equal is called a _____.
	v	A shape with five points is called a _____.

Q. 3		Complete the following pattern:		2 ½ Marks x 2 = 05 Marks	
	(a)			(b)	
Q. 4		Match the following		½ Mark x 5 = 2 ½ Marks	
		Set-1 (Shapes)		Set-II (Shape's Design)	
	i			a	
	ii			b	
	iii			c	
	iv			d	
	v			e	
Q. 5		Match the following		½ Mark x 5 = 2 ½ Marks	
		Set-1 (Shapes)		Set-II (Shape's objects)	
	i			a	
	ii			b	
	iii			c	
	iv			d	
	v			e	

Q. 6

Look at the picture carefully and write the names of the shapes that are pointed at.

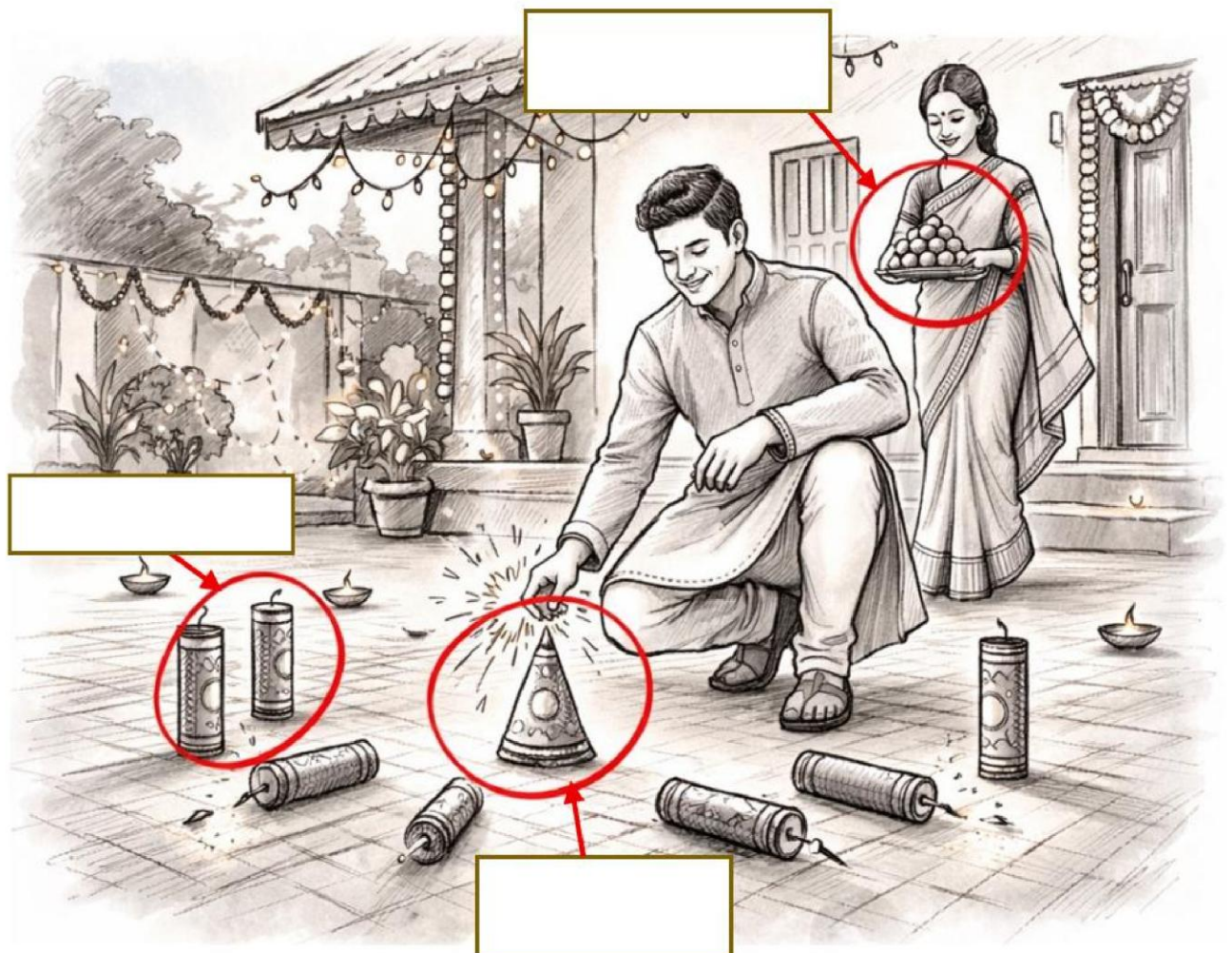
$\frac{1}{2}$ Mark x 5 = 2 $\frac{1}{2}$ Marks



Q. 7 Look at the picture carefully and write the names of the objects that have been encircled.

(i) That have been encircled

$\frac{1}{2}$ Mark x 3 = 1 $\frac{1}{2}$ Marks



(ii) That have been pointed at:

½ Mark x 2 = 01 Marks



Q. 8	Find the Odd One Out		½ Mark x 5 = 2 ½ Marks	
	Instruction: In each group, three shapes are similar and one shape is different, tick mark (✓) on odd one out.			
a	 Circle	 Triangle	 Square	 Ball
b	 Cube	 Cone	 Sphere	 Triangle
c	 Star	 Rectangle	 Square	 Circle
d	 Dice	 Ball	 Ice-cream Cone	 Square
e	 Cylinder	 Cube	 Box	 Rectangle

Signature with date

APPENDIX – C

RESEARCHER MADE POST-TEST

Post test

Researcher Made Achievement Test

Respondent no. _____

STD: 4th

Subject: Mathematics

Chapters: Tangrams and Designs & Solids

Time: 1 hour

Maximum Marks: 25

Name of the Student: Roll No:

Name of the School: Category of Disability:

Instructions: All questions are compulsory. You can attempt in any order.

Q. 1 Name the following:

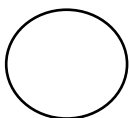
$\frac{1}{2}$ Mark x 10 = 05 Marks

i.		ii.		iii.		iv.	
v.		vi.		vii.		viii.	
ix.		x.					

Q. 2 Fill in the blanks with the correct name of the shape:

$\frac{1}{2}$ Mark x 5 = 2 $\frac{1}{2}$ Marks

Instruction: Choose the correct answer from the options given in the box and write it in the blank.



Circle



Square



Triangle



Rectangle



Star

- i. A shape with three sides is called a _____.

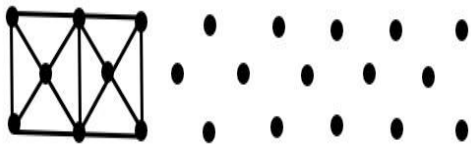
- ii. A round shape with no corners is called a _____.
- iii. A shape with four equal sides is called a _____.
- iv. A shape with four sides but opposite sides equal is called a _____.
- v. A shape with five points is called a _____.

Q. 3 Complete the following design:

05 Marks

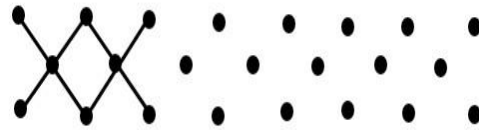
(a)

1 Mark



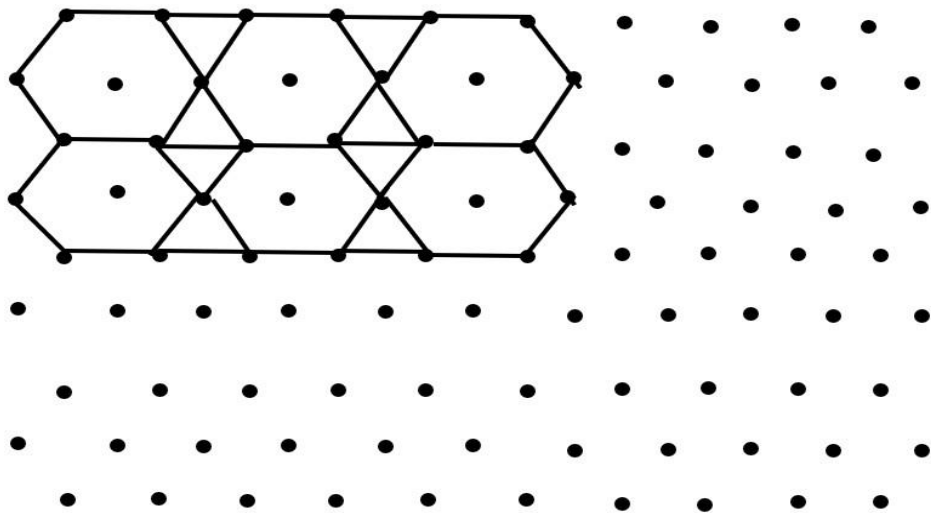
(b)

1 Mark



(c)

3 Marks



Q. 4 Match the following

½ Mark x 5 = 2 ½ Marks

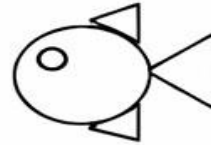
Set-1 (Shapes)

Set-II (Design using shapes)

i



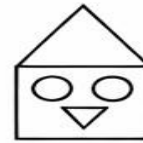
a



ii



b



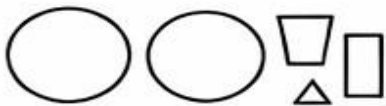
iii



c



iv



d



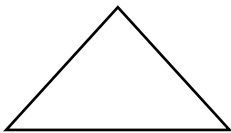
Q.5 Match the following

½ Mark x 5 = 2½ Marks

Set-1 (Shapes)

Set-II (Shape's objects)

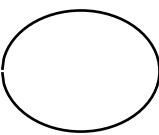
i



a



ii



b



iii



c



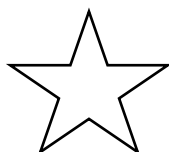
iv



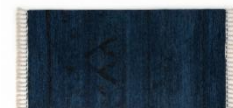
d



v

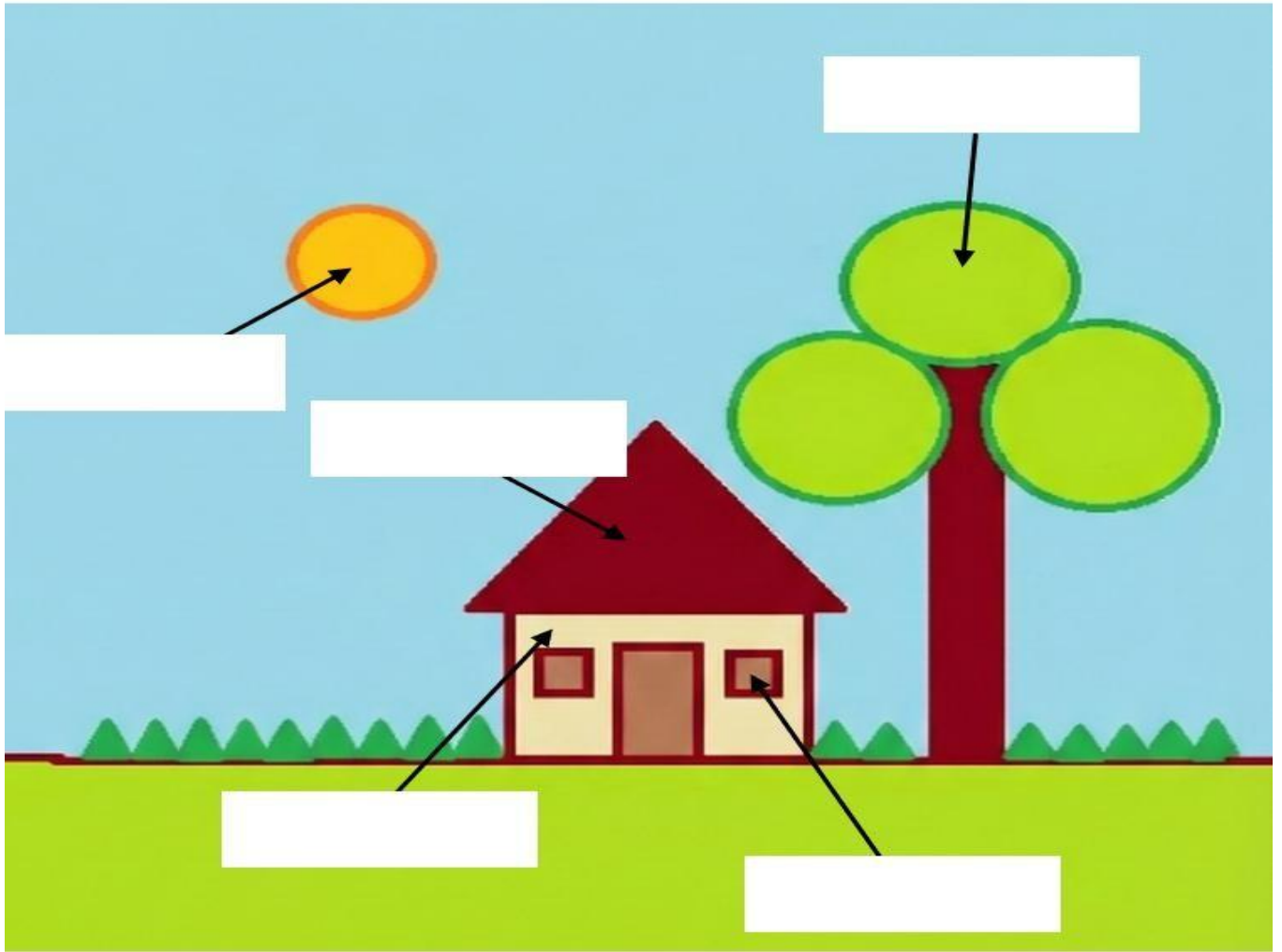


e



Q. 6 Look at the picture carefully and write the names of the shapes that are pointed at:

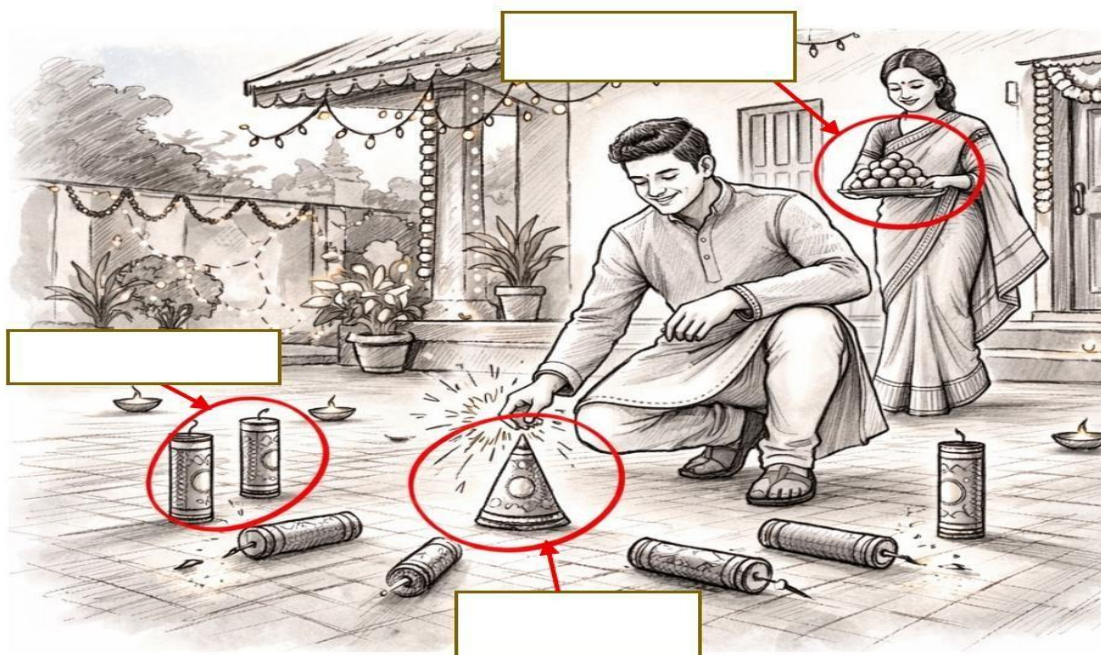
$\frac{1}{2}$ Mark x 5 = 2 $\frac{1}{2}$ Marks



Q. 7 Look at the picture carefully and write the names of the objects:

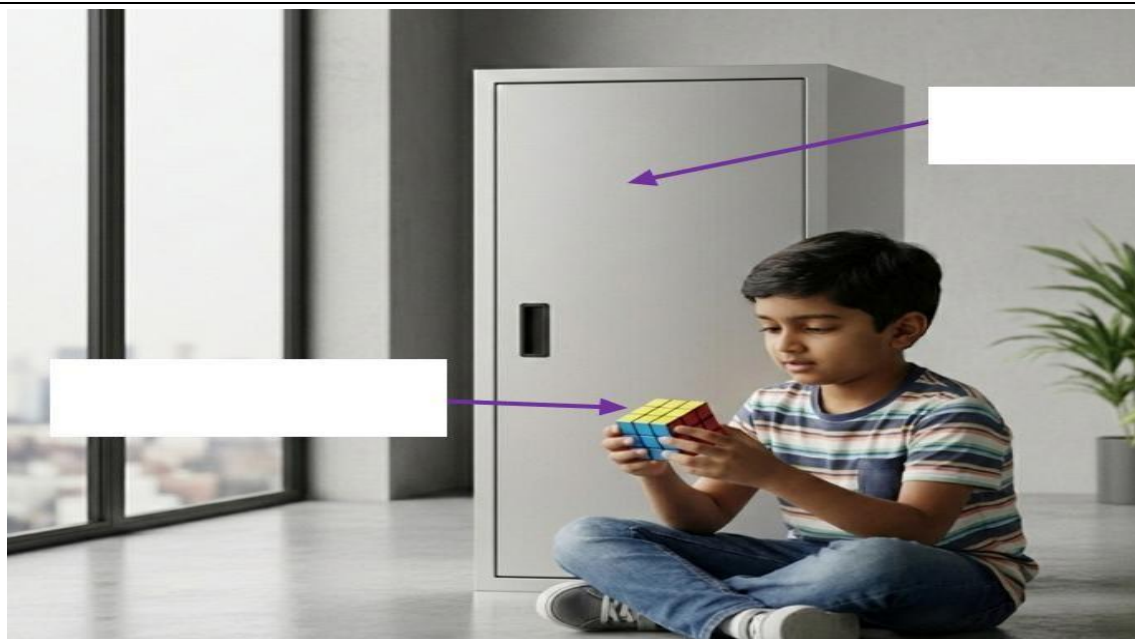
(i) That have been encircled

$\frac{1}{2}$ Mark x 3 = 1 $\frac{1}{2}$ Marks



(ii) That have been pointed at:

$\frac{1}{2}$ Mark x 2 = 01 Marks



Q. 8 Find the Odd One Out:

$\frac{1}{2}$ Mark x 5 = 2 $\frac{1}{2}$ Marks

Instruction: In each group, three shapes are similar and one shape is different, tick mark (✓) on odd one out.

a	 Circle	 Triangle	 Square	 Ball
b	 Cube	 Cone	 Sphere	 Triangle
c	 Star	 Rectangle	 Square	 Circle
d	 Dice	 Ball	 Ice-cream Cone	 Square
e	 Cylinder	 Cube	 Box	 Rectangle

Signature with date

APPENDIX – D

RESEARCHER-MADE STUDENT ENGAGEMENT CHECKLIST (RMSEC)

Tool: Researcher-Made Student Engagement Checklist (RMSEC)

Area and sub-areas selected:

Area	Sub Areas
Engagement levels of students with hearing impairment in STD-4	1. Behavioural Engagement 2. Cognitive Engagement 3. Emotional Engagement 4. Social-Interactive Engagement

1. No. of items – 16 (04 each)
2. Checklist – Engaged (1) / Not Engaged (0)
3. Scoring:
 - ☐ Engaged = 1
 - ☐ Not Engaged = 0
4. Total Score Range = 0–16
5. Higher score = Higher engagement

Weightage to the Area:

Area selected	Weightage (%)	Total no. of Items
Engagement levels of students with hearing impairment in Grade-4	100%	16

Weightage to the Subareas:

Area	Subareas	Weightage (%)	No. of Items
Engagement levels of students with hearing impairment in Grade-4	Behavioural Engagement	25%	4
	Cognitive Engagement	25%	4
	Emotional Engagement	25%	4
	Social-Interactive Engagement	25%	4
	Total	100%	16

Researcher-Made Student Engagement Checklist (RMSEC)

Engagement levels of students with hearing impairment in STD-4 with respect to the use of AI-assisted Scenario-based Learning in the subject of Mathematics

Name of the student:

Roll No.:

Name of the School:

Gender:

Degree of Hearing Loss:

Primary mode of communication:

Instructions: Observe the student throughout the AI-assisted scenario-based mathematics session and mark “**Engaged (1)**” if the behaviour is clearly observed, or “**Not Engaged (0)**” if it is not observed.

Sl.No	Description	Engaged	Not Engaged
Behavioural Engagement			
1	The student maintains visual attention toward the teacher during the lesson/activity.		
2	The student actively participates in the assigned scenario-based mathematics task.		
3	The student follows the given visual or signed instructions appropriately.		
4	The student completes assigned mathematical tasks within the given time.		

Cognitive Engagement			
5	The student attempts to solve the mathematical problem independently.		
6	The student selects appropriate strategies or operations to solve the problem.		
7	The student explains or justifies their answer using signs, visuals, or writing.		
8	The student connects the scenario to prior mathematical knowledge.		
Emotional Engagement			
9	The student shows interest when the scenario is introduced.		
10	The student persists even when the task becomes challenging.		
11	The student shows satisfaction upon completing the task.		
12	The student appears motivated to continue the activity.		
Social-Interactive Engagement			
13	The student interacts appropriately with peers during group activities.		
14	The student seeks clarification when concepts are unclear.		
15	The student responds positively to teacher or peer feedback.		
16	The student contributes ideas during group discussion.		

Name and Signature

APPENDIX – E

RESEARCHER-MADE RATING SCALE FOR MEASURING

Tool – Researcher-Made Rating Scale for measuring Teachers' Perspectives (RMRSTP).

Area and sub-areas selected:

Area	Sub Areas
Perspectives of teachers toward the use of AI-assisted SBL	1.Instructional Effectiveness 2.Student Engagement & Learning 3.Classroom Implementation 4.Feasibility & Professional Acceptance

1. No. of questions – 16 (04 each in each sub-area)

2. Rating Scale:

5 – Strongly Agree

4 – Agree

3 – Neutral

2 – Disagree

1 – Strongly Disagree

3. Scoring:

☐ Positive statement → 5 to 1 (SA to SD)

☐ Negative statement → 1 to 5 (Reverse Scoring)

Weightage to the Area:

Area selected	Weightage (%)	Total no. of Items
Perspectives of teachers toward the use of AI-assisted SBL	100%	16

Weightage to the Subareas:

Area	Subareas	Weightage (%)	No. of Items
Perspectives of teachers toward the use of AI-assisted SBL	Instructional Effectiveness	25%	4
	Student Engagement & Learning	25%	4
	Classroom Implementation	25%	4
	Feasibility & Professional Acceptance	25%	4
	Total	100%	16

Weightage of positive and negative statements

Description	Weightage	Number of Questions
Positive statements	75%	12
Negative statements	25%	4
Total	100%	16

Researcher-Made Rating Scale for measuring Teachers' Perspectives (RMRSTP).

Perspectives of teachers toward the use of AI-assisted Scenario-based Learning in

Mathematics

Name of the Respondent:

Gender.:

Name of the School:

Pedagogy Expert:

Teaching Experience:

Professional Qualification:

Mobile:

Email id:

Instructions: All statements are mandatory. Please indicate your level of agreement by selecting one response option for each statement. There are no right or wrong answers; please respond honestly based on your professional experience.

Sl. No	Description	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Instructional Effectiveness						
1	AI-assisted SBL improves students' understanding of mathematical concepts.					
2	This method helps explain abstract concepts more clearly.					
3	AI-assisted SBL enhances conceptual clarity among students with hearing impairment.					
4	The method supports meaningful learning rather than rote memorisation.					

5	AI-assisted SBL discourages the development of problem-solving skills. <i>(Negative)</i>					
Student Engagement & Learning						
6	Students show higher engagement during AI-assisted SBL sessions.					
7	Students appear more motivated when this method is used.					
8	The method promotes active participation among students.					
9	Students do not retain concepts effectively through AI-assisted SBL. <i>(Negative)</i>					
10	Students apply mathematical concepts to real-life situations more effectively.					
Classroom Implementation						
11	AI-assisted SBL integrates well with the existing curriculum.					
12	Classroom management remains manageable while using this method.					
13	The method allows effective use of visual supports for CwHI.					
14	AI-assisted SBL encourages collaborative learning.					
15	Implementing this method requires excessive preparation time. <i>(Negative)</i>					
Feasibility & Professional Acceptance						
16	I feel confident implementing AI-assisted SBL in my classroom.					
17	The benefits of AI-assisted SBL outweigh the effort required.					
18	This method supports inclusive teaching practices.					
19	AI-assisted SBL increases my professional satisfaction.					

20	AI-assisted SBL is difficult to sustain in regular classroom practice. <i>(Negative)</i>					
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Name and Signature



APPENDIX – F
AI-ASSISTED SCENARIO-BASED LEARNING MODULE
(KANNADA VERSION)



ಕೃತಕ ಬುದ್ಧಿಮತ್ತೆ-ಸಹಾಯಿತ ಸನ್ನಿವೇಶ ಆಧಾರಿತ
ಕಲಿಕಾ ಮಾದರಿ

ಅಧ್ಯಾಯಗಳು:

1. “ಟ್ಯಾನ್‌ಗ್ರಾಮ್ಸ್ ಮತ್ತು ವಿನ್ಯಾಸಗಳು”

2. “ಘನಾಕೃತಿಗಳು”

ವಿಷಯ: ಗಣಿತ

ತರಗತಿ: 4



ನೀಲನಕ್ಷೆ (BLUEPRINT)

ಕ್ರಮ ಸಂಖ್ಯೆ	ವಿವರಣೆ	ಕಲಿಕಾ ಉದ್ದೇಶಗಳು	ಒಳಗೊಂಡಿರುವ ಕ್ಷೇತ್ರಗಳು (Domains)
1.ಟ್ಯಾನ್‌ಗ್ರಾಮ್ಸ್ ಮತ್ತು ವಿನ್ಯಾಸಗಳು			
ಅ.	ಟ್ಯಾನ್‌ಗ್ರಾಮ್‌ಗಳ ಪರಿಚಯ	- ವಿದ್ಯಾರ್ಥಿಗಳು 7-ಖಂಡಗಳ ಟ್ಯಾನ್‌ಗ್ರಾಮ್‌ನ್ನು ಗುರುತಿಸುವಂತೆ ಅನುವು ಮಾಡಿಕೊಡುವುದು - ಟ್ಯಾನ್‌ಗ್ರಾಮ್‌ನ ವಿವಿಧ ಘಟಕಗಳನ್ನು (ಭಾಗಗಳನ್ನು) ವಿವರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಶಕ್ತರನ್ನಾಗಿಸುವುದು. 7-ಖಂಡಗಳ ಟ್ಯಾನ್‌ಗ್ರಾಮ್‌ಲ್ಲಿರುವ ವಿವಿಧ ಆಕಾರಗಳನ್ನು ಗುರುತಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಅನುವು ಮಾಡಿಕೊಡುವುದು. 7-ಖಂಡಗಳ ಟ್ಯಾನ್‌ಗ್ರಾಮ್‌ನಲ್ಲಿ ಒಳಗೊಂಡಿರುವ ಪ್ರತಿಯೊಂದು ಆಕಾರಗಳ ಸಂಖ್ಯೆಯನ್ನು ನಿರ್ಧರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಅನುವು ಮಾಡಿಕೊಡುವುದು.	ಜ್ಞಾನಾತ್ಮಕ ಕ್ಷೇತ್ರ (Cognitive domain)
ಆ.	ಟ್ಯಾನ್‌ಗ್ರಾಮ್ ಬಳಸಿ ವಿವಿಧ ವಿನ್ಯಾಸಗಳು	- ಟ್ಯಾನ್‌ಗ್ರಾಮ್‌ನ ಬಳಕೆಯನ್ನು ವಿವರಿಸುವಂತೆ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಅನುವು ಮಾಡಿಕೊಡುವುದು - ವಿದ್ಯಾರ್ಥಿಗಳು ಟ್ಯಾನ್‌ಗ್ರಾಮ್‌ಗಳನ್ನು ಬಳಸಿ ವಿವಿಧ ವಿನ್ಯಾಸಗಳನ್ನು ರೂಪಿಸಲು ಅನುವು ಮಾಡಿಕೊಡುವುದು - ಹೊಸ ವಿನ್ಯಾಸಗಳನ್ನು ರೂಪಿಸುವಲ್ಲಿ ವಿದ್ಯಾರ್ಥಿಗಳ ಸೃಜನಶೀಲ ಆಲೋಚನೆಗಳನ್ನು ಪ್ರೋತ್ಸಾಹಿಸುವುದು	- ಜ್ಞಾನಾತ್ಮಕ ಕ್ಷೇತ್ರ (Cognitive domain), - ಮನೋವಿಕಾಸಕ ಕ್ಷೇತ್ರ (Psychomotor domain)
ಇ.	ವಿನ್ಯಾಸಗಳು	- ತ್ರಿಭುಜಾಕಾರಗಳನ್ನು ಬಳಸಿ ವಿವಿಧ ವಿನ್ಯಾಸಗಳನ್ನು ಪೂರ್ಣಗೊಳಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಅನುವು ಮಾಡಿಕೊಡುವುದು. - ಷಡ್ಭುಜಾಕೃತಿಯ ಆಕಾರವನ್ನು ಗುರುತಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಅನುವು ಮಾಡಿಕೊಡುವುದು. - ಷಡ್ಭುಜಾಕೃತಿಯ ಬದಿಗಳ ಸಂಖ್ಯೆಯನ್ನು ಗುರುತಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಅನುವು ಮಾಡಿಕೊಡುವುದು.	- ಜ್ಞಾನಾತ್ಮಕ ಕ್ಷೇತ್ರ (Cognitive domain), - ಮನೋವಿಕಾಸಕ ಕ್ಷೇತ್ರ (Psychomotor domain)

		 ಷಡ್ಭುಜಾಕೃತಿಯ ಆಕಾರಗಳನ್ನು ಬಳಸಿ ವಿವಿಧ ವಿನ್ಯಾಸಗಳನ್ನು ಪೂರ್ಣಗೊಳಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಅನುವು ಮಾಡಿಕೊಡುವುದು.	
2.ಘನಾಕೃತಿಗಳು			
ಅ.	(ಅ) ಆಯತ ಘನ	- ವಿದ್ಯಾರ್ಥಿಗಳು ಆಯತಘನದ ಆಕಾರವನ್ನು ವಿವರಿಸುವಂತೆ ಅನುವು ಮಾಡಿಕೊಡುವುದು. - ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಮುಖ, ಅಂಚು ಮತ್ತು ಶೃಂಗಬಿಂದುಗಳ ಪರಿಕಲ್ಪನೆಯನ್ನು ವಿವರಿಸುವಂತೆ ಅನುವು ಮಾಡುವುದು. - ಆಯತಘನದಲ್ಲಿರುವ ಮುಖಗಳು, ಅಂಚುಗಳು ಮತ್ತು ಶೃಂಗಬಿಂದುಗಳ ಸಂಖ್ಯೆಯನ್ನು ಗುರುತಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಶಕ್ತರನ್ನಾಗಿಸುವುದು. - ಆಯತಮತ್ತು ಆಯತಘನದ ನಡುವಿನ ವ್ಯತ್ಯಾಸವನ್ನು ಗುರುತಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಸಹಾಯ ಮಾಡುವುದು. - ಆಯತಘನದ ಆಕಾರದಲ್ಲಿರುವ ದಿನನಿತ್ಯದ ವಸ್ತುಗಳನ್ನು ಗುರುತಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಶಕ್ತರನ್ನಾಗಿಸುವುದು.	 ಜ್ಞಾನಾತ್ಮಕ ಕ್ಷೇತ್ರ (Cognitive domain)  ಮನೋವಿಕಾಸಕ ಕ್ಷೇತ್ರ (Psychomotor domain)
ಆ.	ಚೌಕ ಘನ	■ ಚೌಕಘನದ ಆಕಾರವನ್ನು ವಿವರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಶಕ್ತರನ್ನಾಗಿಸುವುದು.. ■ ಚೌಕಘನದ ಮುಖಗಳು, ಅಂಚುಗಳು ಮತ್ತು ಶೃಂಗಗಳ ಸಂಖ್ಯೆಯನ್ನು ಗುರುತಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಶಕ್ತರನ್ನಾಗಿಸುವುದು. ■ ಚೌಕ ಮತ್ತು ಚೌಕಘನದ ನಡುವಿನ ವ್ಯತ್ಯಾಸವನ್ನು ತಿಳಿಯಪಡಿಸುವುದು ■ ಚೌಕಘನದಂತೆ ಕಾಣುವ ವಸ್ತುಗಳನ್ನು ಗುರುತಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಶಕ್ತರನ್ನಾಗಿಸುವುದು.	 ಜ್ಞಾನಾತ್ಮಕ ಕ್ಷೇತ್ರ (Cognitive domain)
ಇ.	ಸ್ತಂಭಾಕೃತಿ	■ ವಿದ್ಯಾರ್ಥಿಗಳು ಸ್ತಂಭಾಕೃತಿಯ ಆಕಾರವನ್ನು ವಿವರಿಸಲು ಶಕ್ತರನ್ನಾಗಿಸುವುದು	 ಜ್ಞಾನಾತ್ಮಕ ಕ್ಷೇತ್ರ (Cognitive domain),

		■ ವಿದ್ಯಾರ್ಥಿಗಳು ಸ್ತಂಭಾಕೃತಿಯ ಚಿತ್ರವನ್ನು ಬಿಡಿಸಲು ಶಕ್ತರನ್ನಾಗಿಸುವುದು. ■ ಸ್ತಂಭಾಕೃತಿಯ ಆಕಾರವನ್ನು ಹೋಲುವ ವಸ್ತುಗಳನ್ನು ಗುರುತಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಶಕ್ತರನ್ನಾಗಿಸುವುದು.	 ಮನೋವಿಕಾಸಕ ಕ್ಷೇತ್ರ (Psychomotor domain)
ಈ.	ಶಂಕು	▲ ಶಂಕುವಿನ ಆಕಾರವನ್ನು ವಿವರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಶಕ್ತರನ್ನಾಗಿಸುವುದು. ▲ ಶಂಕುವಿನ ಆಕಾರದಲ್ಲಿರುವ ವಸ್ತುಗಳನ್ನು ಗುರುತಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಶಕ್ತರನ್ನಾಗಿಸುವುದು.	 ಜ್ಞಾನಾತ್ಮಕ ಕ್ಷೇತ್ರ (Cognitive domain)  ಮನೋವಿಕಾಸಕ ಕ್ಷೇತ್ರ (Psychomotor domain)
ಉ.	ಗೋಳ	● ಗೋಳದ ಆಕಾರವನ್ನು ವಿವರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಸಜ್ಜುಗೊಳಿಸುವುದು. ● ಗೋಳದಂತೆ ಕಾಣುವ ವಸ್ತುಗಳನ್ನು ಗುರುತಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಶಕ್ತರಾಗುವಂತೆ ಮಾಡುವುದು. ● ವೃತ್ತ ಮತ್ತು ಗೋಳದ ನಡುವಿನ ವ್ಯತ್ಯಾಸವನ್ನು ತಿಳಿಯಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಶಕ್ತರಾಗುವಂತೆ ಮಾಡುವುದು.	 ಜ್ಞಾನಾತ್ಮಕ ಕ್ಷೇತ್ರ (Cognitive domain)

ಮೌಲ್ಯಮಾಪನದ ನೀಲನಕ್ಷೆ

ವಿಷಯದ ಪ್ರಾಮುಖ್ಯತೆಯ ನೀಲನಕ್ಷೆ

ಕ್ರಮ ಸಂಖ್ಯೆ	ಅಧ್ಯಾಯ	ಉಪ-ಘಟಕ	ಅಂಕಗಳು	ಪ್ರಾಮುಖ್ಯತೆ/ಮೌಲ್ಯಮಾಪನ ತೂಕ(ಶೇಕಡಾ (%))
1	ಟ್ಯಾನ್‌ಗ್ರಾಮ್ಸ್ ಮತ್ತು ವಿನ್ಯಾಸಗಳು	(ಅ)ಟ್ಯಾನ್‌ಗ್ರಾಮ್‌ಗಳ ಪರಿಚಯ	10	13.33%
		(ಆ) ಟ್ಯಾನ್‌ಗ್ರಾಮ್ ಬಳಸಿ ವಿವಿಧ ವಿನ್ಯಾಸಗಳು	5	6.67%
		(ಇ) ವಿನ್ಯಾಸಗಳು	10	13.33%
2	ಘನಾಕೃತಿಗಳು	(ಅ) ಆಯತ ಘನ	10	13.33%
		(ಆ)ಚೌಕ ಘನ	10	13.33%
		(ಇ) ಸ್ತಂಭಾಕೃತಿ	10	13.33%
		(ಈ) ಶಂಕು	10	13.33%
		(ಉ) ಗೋಳ	10	13.33%
ಒಟ್ಟು			75	100%

ಕಲಿಕಾ ಉದ್ದೇಶಗಳ ಪ್ರಾಮುಖ್ಯತೆಯ ನೀಲನಕ್ಷೆ

ಕ್ರಮ ಸಂಖ್ಯೆ	ಅಧ್ಯಾಯ	ಉಪ-ಘಟಕ	ಒಳಗೊಂಡಿರುವ ಕ್ಷೇತ್ರಗಳು	ಹಂತ	ಅಂಕಗಳು	ಪ್ರಾಮುಖ್ಯತೆ/ಮೌಲ್ಯಮಾಪನ ತೂಕ(ಶೇಕಡಾ (%))
1	ಟ್ಯಾನ್‌ಗ್ರಾಮ್ಸ್ ಮತ್ತು ವಿನ್ಯಾಸಗಳು	(ಅ) ಟ್ಯಾನ್‌ಗ್ರಾಮ್‌ಗಳ ಪರಿಚಯ	ಜ್ಞಾನಾತ್ಮಕ ಕ್ಷೇತ್ರ	ಜ್ಞಾನ	10	13.33%
		(ಆ) ಟ್ಯಾನ್‌ಗ್ರಾಮ್ ಬಳಸಿ ವಿವಿಧ ವಿನ್ಯಾಸಗಳು	ಜ್ಞಾನಾತ್ಮಕ ಕ್ಷೇತ್ರ	ಜ್ಞಾನ	1	1.33%
			ಮನೋವಿಕಾಸಕ ಕ್ಷೇತ್ರ	ಅನುಕರಣೆ	2	2.67%
				ಕೈಚಳಕ/ಚಾಲನೆ	2	2.67%
		(ಇ) ವಿನ್ಯಾಸಗಳು	ಜ್ಞಾನಾತ್ಮಕ ಕ್ಷೇತ್ರ	ಅನ್ವಯಿಸುವಿಕೆ	5	6.67%
			ಮನೋವಿಕಾಸಕ ಕ್ಷೇತ್ರ	ಅನುಕರಣೆ	5	6.67%
2	ಘನಾಕೃತಿಗಳು	(ಅ) ಆಯತ ಘನ	ಜ್ಞಾನಾತ್ಮಕ ಕ್ಷೇತ್ರ	ಜ್ಞಾನ	8	10.67%
				ತಿಳುವಳಿಕೆ	1	1.33%

			ಮನೋವಿಕಾಸಕ ಕ್ಷೇತ್ರ	ಅನುಕರಣೆ	1	1.33%
		(ಆ) ಚೌಕ ಘನ	ಜ್ಞಾನಾತ್ಮಕ ಕ್ಷೇತ್ರ	ಜ್ಞಾನ	4	5.33%
				ತಿಳುವಳಿಕೆ	6	8%
		(ಇ) ಸ್ತಂಭಾಕೃತಿ	ಜ್ಞಾನಾತ್ಮಕ ಕ್ಷೇತ್ರ	ಜ್ಞಾನ	4	5.33%
			ಮನೋವಿಕಾಸಕ ಕ್ಷೇತ್ರ	ಅನುಕರಣೆ	3	4%
				ನಿಖರತೆ	3	4%
		(ಈ) ಶಂಕು	ಜ್ಞಾನಾತ್ಮಕ ಕ್ಷೇತ್ರ	ಜ್ಞಾನ	4	5.33%
			ಮನೋವಿಕಾಸಕ ಕ್ಷೇತ್ರ	ಅನುಕರಣೆ	3	4%
				ನಿಖರತೆ	3	4%
		(ಉ) ಗೋಳ	ಜ್ಞಾನಾತ್ಮಕ ಕ್ಷೇತ್ರ	ಜ್ಞಾನ	5	6.67%
				ತಿಳುವಳಿಕೆ	5	6.67%
ಒಟ್ಟು					75	100%

ಪ್ರಶ್ನೆಗಳ ಸ್ವರೂಪ:

ಕ್ರಮ ಸಂಖ್ಯೆ	ಅಧ್ಯಾಯ	ಪ್ರಶ್ನೆಗಳ ಸ್ವರೂಪ	ಅಂಕಗಳು	ಪ್ರಾಮುಖ್ಯತೆ/ಮೌಲ್ಯಮಾಪನ ತೂಕ(ಶೇಕಡಾ (%))
1	ಟ್ಯಾನ್‌ಗ್ರಾಮ್ಸ್ ಮತ್ತು ವಿನ್ಯಾಸಗಳು	ಹೆಸರಿಸಿ	1	1.33%
		ಹೊಂದಿಸಿ ಬರೆಯಿರಿ	3	4%
		ಸರಿಯಾದ ಉತ್ತರವನ್ನು ಆರಿಸಿ	3	4%
		ವಿನ್ಯಾಸಗಳನ್ನು ಪೂರ್ಣಗೊಳಿಸಿ	15	20%
		ಗುರುತಿಸಿ	3	4%
2	ಘನಾಕೃತಿಗಳು	ಹೆಸರಿಸಿ	17	22.67%
		ಗುರುತಿಸಿ	20	26.67%
		ಚಿತ್ರ ಬಿಡಿಸಿ	13	17.33%
ಒಟ್ಟು			75	100%

ಕಾರ್ಣದ ಮಟ್ಟ

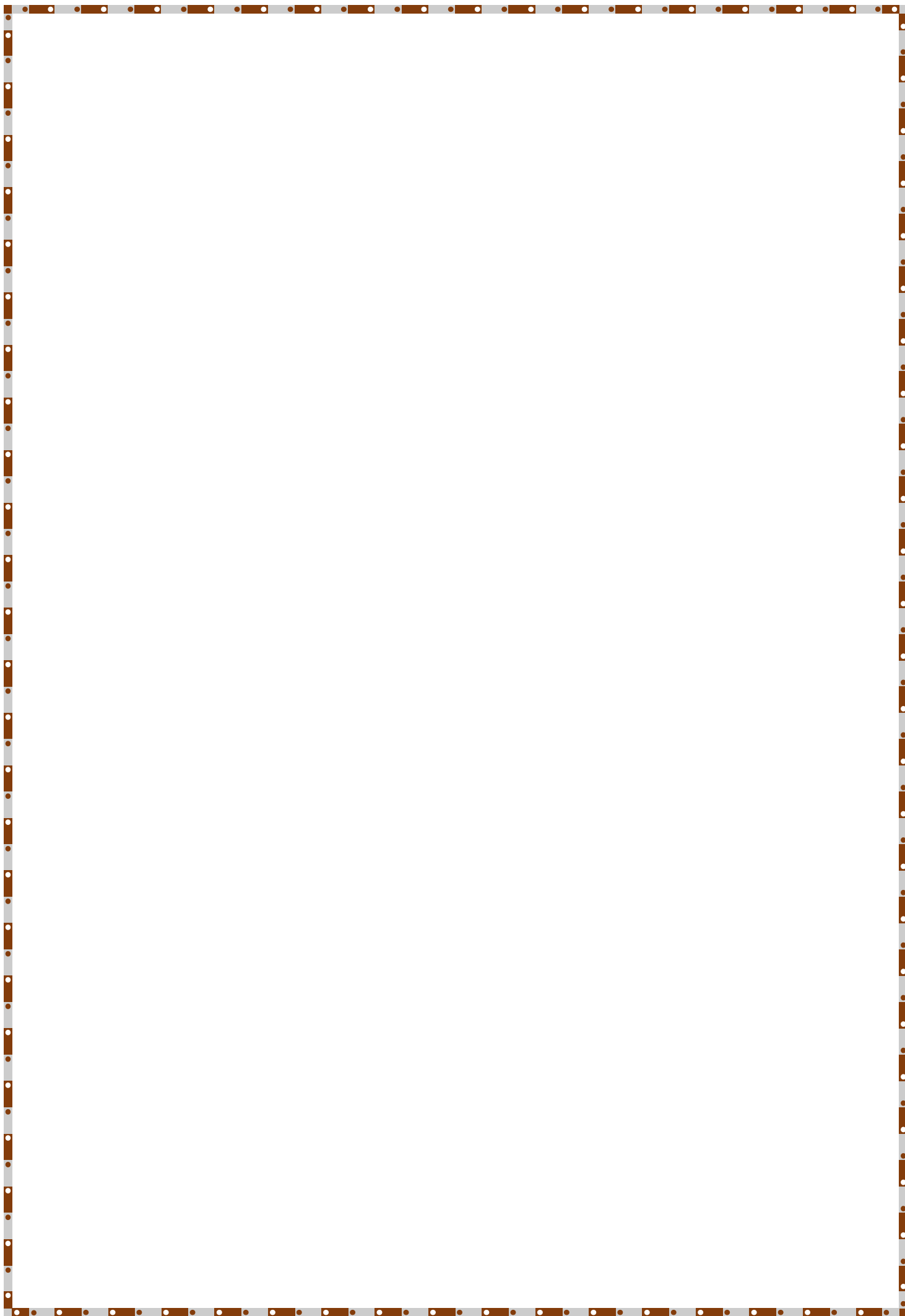
ಕ್ರಮ ಸಂಖ್ಯೆ	ಅಧ್ಯಾಯ	ಉಪ-ಘಟಕ	ಕಾರ್ಣದ ಮಟ್ಟ	ಅಂಕಗಳು	ಪ್ರಾಮುಖ್ಯತೆ/ಮೌಲ್ಯಮಾಪನ ತೂಕ(ಶೇಕಡಾ (%))
1	ಟ್ಯಾನ್‌ಗ್ರಾಮ್ಸ್ ಮತ್ತು ವಿದ್ಯಾಸಗಳು	(ಅ) ಟ್ಯಾನ್‌ಗ್ರಾಮ್‌ಗಳ ಪರಿಚಯ	ಸುಲಭ	10	13.33%
		(ಆ) ಟ್ಯಾನ್‌ಗ್ರಾಮ್ ಬಳಸಿ ವಿವಿಧ ವಿದ್ಯಾಸಗಳು	ಮಧ್ಯಮ	5	6.67%
			ಮಧ್ಯಮ	4	5.33%
				ಕಠಿಣ	6
2	ಘನಾಕೃತಿಗಳು	(ಅ) ಆಯತ ಘನ	ಸುಲಭ	7	9.33%
			ಮಧ್ಯಮ	3	4%
		(ಆ)ಚೌಕ ಘನ	ಸುಲಭ	5	6.67%
			ಮಧ್ಯಮ	5	6.67%
		(ಇ) ಸ್ತಂಭಾಕೃತಿ	ಸುಲಭ	4	5.33%
			ಮಧ್ಯಮ	6	8%
		(ಈ) ಶಂಕು	ಸುಲಭ	1	1.33%
			ಕಠಿಣ	9	12%
		(ಉ) ಗೋಳ	ಸುಲಭ	5	6.67%
			ಮಧ್ಯಮ	5	6.67%
ಒಟ್ಟು				75	100%

3D ನೀಲನಕ್ಷೆ (ಒಟ್ಟು ಅಂಕಗಳ ವಿಭಜನೆ)

ಕ್ರಮ ಸಂಖ್ಯೆ	ವಿವರಣೆ	ಒಟ್ಟು ಅಂಕಗಳು						ಒಟ್ಟು
		ಜ್ಞಾನಾತ್ಮಕ ಕ್ಷೇತ್ರ			ಮನೋವಿಕಾಸಕ ಕ್ಷೇತ್ರ			
		ಗಣಿತ	ಶಿಕ್ಷಣ	ಅನ್ವಯಿಸುವಿಕೆ	ಅನುಕರಣೆ	ಕೃತಿಚಳಕ/ಚಾಲನೆ	ನಿಖರತೆ	
1	ಟ್ಯಾನ್‌ಗ್ರಾಮ್ಸ್ ಮತ್ತು ವಿನ್ಯಾಸಗಳು							
ಅ	ಟ್ಯಾನ್‌ಗ್ರಾಮ್‌ಗಳ ಪರಿಚಯ	10	-	-	-	-	-	10
ಆ	ಟ್ಯಾನ್‌ಗ್ರಾಮ್ ಬಳಸಿ ವಿವಿಧ ವಿನ್ಯಾಸಗಳು	1	-	-	2	2	-	5
ಇ	ವಿನ್ಯಾಸಗಳು	-	-	5	5	-	-	10
	ಒಟ್ಟು(1)							25
2	ಘನಾಕೃತಿಗಳು							
ಅ	(ಅ) ಆಯತ ಘನ	8	1	-	1	-	-	10
ಆ	ಚೌಕ ಘನ	4	6	-	-	-	-	10
ಇ	ಸ್ತಂಭಾಕೃತಿ	4	-	-	3	-	3	10
ಈ	ಶಂಕು	4	-	-	3	-	3	10
ಉ	ಗೋಳ	5	5	-	-	-	-	10
	ಒಟ್ಟು(2)							50
	ಒಟ್ಟು ಮೊತ್ತ(1+2)	36	12	5	14	2	6	75

ಪರಿವಿಡಿ

ಕ್ರಮ ಸಂಖ್ಯೆ	ಅಧ್ಯಾಯ	ಪುಟ ಸಂಖ್ಯೆ
1. ಟ್ಯಾನ್‌ಗ್ರಾಮ್ಸ್ ಮತ್ತು ವಿನ್ಯಾಸಗಳು		
(ಅ)	ಟ್ಯಾನ್‌ಗ್ರಾಮ್‌ಗಳ ಪರಿಚಯ	1-12
(ಆ)	ಟ್ಯಾನ್‌ಗ್ರಾಮ್ ಬಳಸಿ ವಿವಿಧ ವಿನ್ಯಾಸಗಳು	13-17
(ಇ)	ವಿನ್ಯಾಸಗಳು	18-25
2. ಘನಾಕೃತಿಗಳು		
(ಅ)	ಆಯತ ಘನ	26-37
(ಆ)	ಚೌಕ ಘನ	38-44
(ಇ)	ಸ್ತಂಭಾಕೃತಿ	45-49
(ಈ)	ಶಂಕು	50-54
(ಉ)	ಗೋಳ	55-60
	ಉತ್ತರಗಳು	61-72



ಅಧ್ಯಾಯ-1: ಟ್ಯಾನ್‌ಗ್ರಾಮ್ಸ್ ಮತ್ತು ವಿನ್ಯಾಸಗಳು

ಉಪ-ಘಟಕ (ಅ): ಟ್ಯಾನ್‌ಗ್ರಾಮ್‌ಗಳ ಪರಿಚಯ

ಕಲಿಕಾ ಉದ್ದೇಶಗಳು

- ವಿದ್ಯಾರ್ಥಿಗಳು 7-ಖಂಡಗಳ ಟ್ಯಾನ್‌ಗ್ರಾಮ್‌ನ್ನು ಗುರುತಿಸುವಂತೆ ಅನುವು ಮಾಡಿಕೊಡುವುದು
- ಟ್ಯಾನ್‌ಗ್ರಾಮ್‌ನ ವಿವಿಧ ಘಟಕಗಳನ್ನು (ಭಾಗಗಳನ್ನು) ವಿವರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಶಕ್ತರನ್ನಾಗಿಸುವುದು.
- 7-ಖಂಡಗಳ ಟ್ಯಾನ್‌ಗ್ರಾಮ್‌ಲ್ಲಿರುವ ವಿವಿಧ ಆಕಾರಗಳನ್ನು ಗುರುತಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಅನುವು ಮಾಡಿಕೊಡುವುದು.
- 7-ಖಂಡಗಳ ಟ್ಯಾನ್‌ಗ್ರಾಮ್‌ನಲ್ಲಿ ಒಳಗೊಂಡಿರುವ ಪ್ರತಿಯೊಂದು ಆಕಾರಗಳ ಸಂಖ್ಯೆಯನ್ನು ನಿರ್ಧರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಅನುವು ಮಾಡಿಕೊಡುವುದು.

ಸನ್ನಿವೇಶ-1: ಚಂದನ್ ಮತ್ತು ಅವನ ತಾಯಿ, ಕೇಕ್ ಖರೀದಿಸಲು ಬೇಕರಿಗೆ ಹೋಗಲು ನಿರ್ಧರಿಸುತ್ತಾರೆ.



ಕೇಕ್ ಎಂದರೆ ತುಂಬಾ ಇಷ್ಟಪಡುವ ಚಂದನ್, ತನ್ನ ತಾಯಿಯೊಂದಿಗೆ ಬೇಕರಿಗೆ ಹೋಗುತ್ತಾನೆ.



ಅವನ ತಾಯಿಯು, ಅವನಿಗೆ ಏನು ಖರೀದಿಸಬೇಕೆಂದು ಕೇಳುತ್ತಾರೆ.



ಅವನು ಒಂದು ಕೇಕ್‌ನತ್ತ ಬೆರಳು ಮಾಡಿ ತೋರಿಸುತ್ತಾನೆ.



ಅವರು ಅದನ್ನು ಖರೀದಿಸಿ ಮನೆಗೆ ತರುತ್ತಾರೆ.

5



ಈ ಕೇಕ್‌ನ ಆಕಾರ
ಯಾವುದು?

ಕೇಕ್ ತೆರೆದಾಗ ಈ ರೀತಿ ಕಾಣುತ್ತದೆ ↑



ಹೌದು! ನಿಮ್ಮ ಊಹೆ ಸರಿ! ಕೇಕ್‌ನ
ಆಕಾರ 'ಚೌಕ'

6



ತಾಯಿ ಕೇಕ್ ಕತ್ತರಿಸುತ್ತಾರೆ
ತಾಯಿ ಈ ಕೆಳಗಿನಂತೆ ಕೇಕ್ ಕತ್ತರಿಸುತ್ತಾರೆ:

7



ಕೇಕ್‌ಅನ್ನು ಎರಡಾಗಿ ಕತ್ತರಿಸಿದಾಗ
ರೂಪುಗೊಂಡ ಹೊಸ ಆಕಾರಗಳು
ಯಾವುವು?

ಅವರು ಅದನ್ನು ಮೇಲೆ ತೋರಿಸಿದಂತೆ ಎರಡು ಸಮ
ಭಾಗಗಳಾಗಿ ಕತ್ತರಿಸುತ್ತಾರೆ.



ಹೌದು! ನಮಗೆ ಎರಡು
ತ್ರಿಭುಜಗಳು ಸಿಗುತ್ತವೆ!

8



ಈಗ, ತಾಯಿ ಒಂದು ತ್ರಿಭುಜವನ್ನು ಎರಡು ಸಮ
ಭಾಗಗಳಾಗಿ ಕತ್ತರಿಸುತ್ತಾರೆ.

9



ನಂತರ ತಾಯಿ ಉಳಿದ ಭಾಗದಿಂದ ಇನ್ನೊಂದು
ಸಣ್ಣ ತ್ರಿಭುಜವನ್ನು ಕತ್ತರಿಸುತ್ತಾರೆ.

10



ಅಂತಿಮವಾಗಿ, ಅವರು ಉಳಿದ ಭಾಗದಿಂದ 2 ಸಣ್ಣ
ತ್ರಿಭುಜಗಳು ಮತ್ತು ಒಂದು ಸಣ್ಣ ಚೌಕವನ್ನು
ಕತ್ತರಿಸುತ್ತಾರೆ.

ಈಗ, ಅದನ್ನು ಕತ್ತರಿಸಿದ
ನಂತರ ಎಷ್ಟು ಆಕಾರಗಳು
ಉಂಟಾಗಿವೆ ಎಂದು ನೀವು
ಎಣಿಸಬಲ್ಲೀರಾ?

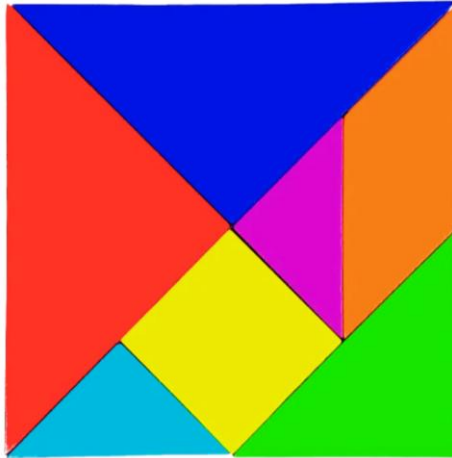


ನೀವು ಹೇಳುತ್ತಿರುವುದು ಸರಿ!

7 ಆಕಾರಗಳು ಇವೆ.

ಇದು 7-ತುಂಡುಗಳ ಟ್ಯಾನ್‌ಗ್ರಾಮಿನ ಆಕಾರವನ್ನು ಹೋಲುತ್ತದೆ.

ಹೌದು! ಇದೇ ಟ್ಯಾನ್‌ಗ್ರಾಮ್!



ಸನ್ನಿವೇಶ-2: ಚಂದನ್, ತನ್ನ ಕೋಣೆಯಲ್ಲಿರುವ ಟ್ರಾನ್‌ಗ್ರಾಮಿನ ವಿವಿಧ ಭಾಗಗಳನ್ನು ಅನ್ವೇಷಿಸುತ್ತಾನೆ

1



ಇದನ್ನು ನೋಡಿ, ಚಂದನ್ ತನ್ನ ಕೋಣೆಯಲ್ಲಿರುವ ಟ್ರಾನ್‌ಗ್ರಾಮನ್ನು ಅನ್ವೇಷಿಸುತ್ತಾನೆ.

2



ಅದರಲ್ಲಿ 2 ದೊಡ್ಡ ತ್ರಿಭುಜಗಳನ್ನು ಕಂಡುಕೊಳ್ಳುತ್ತಾನೆ.

3



ಆಮೇಲೆ, ಅವನು 2 ಸಣ್ಣ ತ್ರಿಭುಜಗಳನ್ನು ಕಂಡುಕೊಳ್ಳುತ್ತಾನೆ.

4



ನಂತರ ಅವನು ಮತ್ತೊಂದು ತ್ರಿಭುಜವನ್ನು ನೋಡುತ್ತಾನೆ.

ಚಂದನ್ ಕೋಣೆಯಲ್ಲಿ ಕಂಡುಕೊಂಡ
ತ್ರಿಭುಜದ ಗಾತ್ರವನ್ನು, ಅವನು
ಅದಕ್ಕಿಂತ ಮುಂಚೆ ಕಂಡುಕೊಂಡ
ಇತರ ತ್ರಿಭುಜಗಳ ಗಾತ್ರಕ್ಕೆ ಹೋಲಿಸಿ



ಅದು ಮೊದಲ 2 ತ್ರಿಭುಜಗಳಿಗಿಂತ
ಚಿಕ್ಕದಾಗಿದ್ದು, ಉಳಿದ 2
ತ್ರಿಭುಜಗಳಿಗಿಂತ ದೊಡ್ಡದಾಗಿದೆ
ಅಲ್ಲವೇ?



ಹೌದು, ಇದು ಮೊದಲ ಎರಡು
ದೊಡ್ಡ ತ್ರಿಭುಜಗಳಿಗಿಂತ ಚಿಕ್ಕದಾಗಿದೆ,
ಆದರೆ ಉಳಿದ 2 ಸಣ್ಣ
ತ್ರಿಭುಜಗಳಿಗಿಂತ ದೊಡ್ಡದಾಗಿದೆ.
ಆದ್ದರಿಂದ, ಇದು ಮಧ್ಯಮ ಗಾತ್ರದ
ತ್ರಿಭುಜವಾಗಿದೆ.

5



ಅವನಿಗೆ ಅದರಲ್ಲಿ ಒಂದು ಚೌಕವೂ ಕಾಣಿಸುತ್ತದೆ.

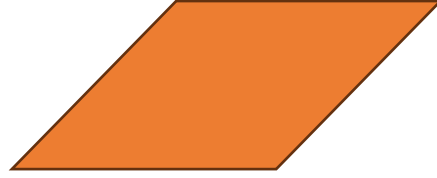
6



ಕೊನೆಯದಾಗಿ, ಅವನು ಅದರಲ್ಲಿ ಒಂದು ಹೊಸ
ಆಕಾರವನ್ನು ಕಂಡುಹಿಡಿಯುತ್ತಾನೆ.



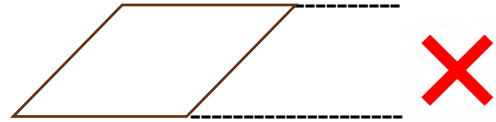
↑ ಇದು ಆ ಹುಡುಗನಿಗೆ ಸಿಕ್ಕ ಹೊಸ ಆಕಾರ



ಈಗ ಹೊಸ ಆಕಾರವನ್ನು ನೋಡಿ

ನೀವು ಗಮನಿಸಿದರೆ, ಈ ಹೊಸ
ಆಕಾರದ ಅಭಿಮುಖ ಬಾಹುಗಳನ್ನು
ಎಷ್ಟೇ ವಿಸ್ತರಿಸಿದರೂ ಅವು
ಒಂದನ್ನೊಂದು ಸಂಧಿಸುವುದಿಲ್ಲ
(ಸೇರುವುದಿಲ್ಲ) ಎಂದು ನಿಮಗೆ
ತಿಳಿಯುತ್ತದೆ.

ಅಂದರೆ, ಈ ಅಭಿಮುಖ ಬಾಹುಗಳು
ಪರಸ್ಪರ ಸಮಾಂತರವಾಗಿವೆ ಎಂದು
ನಾವು ಹೇಳಬಹುದು

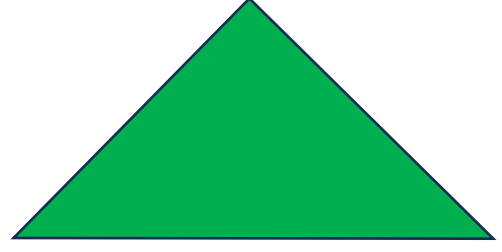
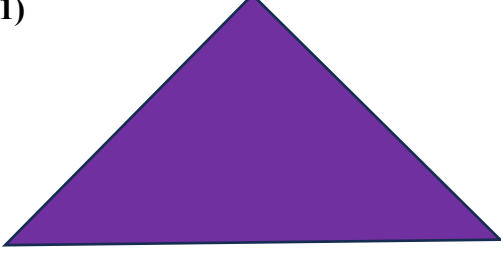


ಎದುರು ಬದಿಗಳು ಪರಸ್ಪರ ಸಮಾಂತರವಾಗಿರುವ ಈ ಹೊಸ ಆಕಾರವನ್ನು 'ಸಮಾಂತರ ಚತುರ್ಭುಜ' ಎಂದು ಕರೆಯಲಾಗುತ್ತದೆ.



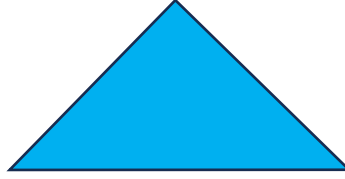
ಈಗ, ಟ್ಯಾನ್‌ಗ್ರಾಮಿನ ವಿವಿಧ ಆಕಾರಗಳನ್ನು ಒಂದೊಂದಾಗಿ ನೋಡೋಣ:

(1)



ಇದರಲ್ಲಿ 2 ದೊಡ್ಡ ತ್ರಿಭುಜಗಳಿವೆ

(2)



ಇದರಲ್ಲಿ 1 ಮಧ್ಯಮ ಗಾತ್ರದ ತ್ರಿಭುಜವಿದೆ

(3)



ಇದರಲ್ಲಿ 2 ಸಣ್ಣ ತ್ರಿಭುಜಗಳಿವೆ.

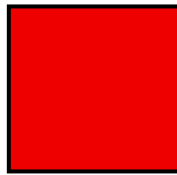


ಈಗ, ತ್ರಿಭುಜಗಳ ಒಟ್ಟು
ಸಂಖ್ಯೆಯನ್ನು ನೀವು ಎಣಿಸಬಲ್ಲೀರಾ?



ಹೌದು! ನೀವು ಹೇಳಿದ್ದು ಸರಿ! ಅಲ್ಲಿ
ಒಟ್ಟು 5 ತ್ರಿಭುಜಗಳಿವೆ

(4)



ಇದರಲ್ಲಿ ಒಂದು ಚೌಕವಿದೆ.

(5)



ಇದರಲ್ಲಿ ಒಂದು ಸಮಾಂತರ ಚತುರ್ಭುಜವಿದೆ.

ಉತ್ತಮ ಕಲಿಕೆಗಾಗಿ ಸೂಚಿಸಲಾದ ಚಟುವಟಿಕೆಗಳ ಪಟ್ಟಿ:

(1) ಬುಟ್ಟಿಯಿಂದ ಆಕಾರವನ್ನು ಹುಡುಕುವುದು:

- ಒಂದು ಬುಟ್ಟಿಯಲ್ಲಿ ಟ್ಯಾನ್‌ಗ್ರಾಮಿನ ಎಲ್ಲಾ ಆಕಾರಗಳನ್ನು ಹಾಕಿ. ಅಂದರೆ, 2 ದೊಡ್ಡ ತ್ರಿಭುಜಗಳು, 1 ಮಧ್ಯಮ ಗಾತ್ರದ ತ್ರಿಭುಜ, 2 ಸಣ್ಣ ತ್ರಿಭುಜಗಳು, 1 ಚೌಕ ಮತ್ತು 1 ಸಮಾಂತರ ಚತುರ್ಭುಜ.
- ಕಪ್ಪು ಹಲಗೆಯ ಮೇಲೆ ಯಾವುದಾದರೂ ಒಂದು ಆಕಾರದ ಹೆಸರನ್ನು ಬರೆಯಿರಿ. ಉದಾಹರಣೆಗೆ: “ದೊಡ್ಡ ತ್ರಿಭುಜ”, “ಮಧ್ಯಮ ಗಾತ್ರದ ತ್ರಿಭುಜ”, “ಸಣ್ಣ ತ್ರಿಭುಜ”, “ಚೌಕ” ಅಥವಾ “ಸಮಾಂತರ ಚತುರ್ಭುಜ”.
- ವಿದ್ಯಾರ್ಥಿಯು ಹಲಗೆಯ ಮೇಲಿರುವ ಆಕಾರದ ಹೆಸರನ್ನು ನೋಡಿ, ಅದಕ್ಕೆ ಸೂಕ್ತವಾದ ಆಕಾರವನ್ನು ಬುಟ್ಟಿಯಿಂದ ಆರಿಸಿಕೊಳ್ಳಬೇಕು.
- ಪ್ರತಿಯೊಬ್ಬ ವಿದ್ಯಾರ್ಥಿಯನ್ನೂ ಒಬ್ಬೊಬ್ಬರಾಗಿ ಕರೆಯಲಾಗುವುದು ಮತ್ತು ಶಿಕ್ಷಕರು ಹಲಗೆಯ ಮೇಲೆ ಬರೆದಿರುವ ಆಕಾರವನ್ನು ಅವರು ಬುಟ್ಟಿಯಿಂದ ಆಯ್ದುಕೊಳ್ಳಬೇಕು.



(2) ಆಕಾರಗಳನ್ನು ಅವುಗಳ ಹೆಸರುಗಳೊಂದಿಗೆ ಹೊಂದಿಸುವುದು

- 7-ತುಂಡುಗಳ ಟ್ಯಾನ್‌ಗ್ರಾಮಿನ ಒಂದು ಭಾಗವನ್ನು ವಿದ್ಯಾರ್ಥಿಗೆ ನೀಡಬೇಕು. (ಅದು ದೊಡ್ಡ ತ್ರಿಭುಜ, ಮಧ್ಯಮ ಗಾತ್ರದ ತ್ರಿಭುಜ, ಸಣ್ಣ ತ್ರಿಭುಜ, ಚೌಕ ಅಥವಾ ಸಮಾಂತರ ಚತುರ್ಭುಜವಾಗಿರಬಹುದು)
- ಆಕಾರಗಳ ಹೆಸರುಗಳಾದ ‘ದೊಡ್ಡ ತ್ರಿಭುಜ’, ‘ಮಧ್ಯಮ ಗಾತ್ರದ ತ್ರಿಭುಜ’, ‘ಸಣ್ಣ ತ್ರಿಭುಜ’, ‘ಚೌಕ’ ಮತ್ತು ‘ಸಮಾಂತರ ಚತುರ್ಭುಜ’ ಎಂಬ ಪದಗಳ ಕಾರ್ಡ್‌ಗಳಿರುವ ಒಂದು ಪೆಟ್ಟಿಗೆಯನ್ನು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ನೀಡಬೇಕು.
- ಶಿಕ್ಷಕರು ತಮಗೆ ನೀಡಿರುವ ಆಕಾರಕ್ಕೆ ಹೊಂದುವಂತಹ ಪದದ ಕಾರ್ಡ್‌ನ್ನು ವಿದ್ಯಾರ್ಥಿಗಳು ಪೆಟ್ಟಿಗೆಯಿಂದ ಆರಿಸಿಕೊಳ್ಳಬೇಕು.



(3) ಟ್ಯಾನ್‌ಗ್ರಾಮಿನ ಘಟಕಗಳನ್ನು ಗುರುತಿಸುವುದು

- ಒಂದು ಪೆಟ್ಟಿಗೆಯಲ್ಲಿ ತ್ರಿಭುಜ, ವೃತ್ತ, ಚೌಕ, ಸಮಾಂತರ ಚತುರ್ಭುಜ, ಆಯತ, ನಕ್ಷತ್ರ, ಅಂಡಾಕಾರ, ಪಂಚಭುಜಾಕೃತಿ, ಷಡ್ಭುಜಾಕೃತಿ, ಅಷ್ಟಭುಜಾಕೃತಿ, ನವಭುಜಾಕೃತಿ ಮುಂತಾದ ವಿವಿಧ ಆಕಾರಗಳನ್ನು ಹಾಕಿ. (ಘನಾಕೃತಿ, ಚೌಕ ಘನ, ಆಯತ ಘನ, ಗೋಳ, ಶಂಕು, ಸ್ತಂಭಾಕೃತಿಯಂತಹ 3-ಆಯಾಮದ ಆಕಾರಗಳನ್ನು ಸಹ ಸೇರಿಸಬಹುದು)
- ವಿದ್ಯಾರ್ಥಿಯು ತಂಗ್ರಾಮ್‌ನಲ್ಲಿ ಇರುವ ಎಲ್ಲಾ ಆಕಾರಗಳನ್ನು ಆರಿಸಿಕೊಳ್ಳಬೇಕೆಂದು ನಿರೀಕ್ಷಿಸಲಾಗುತ್ತದೆ (ಅಂದರೆ, ವಿದ್ಯಾರ್ಥಿಯು ಒಂದು ತ್ರಿಭುಜ, ಒಂದು ಚೌಕ ಮತ್ತು ಒಂದು ಸಮಾಂತರ ಚತುರ್ಭುಜವನ್ನು ಆರಿಸಬೇಕಾಗುತ್ತದೆ)



(4) ಟ್ಯಾನ್‌ಗ್ರಾಮ್‌ನ ಕಾಣೆಯಾದ ಭಾಗಗಳನ್ನು ಕಂಡುಹಿಡಿಯುವುದು

- ಮೊದಲಿಗೆ ವಿದ್ಯಾರ್ಥಿಯ ಮುಂದೆ ಒಂದು ಖಾಲಿ ಚೌಕಾಕಾರದ ಟ್ಯಾನ್‌ಗ್ರಾಮ್ ಫ್ರೇಮನ್ನು ಇಡಬೇಕು.
- ನಾವು ಆ ಖಾಲಿ ಚೌಕಾಕಾರದ ಫ್ರೇಮ್‌ನಲ್ಲಿ ಟ್ಯಾನ್‌ಗ್ರಾಮ್‌ನ ಒಂದು ಅಥವಾ ಒಂದಕ್ಕಿಂತ ಹೆಚ್ಚು ಆಕಾರಗಳನ್ನು ಇಡಬಹುದು, ಆದರೆ ಎಲ್ಲಾ ಏಳು ಆಕಾರಗಳನ್ನು ಇಡಬಾರದು.
- ವಿದ್ಯಾರ್ಥಿಯು ಟ್ಯಾನ್‌ಗ್ರಾಮನ್ನು ಪೂರ್ಣಗೊಳಿಸಲು ಬೇಕಾದ ಉಳಿದ ಆಕಾರಗಳನ್ನು ಒಂದು ಚೀಲ ಅಥವಾ ಪೆಟ್ಟಿಗೆಯಿಂದ ಆಯ್ದುಕೊಳ್ಳಬೇಕು. ಆ ಚೀಲದಲ್ಲಿ ಆಯತ, ತ್ರಿಭುಜ, ಚೌಕ, ವೃತ್ತ, ನಕ್ಷತ್ರ, ಅಂಡಾಕಾರ ಮುಂತಾದ

ವಿವಿಧ ರೀತಿಯ ಆಕಾರಗಳನ್ನು ಮಿಶ್ರಣ ಮಾಡಿ ಹಾಕಿರಬೇಕು. (ಇದರೊಂದಿಗೆ ಚೌಕ ಘನ, ಆಯತ ಘನ, ಗೋಳ, ಶಂಕು, ಸ್ತಂಭಾಕೃತಿಯಂತಹ 3-ಆಯಾಮದ ಆಕಾರಗಳನ್ನು ಸಹ ಆ ಚೀಲದಲ್ಲಿ ಇಡಬಹುದು). ವಿದ್ಯಾರ್ಥಿಯು ಇವುಗಳಲ್ಲಿ ಸರಿಯಾದ ಆಕಾರಗಳನ್ನು ಆರಿಸಿ ಟ್ಯಾಂಗ್ರಾಮನ್ನು ಪೂರ್ಣಗೊಳಿಸಬೇಕು.



(5) ಆಕಾರಗಳನ್ನು ಸಂಖ್ಯೆಗಳೊಂದಿಗೆ ಹೊಂದಿಸುವುದು

- ವಿದ್ಯಾರ್ಥಿಗೆ ಟ್ಯಾಂಗ್ರಾಮ್‌ನ ಒಂದು ಆಕಾರವನ್ನು ನೀಡಲಾಗುತ್ತದೆ, ಅದು ದೊಡ್ಡ ತ್ರಿಭುಜ, ಮಧ್ಯಮ ಗಾತ್ರದ ತ್ರಿಭುಜ, ಸಣ್ಣ ತ್ರಿಭುಜ, ಚೌಕ ಅಥವಾ ಸಮಾಂತರ ಚತುರ್ಭುಜ ಆಗಿರಬಹುದು ಅಥವಾ ಟ್ಯಾಂಗ್ರಾಮ್‌ನ ಯಾವುದಾದರೂ ಒಂದು ಆಕಾರದ ಹೆಸರನ್ನು ಹೊಂದಿರುವ ಪದದ ಕಾರ್ಡ್ (ದೊಡ್ಡ ತ್ರಿಭುಜ, ಮಧ್ಯಮ ಗಾತ್ರದ ತ್ರಿಭುಜ, ಸಣ್ಣ ತ್ರಿಭುಜ, ಚೌಕ ಅಥವಾ ಸಮಾಂತರ ಚತುರ್ಭುಜ) ಆಗಿರಬಹುದು.
- 1-20ರವರೆಗಿನ ಸಂಖ್ಯೆಗಳ ಫ್ಲಾಶ್ ಕಾರ್ಡ್‌ಗಳನ್ನು ಒಂದು ತಟ್ಟೆಯಲ್ಲಿ, ವಿದ್ಯಾರ್ಥಿಗೆ ಎಟುಕುವಂತೆ ಇಡಲಾಗುತ್ತದೆ.
- ವಿದ್ಯಾರ್ಥಿಯು ತನಗೆ ನೀಡಲಾದ ಆಕಾರವನ್ನು ಅಥವಾ ಆಕಾರದ ಹೆಸರನ್ನು, ತಟ್ಟೆಯಿಂದ ಸಂಖ್ಯೆಯ ಫ್ಲಾಶ್ ಕಾರ್ಡ್‌ನ್ನು ಆರಿಸುವ ಮೂಲಕ ಟ್ಯಾಂಗ್ರಾಮ್‌ನಲ್ಲಿರುವ ಅದರ ಸಂಬಂಧಿತ ಸಂಖ್ಯೆಯೊಂದಿಗೆ ಹೊಂದಿಸಬೇಕು.



ಮೌಲ್ಯಮಾಪನ

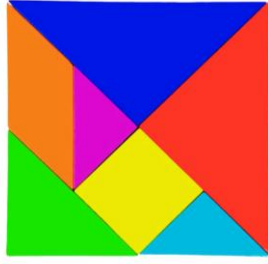
ಒಟ್ಟು ಅಂಕಗಳು: 10
ಸಮಯ: 10 ನಿಮಿಷಗಳು

ಸೂಚನೆಗಳು:

- ಎಲ್ಲಾ ಪ್ರಶ್ನೆಗಳನ್ನು ಎಚ್ಚರಿಕೆಯಿಂದ ಓದಿ ಮತ್ತು ಉತ್ತರಿಸಿ.
- ಈ ಮೌಲ್ಯಮಾಪನದ ಒಟ್ಟು ಅಂಕಗಳು 10 ಮತ್ತು ನಿಗದಿಪಡಿಸಿದ ಸಮಯ 10 ನಿಮಿಷಗಳು.
- ಪ್ರತಿ ಪ್ರಶ್ನೆಯಲ್ಲಿ ನೀಡಲಾದ ಸೂಚನೆಯಂತೆ, ಬರೆಯುವುದು, ಹೊಂದಿಸುವುದು, ಸರಿ ಗುರುತು ಹಾಕುವುದು ಅಥವಾ ಸುತ್ತವರಿಯುವಮೂಲಕ ಉತ್ತರಿಸಲು ಪ್ರಯತ್ನಿಸಿ.

I. ಈ ಕೆಳಗಿನ ಚಿತ್ರದ ಹೆಸರನ್ನು ತಿಳಿಸಿ:

(1x1 ಅಂಕ = 1)



ಇದರ ಹೆಸರು _____

ಈ ಕೆಳಗಿನ ಆಕಾರಗಳನ್ನು ಅವುಗಳ ಹೆಸರುಗಳೊಂದಿಗೆ ಹೊಂದಿಸಿ:

(3x1 ಅಂಕ = 3)

(1)



-

ಚೌಕ

(2)



-

ಸಮಾಂತರ ಚತುರ್ಭುಜ

(3)



-

ತ್ರಿಭುಜ

III. ಟ್ಯಾನ್‌ಗ್ರಾಮ್‌ನಲ್ಲಿರುವ ಈ ಕೆಳಗಿನ ಆಕಾರಗಳ ಸರಿಯಾದ ಸಂಖ್ಯೆಯನ್ನು ಆರಿಸಿ: (3x1 ಅಂಕ = 3)

(1)



(a) 1 (b) 3 (c) 5 (d) 7

(2)



(a) 2 (b) 4 (c) 1 (d) 3

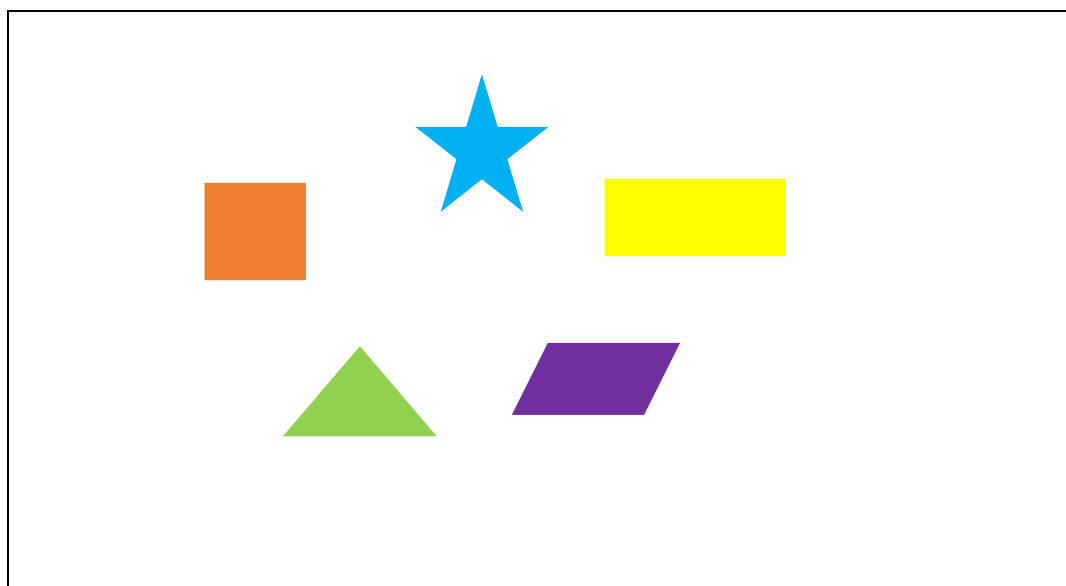
(3)



(a) 1 (b) 2 (c) 5 (d) 7

IV. ಟ್ಯಾನ್‌ಗ್ರಾಮ್‌ನಲ್ಲಿ ಕಂಡುಬರುವ ಆಕಾರಗಳನ್ನು ವೃತ್ತಾಕಾರವಾಗಿ ಸುತ್ತುವರಿಯಿರಿ :

(3x1 ಅಂಕ = 3)



ಉಪ-ಘಟಕ (ಆ): ಟ್ಯಾನ್‌ಗ್ರಾಮ್ ಬಳಸಿ ವಿವಿಧ ವಿನ್ಯಾಸಗಳು

ಕಲಿಕಾ ಉದ್ದೇಶಗಳು:

- ಟ್ಯಾನ್‌ಗ್ರಾಮ್‌ನ ಬಳಕೆಯನ್ನು ವಿವರಿಸುವಂತೆ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಅನುವು ಮಾಡಿಕೊಡುವುದು
 - ವಿದ್ಯಾರ್ಥಿಗಳು ಟ್ಯಾನ್‌ಗ್ರಾಮ್‌ಗಳನ್ನು ಬಳಸಿ ವಿವಿಧ ವಿನ್ಯಾಸಗಳನ್ನು ರೂಪಿಸಲು ಅನುವು ಮಾಡಿಕೊಡುವುದು
 - ಹೊಸ ವಿನ್ಯಾಸಗಳನ್ನು ರೂಪಿಸುವಲ್ಲಿ ವಿದ್ಯಾರ್ಥಿಗಳ ಸೃಜನಶೀಲ ಆಲೋಚನೆಗಳನ್ನು ಪ್ರೋತ್ಸಾಹಿಸುವುದು
- ಸನ್ನಿವೇಶ-1: ಮೆಹೆರಿನ್ ಟ್ಯಾನ್‌ಗ್ರಾಮ್‌ನ ವಿವಿಧ ಆಕಾರಗಳನ್ನು ಬಳಸಿ ತಾನು ಏನೆಲ್ಲಾ ಮಾಡಬಹುದು ಎಂದು ಯೋಚಿಸುತ್ತಿದ್ದಾಳೆ

1



ಮೆಹೆರಿನ್, ಟ್ಯಾನ್‌ಗ್ರಾಮ್‌ನ ವಿವಿಧ ಆಕಾರಗಳನ್ನು
ಬಳಸಿ ತಾನು ಏನೆಲ್ಲಾ ಮಾಡಬಹುದು ಎಂದು
ಯೋಚಿಸುತ್ತಿದ್ದಾಳೆ

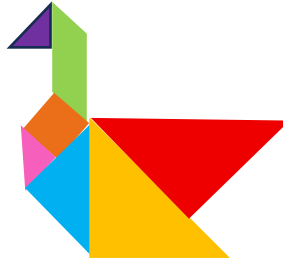
2



ನಂತರ ಅವಳಿಗೆ ಟ್ಯಾನ್‌ಗ್ರಾಮ್ ಬಳಸಿ
ಮಾಡಬಹುದಾದ ವಿವಿಧ ವಿನ್ಯಾಸಗಳ ಬಗ್ಗೆ ಬೇರೆ
ಬೇರೆ ಆಲೋಚನೆಗಳು ಬರುತ್ತವೆ.

ಈಗ ನಾವು ಟ್ಯಾನ್‌ಗ್ರಾಮ್‌ನ ವಿವಿಧ ಆಕಾರಗಳನ್ನು ಬಳಸಿ ಕೆಲವು ವಿನ್ಯಾಸಗಳನ್ನು ಮಾಡೋಣ!

ಮೊದಲಿಗೆ, ನಾವು ಒಂದು ಹಂಸದ ವಿನ್ಯಾಸವನ್ನು ಮಾಡೋಣ!



ಬನ್ನಿ, ಮೊದಲು ಟ್ಯಾಂಗ್ರಾಮ್‌ನ ಭಾಗಗಳನ್ನು ಹೆಸರಿಸೋಣ:

- ಚಿಕ್ಕ ತ್ರಿಭುಜಗಳನ್ನು 'ತ್ರಿ1' ಮತ್ತು 'ತ್ರಿ2' ಎಂದು ಕರೆಯೋಣ.
- ಮಧ್ಯಮ ಟ್ಯಾಂಗ್ರಾಮ್‌ನ ಗಾತ್ರದ ತ್ರಿಭುಜವು 'ತ್ರಿ3' ಆಗಿರಲಿ.
- ದೊಡ್ಡ ತ್ರಿಭುಜಗಳನ್ನು 'ತ್ರಿ4' ಮತ್ತು 'ತ್ರಿ5' ಎಂದು ಕರೆಯೋಣ
- ಚೌಕವು 'ಚೌ' ಆಗಿರಲಿ.
- ಸಮಾಂತರ ಚತುರ್ಭುಜವು 'ಸ' ಆಗಿರಲಿ.



ಹಾಗಾದರೆ, ಮಾಡೋಣ ಬನ್ನಿ! ಹಂತದ ವಿನ್ಯಾಸವನ್ನು ಮಾಡುವ ಹಂತಗಳು:

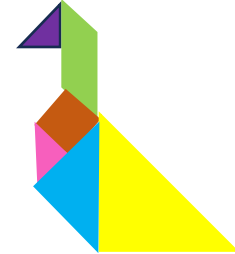
1. ಹಂತ-1: ಕೆಳಗೆ ತೋರಿಸಿರುವಂತೆ 'ತ್ರಿ1' ಅನ್ನು ಇರಿಸಿ.
2. ಹಂತ-2: 'ತ್ರಿ1' ರ ಪಕ್ಕದಲ್ಲಿ 'ಸ' ಅನ್ನು ಇರಿಸಿ.



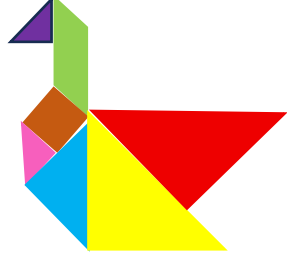
3. ಹಂತ-3: ಈಗ 'ಸ' ಕೆಳಗೆ 'ಚೌ' ಅನ್ನು ಇರಿಸಿ.
4. ಹಂತ-4: 'ಚೌ' ನ ಎಡಭಾಗದಲ್ಲಿ 'ತ್ರಿ2' ಅನ್ನು ಇರಿಸಿ.



5. ಹಂತ-5: 'ಚೌ' ಮತ್ತು 'ತ್ರಿ2' ನ ಬಲಭಾಗದಲ್ಲಿ 'ತ್ರಿ3' ಅನ್ನು ಇರಿಸಿ.
6. ಹಂತ-6: 'ತ್ರಿ3' ನ ಬಲಭಾಗದಲ್ಲಿ 'ತ್ರಿ4' ಅನ್ನು ಇರಿಸಿ.



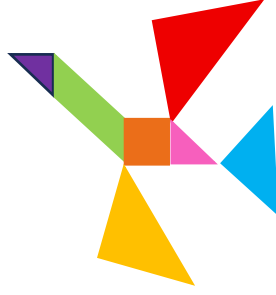
7. ಹಂತ-7:ಕೊನೆಯದಾಗಿ, 'ತ್ರಿ4' ನ ಬಲಭಾಗದಲ್ಲಿ
'ತ್ರಿ5' ಅನ್ನು ಇರಿಸಿ



ಟ್ರಾನ್‌ಗ್ರಾಮ್‌ಗಳನ್ನು ಬಳಸಿ ನಾವು ರಚಿಸಬಹುದಾದ ಇನ್ನು ಕೆಲವು ವಿನ್ಯಾಸಗಳು ಇಲ್ಲಿವೆ



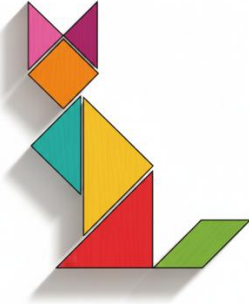
ಮೊಲ



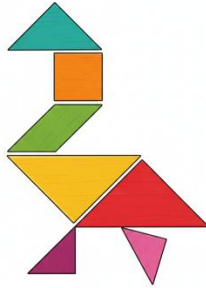
(2) ಪಕ್ಷಿ



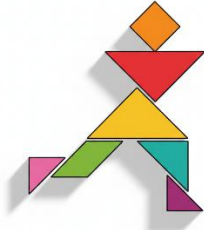
(3) ಒಂಟೆ



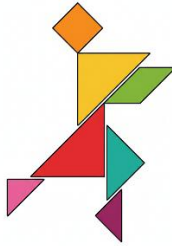
(4) ಬೆಕ್ಕು



(5) ಬಾತುಕೋಳಿ



(6) ವ್ಯಾಯಾಮ ಮಾಡುತ್ತಿರುವ ವ್ಯಕ್ತಿ



(7) ನೃತ್ಯ ಮಾಡುತ್ತಿರುವ ವ್ಯಕ್ತಿ

ಉತ್ತಮ ಕಲಿಕೆಗಾಗಿ ಸೂಚಿಸಲಾದ ಚಟುವಟಿಕೆಗಳ ಪಟ್ಟಿ:

(1) ಟ್ಯಾಂಗ್ರಾಮ್ ವಿನ್ಯಾಸಗಳನ್ನು ಪೂರ್ಣಗೊಳಿಸುವುದು

- ಹಂಸ, ಮೊಲ, ಬಾತುಕೋಳಿ, ನೃತ್ಯ ಮಾಡುವ ವ್ಯಕ್ತಿ, ಬೆಕ್ಕು, ಪಕ್ಷಿ, ವ್ಯಾಯಾಮ ಮಾಡುವ ವ್ಯಕ್ತಿ, ಒಂಟೆ ಮುಂತಾದ ಟ್ಯಾಂಗ್ರಾಮ್‌ಗಳನ್ನು ಬಳಸಿಕೊಂಡು ರೂಪಿಸಬಹುದಾದ ವಿವಿಧ ವಿನ್ಯಾಸಗಳ ರೂಪರೇಷೆಗಳನ್ನು ಹೊಂದಿರುವ ಚೌಕಟ್ಟನ್ನು ವಿದ್ಯಾರ್ಥಿಯ ಮುಂದೆ ಇಡಬಹುದು.
- ನಾವು ಚೌಕಟ್ಟಿನಲ್ಲಿ ಕೆಲವು ಟ್ಯಾಂಗ್ರಾಮ್ ಆಕಾರಗಳನ್ನು ಇರಿಸಬಹುದು.(ಇದು ಐಚ್ಛಿಕ)
- ಟ್ಯಾಂಗ್ರಾಮ್ ಆಕಾರಗಳನ್ನು ಹೊಂದಿರುವ ತಟ್ಟೆಯಿಂದ ಸೂಕ್ತವಾದ ಟ್ಯಾಂಗ್ರಾಮ್ ಆಕಾರಗಳನ್ನು ಆರಿಸುವ ಮೂಲಕ ವಿದ್ಯಾರ್ಥಿಯು ವಿನ್ಯಾಸದ ಖಾಲಿ ಚೌಕಟ್ಟನ್ನು ಭರ್ತಿ ಮಾಡಬೇಕು.



(2) ಹೊಸ ವಿನ್ಯಾಸಗಳನ್ನು ರಚಿಸುವುದು

- ಟ್ಯಾಂಗ್ರಾಮ್‌ನ 7 ತುಣುಕುಗಳನ್ನು ವಿದ್ಯಾರ್ಥಿಗೆ ನೀಡಬೇಕು.
- ವಿದ್ಯಾರ್ಥಿಯು ಅದನ್ನು ಟ್ಯಾಂಗ್ರಾಮ್ ಬೋರ್ಡ್‌ನಲ್ಲಿ ಜೋಡಿಸಬೇಕು ಮತ್ತು ವಿದ್ಯಾರ್ಥಿಯಿಷ್ಟದ ಹೊಸ ವಿನ್ಯಾಸವನ್ನು ರೂಪಿಸಬೇಕು.



ಮೌಲ್ಯಮಾಪನ

ಒಟ್ಟು ಅಂಕಗಳು: 5

ನಿಗದಿಪಡಿಸಿದ ಸಮಯ: 10 ನಿಮಿಷಗಳು

ಸೂಚನೆಗಳು:

- ಪ್ರಶ್ನೆಯನ್ನು ಎಚ್ಚರಿಕೆಯಿಂದ ಓದಿ ಮತ್ತು ಅದಕ್ಕೆ ಅನುಗುಣವಾಗಿ ಉತ್ತರಿಸಿ.
- ಒಟ್ಟು 5 ಅಂಕಗಳನ್ನು ನಿಗದಿಪಡಿಸಲಾಗಿದೆ ಮತ್ತು ಒಟ್ಟು ಸಮಯ 10 ನಿಮಿಷಗಳು.
- ವಿದ್ಯಾರ್ಥಿಗಳು ಟ್ಯಾಂಗ್ರಾಮ್‌ನ ಈ ಕೆಳಗಿನ ಆಕಾರಗಳನ್ನು ಜೋಡಿಸಿ ಒಂದು ಅರ್ಥಪೂರ್ಣ ವಿನ್ಯಾಸವನ್ನು ರೂಪಿಸಬೇಕೆಂದು ನಿರೀಕ್ಷಿಸಲಾಗಿದೆ.

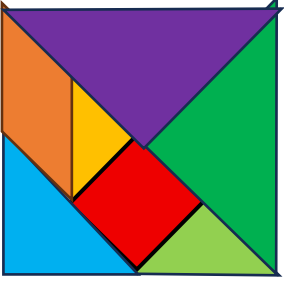
I. ಈ ಕೆಳಗಿನ ಟ್ಯಾಂಗ್ರಾಮ್ ಆಕಾರಗಳನ್ನು ಬಳಸಿ ಒಂದು ವಿನ್ಯಾಸವನ್ನು ಸಿದ್ಧಪಡಿಸಿ:

(1x5 ಅಂಕಗಳು = 5)

(ಅ) ಬಾತುಕೋಳಿ (ಅಥವಾ)

(ಆ) ಮೊಲ (ಅಥವಾ)

(ಇ) ನಿಮ್ಮ ಆಯ್ಕೆಯ ಯಾವುದೇ ವಿನ್ಯಾಸ

ಇದು ಟ್ಯಾಂಗ್ರಾಮ್	ಇವು ಟ್ಯಾಂಗ್ರಾಮ್‌ನ ವಿವಿಧ ಆಕಾರಗಳು
	

ಅಂಕಗಳ ಮಾನದಂಡ:

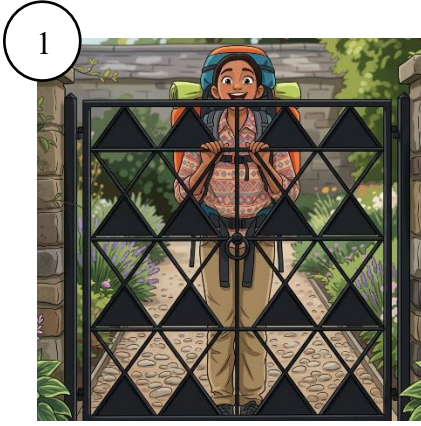
ವಿವರಣೆ	ಅಂಕಗಳು
ವಿನ್ಯಾಸದ ರಚನೆ	4
ನಿಗದಿತ ಸಮಯದಲ್ಲಿ ಅಚ್ಚುಕಟ್ಟುತನ ಮತ್ತು ಪೂರ್ಣಗೊಳಿಸುವಿಕೆ	1
ಒಟ್ಟು	5

ಉಪ-ಘಟಕ (ಇ): ವಿನ್ಯಾಸಗಳು

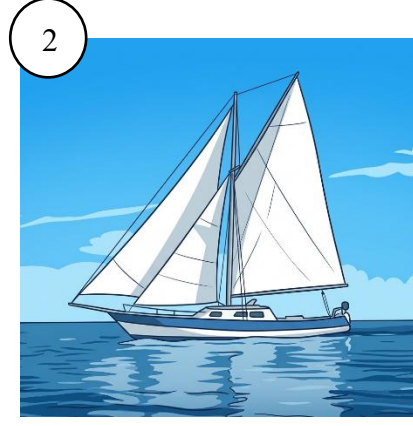
ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು:

- ತ್ರಿಭುಜಾಕಾರಗಳನ್ನು ಬಳಸಿ ವಿವಿಧ ವಿನ್ಯಾಸಗಳನ್ನು ಪೂರ್ಣಗೊಳಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಅನುವು ಮಾಡಿಕೊಡುವುದು.
- ಷಡ್ಭುಜಾಕೃತಿಯ ಆಕಾರವನ್ನು ಗುರುತಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಅನುವು ಮಾಡಿಕೊಡುವುದು.
- ಷಡ್ಭುಜಾಕೃತಿಯ ಬದಿಗಳ ಸಂಖ್ಯೆಯನ್ನು ಗುರುತಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಅನುವು ಮಾಡಿಕೊಡುವುದು.
- ಷಡ್ಭುಜಾಕೃತಿಯ ಆಕಾರಗಳನ್ನು ಬಳಸಿ ವಿವಿಧ ವಿನ್ಯಾಸಗಳನ್ನು ಪೂರ್ಣಗೊಳಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಅನುವು ಮಾಡಿಕೊಡುವುದು.

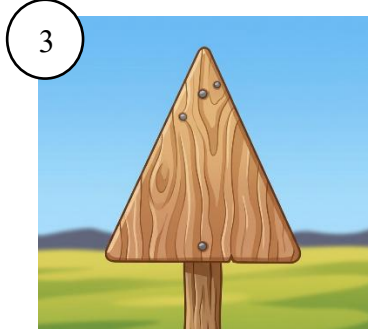
ಸನ್ನಿವೇಶ-1: ಎಮಿಲಿ ಪ್ರವಾಸಕ್ಕೆ ಹೋಗುತ್ತಾಳೆ.



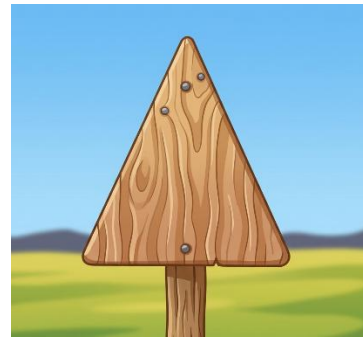
ಎಮಿಲಿ ಪ್ರವಾಸಕ್ಕೆ ಹೋಗುತ್ತಾಳೆ



ಅವಳು ದೋಣಿಯಲ್ಲಿ ಪ್ರಯಾಣಿಸುತ್ತಾಳೆ

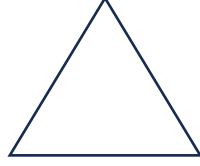


ಅವಳು ದಡವನ್ನು ತಲುಪಿದಾಗ, ಅಲ್ಲಿ ಒಂದು ನಾಮಫಲಕವನ್ನು ನೋಡುತ್ತಾಳೆ





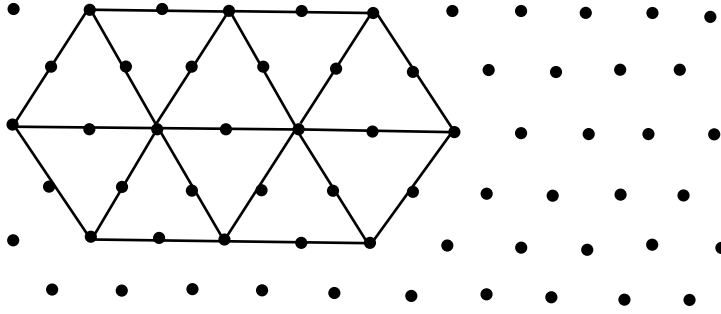
ಈಗ ಈ ಮೂರು ಚಿತ್ರಗಳನ್ನು ನೋಡಿ ಮತ್ತು ನೀವು
ಕಾಣುವ ಪ್ರಮುಖ ಆಕಾರವನ್ನು ಉಹಿಸಿ...



ಹೌದು! ಇದು ತ್ರಿಭುಜ

ವಿನ್ಯಾಸ : ವಿನ್ಯಾಸ ಎಂದರೆ ಏನನ್ನಾದರೂ ಹೇಗೆ ತಯಾರಿಸಬೇಕೆಂದು ತೋರಿಸುವ ಒಂದು ಯೋಜನೆ, ರೇಖಾಚಿತ್ರ ಅಥವಾ ಮಾದರಿ.

(i) ಈಗ, ತ್ರಿಭುಜಗಳನ್ನು ಬಳಸಿ ಕೆಳಗಿನ ವಿನ್ಯಾಸವನ್ನು ಪೂರ್ಣಗೊಳಿಸಿ



ಸನ್ನಿವೇಶ-2: ಬೀನ ಉದ್ಯಾನವನಕ್ಕೆ ಹೋಗುತ್ತಾಳೆ ಮತ್ತು ಅಲ್ಲಿ ಒಂದು ಖಾಲಿ ಬೇನುಗೂಡನ್ನು ಕಾಣುತ್ತಾಳೆ



ಬೀನ ಉದ್ಯಾನವನಕ್ಕೆ ಹೋಗುತ್ತಾಳೆ



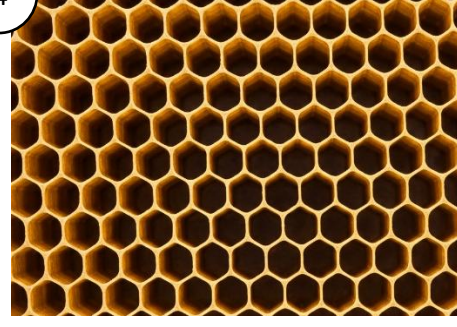
ತೋಟದಲ್ಲಿ ಅವಳಿಗೆ ಒಂದು ಖಾಲಿ ಬೇನುಗೂಡು
ಸಿಗುತ್ತದೆ.

3

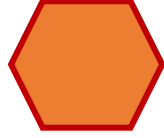


ನಂತರ, ಅವಳು ಆ ಖಾಲಿ ಜೇನುಗೂಡನ್ನು
ಹತ್ತಿರದಿಂದ ನೋಡುತ್ತಾಳೆ.

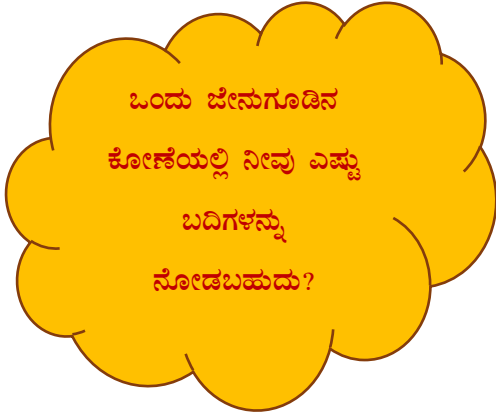
4



ಅವಳು ಜೇನುಗೂಡನ್ನು ಹತ್ತಿರದಿಂದ
ನೋಡಿದಾಗ, ಅದರಲ್ಲಿ ಜೇನುಗೂಡಿನ
ಕೋಣೆಗಳನ್ನು ಕಾಣುತ್ತಾಳೆ.



ಜೇನುಗೂಡಿನ ಕೋಣೆ ಈ ರೀತಿ ಕಾಣಿಸುತ್ತದೆ.



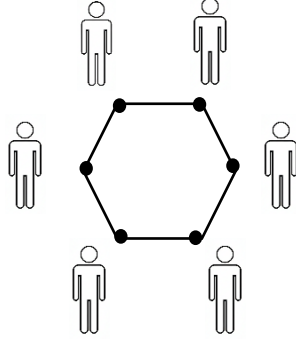
ಹೌದು! ನೀವು ಹೇಳಿದ್ದು ಸರಿ! ಅದರಲ್ಲಿ 6
ಬದಿಗಳಿವೆ.

ಈ ಹೊಸ ಆಕಾರವನ್ನು 'ಷಡ್ಭುಜಾಕೃತಿ' ಎಂದು ಕರೆಯಲಾಗುತ್ತದೆ.



ಷಡ್ಭುಜಾಕೃತಿಯು 6 ಬದಿಗಳನ್ನು ಹೊಂದಿರುತ್ತದೆ

ಚಟುವಟಿಕೆ-1: ಷಡ್ಭುಜಾಕೃತಿಯ ಪರಿಕಲ್ಪನೆಯನ್ನು ಚೆನ್ನಾಗಿ ಅರ್ಥಮಾಡಿಕೊಳ್ಳಲು ನಾವು ಒಂದು ಚಟುವಟಿಕೆಯನ್ನು
ಮಾಡೋಣ. ಕೆಳಗಿನ ಚಿತ್ರವನ್ನು ನೋಡಿ ಮತ್ತು ಅದರಂತೆ ನಿಂತುಕೊಳ್ಳಿ.



ನಂತರ ಒಂದು ಸೀಮೆಸುಣ್ಣವನ್ನು ತೆಗೆದುಕೊಂಡು, ಮೇಲೆ ತೋರಿಸಿರುವಂತೆ ಪಕ್ಕ ಪಕ್ಕದಲ್ಲಿ ನಿಂತಿರುವ ಇಬ್ಬರು ವ್ಯಕ್ತಿಗಳ ನಡುವಿನ ಜಾಗವನ್ನು ಜೋಡಿಸಿ. ಈಗ ನೀವು ಷಡ್ಭುಜಾಕೃತಿಯ ಆಕಾರದಲ್ಲಿ ನಿಂತಿದ್ದೀರಿ.

ಇದೇ ಷಡ್ಭುಜಾಕೃತಿಯ ಆಕಾರ!

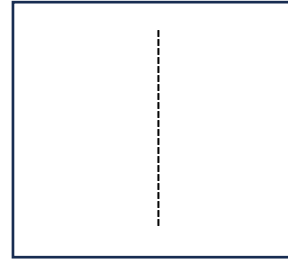
ಚಟುವಟಿಕೆ-2: ನಾವು ಈಗ ಒಂದು ಷಡ್ಭುಜಾಕೃತಿಯನ್ನು ತಯಾರಿಸೋಣ!

1



ಹಂತ-1: ಒಂದು ಆಯತಾಕಾರದ ಕಾಗದದ ತುಂಡನ್ನು ತೆಗೆದುಕೊಳ್ಳಿ.

2



ಹಂತ-2: ಈಗ ಚುಕ್ಕೆಗಳ ಸಾಲಿನಮೇಲೆ ಕಾಗದವನ್ನು ಮಡಚಿ.

3

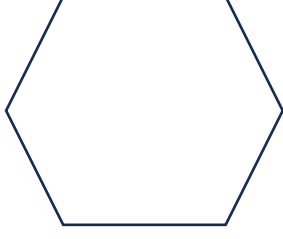


ಹಂತ-3: ಹಂತ-2ರಲ್ಲಿ ತೋರಿಸಿದಂತೆ ಕಾಗದವನ್ನು ಮಡಚಿದ ನಂತರ, ಈಗ ಮೇಲೆ ತೋರಿಸಿರುವ ಚುಕ್ಕೆಗಳ ಸಾಲಿನಮೇಲೆ ಕಾಗದವನ್ನು ಮತ್ತೊಮ್ಮೆ ಮಡಚಿ.

4

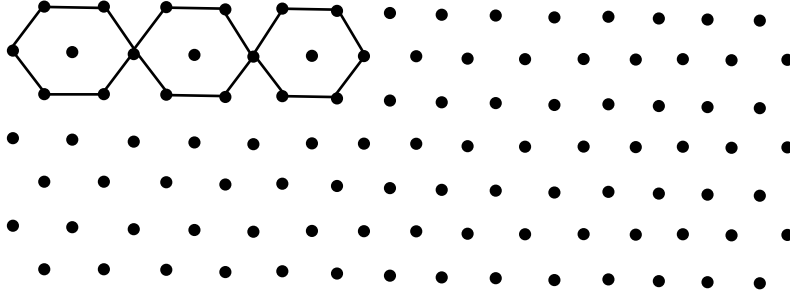


ಹಂತ-4: ಈಗ ಮಡಚಿದ ಕಾಗದವನ್ನು ಚುಕ್ಕೆಗಳ ಸಾಲಿನಮೇಲೆ ಕತ್ತರಿಸಿ.



ಹಂತ-5: ಈಗ ನೀವು ಈ ಕಾಗದವನ್ನು ತೆರೆದಾಗ,
ನಿಮಗೆ ಪಡ್ಡಜಾಕೃತಿಯು ಸಿಗುತ್ತದೆ!

ಪಡ್ಡಜಾಕೃತಿಯ ಆಕಾರಗಳನ್ನು ಬಳಸಿ, ಕೆಳಗಿನ ವಿನ್ಯಾಸವನ್ನು ಪೂರ್ಣಗೊಳಿಸಿ:



ಉತ್ತಮ ಕಲಿಕೆಗಾಗಿ ಸೂಚಿಸಲಾದ ಚಟುವಟಿಕೆಗಳ ಪಟ್ಟಿ:

(1) ಕೇವಲ ತ್ರಿಭುಜಗಳಿಗೆ ಬಣ್ಣ ಹಚ್ಚುವುದು:

- ಪಠ್ಯಚಾಕ್ರತಿ ಮತ್ತು ತ್ರಿಭುಜಗಳ ಮಾದರಿಗಳನ್ನು ಒಳಗೊಂಡಿರುವ ವರ್ಕ್‌ಶೀಟ್‌ಗಳನ್ನು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ನೀಡಿ.
- ವಿದ್ಯಾರ್ಥಿಗಳು ಕೇವಲ ತ್ರಿಭುಜಗಳಿಗೆ ಮಾತ್ರ ನಿರ್ದಿಷ್ಟ ಬಣ್ಣಗಳನ್ನು ಹಚ್ಚಬೇಕು.



(2) ಕೇವಲ ತ್ರಿಭುಜಗಳಿಗೆ ಬಣ್ಣ ಹಚ್ಚುವುದು:

- ಪಠ್ಯಚಾಕ್ರತಿಗಳು ಮತ್ತು ತ್ರಿಭುಜಗಳ ವಿನ್ಯಾಸಗಳನ್ನು ಹೊಂದಿರುವ ವರ್ಕ್‌ಶೀಟ್‌ಗಳನ್ನು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಒದಗಿಸಿ.
- ವಿದ್ಯಾರ್ಥಿಗಳು ಕೇವಲ ತ್ರಿಭುಜಗಳಿಗೆ ಮಾತ್ರ, ಸೂಚಿಸಿದ ನಿರ್ದಿಷ್ಟ ಬಣ್ಣಗಳನ್ನು ಹಚ್ಚಬೇಕು.



(3) ಕೋನಗಳನ್ನು ಬಳಸಿ ಪಠ್ಯಚಾಕ್ರತಿಗಳನ್ನು ಮಾಡುವುದು:

- ಪ್ರತಿ ವಿದ್ಯಾರ್ಥಿಗೂ ತಲಾ ಆರು ತ್ರಿಭುಜ ಆಕಾರಗಳನ್ನು ನೀಡಬೇಕು.
- ಪ್ರತಿ ವಿದ್ಯಾರ್ಥಿಯು ಈ ತ್ರಿಭುಜಗಳನ್ನು ಜೋಡಿಸಿ ಒಂದು ಪಠ್ಯಚಾಕ್ರತಿಯನ್ನು ರೂಪಿಸಬೇಕು.



ಮೌಲ್ಯಮಾಪನ

ಒಟ್ಟು ಅಂಕಗಳು: 10

ನಿಗದಿಪಡಿಸಿದ ಸಮಯ: 15 ನಿಮಿಷಗಳು

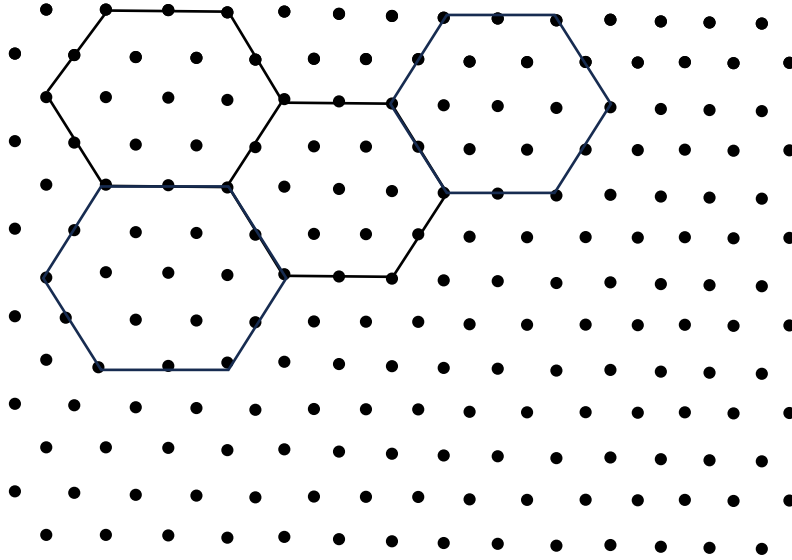
ಸೂಚನೆಗಳು:

- ಎಲ್ಲಾ ಪ್ರಶ್ನೆಗಳನ್ನು ಎಚ್ಚರಿಕೆಯಿಂದ ಓದಿ ಮತ್ತು ಎಲ್ಲದಕ್ಕೂ ಉತ್ತರಿಸಿ.
- ಈ ಮೌಲ್ಯಮಾಪನದ ಒಟ್ಟು ಅಂಕಗಳು 10 ಮತ್ತು ಒಟ್ಟು ಸಮಯ 15 ನಿಮಿಷಗಳು.
- ಪ್ರತಿ ಪ್ರಶ್ನೆಯಲ್ಲಿ ನೀಡಲಾದ ನಿರ್ದೇಶನಗಳಂತೆ ಎಲ್ಲಾ ಪ್ರಶ್ನೆಗಳನ್ನು ಪ್ರಯತ್ನಿಸಿ ಮತ್ತು ಕೆಳಗಿನ ವಿನ್ಯಾಸಗಳನ್ನು ಪೂರ್ಣಗೊಳಿಸಿ.

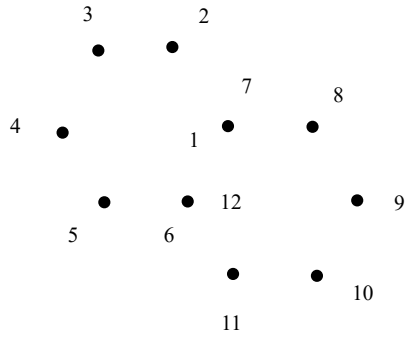
I. ಕೆಳಗಿನ ವಿನ್ಯಾಸಗಳನ್ನು ಪೂರ್ಣಗೊಳಿಸಿ:

(5x2 ಅಂಕಗಳು = 10)

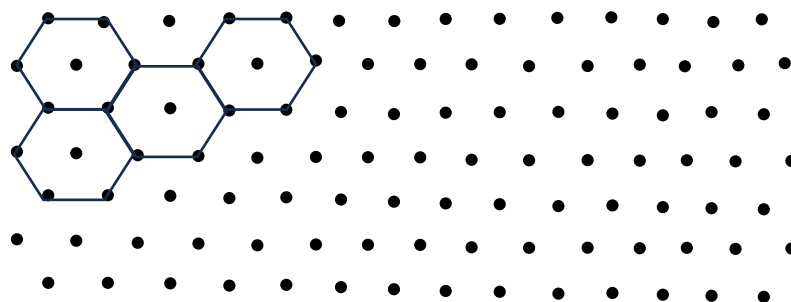
(1)



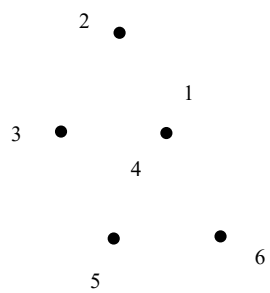
(2)



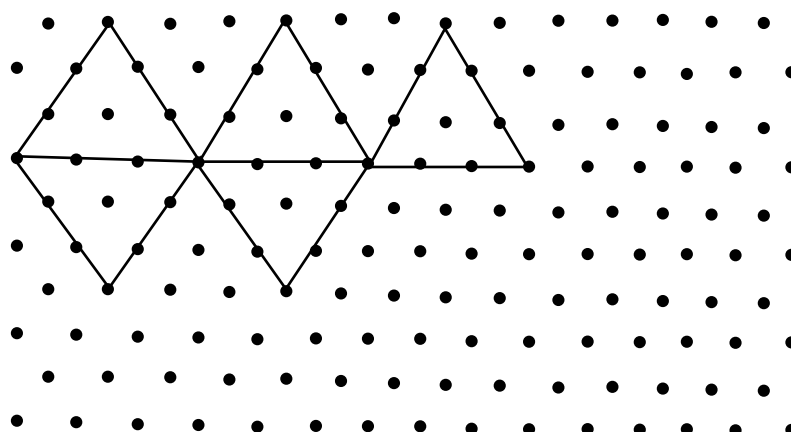
(3)



(4)



(5)



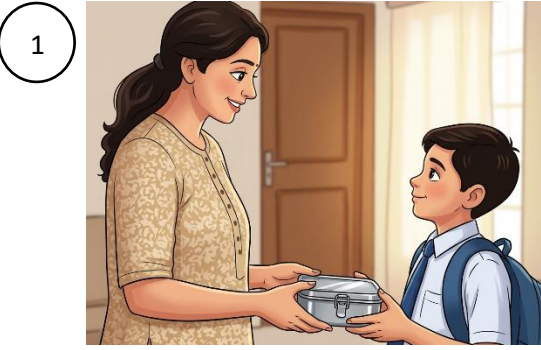
ಅಧ್ಯಾಯ-2: ಘನಾಕೃತಿಗಳು

ಉಪ-ಘಟಕ (ಅ): ಆಯತ ಘನ

ಕಲಿಕಾ ಉದ್ದೇಶಗಳು:

- ವಿದ್ಯಾರ್ಥಿಗಳು ಆಯತಘನದ ಆಕಾರವನ್ನು ವಿವರಿಸುವಂತೆ ಅನುವು ಮಾಡಿಕೊಡುವುದು.
- ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಮುಖ, ಅಂಚು ಮತ್ತು ಶೃಂಗಬಿಂದುಗಳ ಪರಿಕಲ್ಪನೆಯನ್ನು ವಿವರಿಸುವಂತೆ ಅನುವು ಮಾಡುವುದು.
- ಆಯತಘನದಲ್ಲಿರುವ ಮುಖಗಳು, ಅಂಚುಗಳು ಮತ್ತು ಶೃಂಗಬಿಂದುಗಳ ಸಂಖ್ಯೆಯನ್ನು ಗುರುತಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಶಕ್ತರನ್ನಾಗಿಸುವುದು.
- ಆಯತಮತ್ತು ಆಯತಘನದ ನಡುವಿನ ವ್ಯತ್ಯಾಸವನ್ನು ಗುರುತಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಸಹಾಯ ಮಾಡುವುದು.
- ಆಯತಘನದ ಆಕಾರದಲ್ಲಿರುವ ದಿನನಿತ್ಯದ ವಸ್ತುಗಳನ್ನು ಗುರುತಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಶಕ್ತರನ್ನಾಗಿಸುವುದು.

ಸನ್ನಿವೇಶ-1: ಅಲಿ ಶಾಲೆಗೆ ಹೋಗುತ್ತಾನೆ



ಅಲಿ ಶಾಲೆಗೆ ಹೋಗುವಾಗ ಅವನ ತಾಯಿ ಅವನಿಗೆ ಊಟದ ಡಬ್ಬಿಯನ್ನು ನೀಡುತ್ತಾರೆ.



ತಾಯಿಯಿಂದ ಊಟದ ಡಬ್ಬಿಯನ್ನು ಪಡೆದ ನಂತರ ಅವನು ತನ್ನ ಶಾಲಾ ಬಸ್ಸನ್ನು ನೋಡುತ್ತಾನೆ.



ನಂತರ, ಅವನು ಶಾಲಾ ಬಸ್ಸಿನ ಒಳಗೆ ಕುಳಿತು ಶಾಲೆಗೆ ಹೋಗುತ್ತಾನೆ.



ಹೋಗುವ ದಾರಿಯಲ್ಲಿ, ಅವನು ಕೈಯಲ್ಲಿ ಇಟ್ಟಿಗೆಯನ್ನು ಹಿಡಿದಿರುವ ಒಬ್ಬ ಮೇಸ್ತಿಯನ್ನು ನೋಡುತ್ತಾನೆ.

5



ಹಾಗೆಯೇ, ರಟ್ಟಿನ ಪೆಟ್ಟಿಗೆ (ಕಾರ್ಟನ್ ಬಾಕ್ಸ್)ನಲ್ಲಿ
ಏನನ್ನೋ ತಲುಪಿಸುತ್ತಿರುವ ಡೆಲಿವರಿ ಬಾಯ್ ಅನ್ನು
ಸಹ ಅವನು ಗಮನಿಸುತ್ತಾನೆ.

6



ಶಾಲೆಯಿಂದ ಮನೆಗೆ ಬಂದ ನಂತರ, ಅವನು ತನ್ನ
ಮನೆಯಲ್ಲಿರುವ ಶೈಕ್ಷಣಿಕ ಯಂತ್ರದ
(ಫ್ರಿಜ್) ಆಕಾರವನ್ನು ಗಮನಿಸುತ್ತಾನೆ

7



ನಂತರ ಅವನು ತಾನು ನೋಡಿದ ವಿವಿಧ ವಸ್ತುಗಳ ಆಕಾರಗಳ ಬಗ್ಗೆ ಆಳವಾಗಿ ಯೋಚಿಸುತ್ತಾನೆ

1



ಊಟದ ಡಬ್ಬಿಯ(ಟೆಫಿನ್ ಬಾಕ್ಸ್) ಆಕಾರ

2



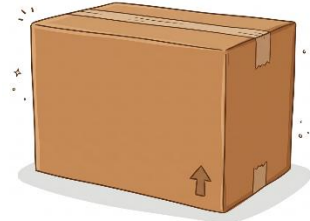
ಶಾಲಾ ಬಸ್ಸಿನ ಆಕಾರ

3



ಇಟ್ಟಿಗೆಯ ಆಕಾರ

4



ರಟ್ಟಿನ ಪೆಟ್ಟಿಗೆಯ
(ಕಾರ್ಟನ್ ಬಾಕ್ಸ್)ನ ಆಕಾರ.

5



ಶೈತ್ಯೀಕರಣ ಯಂತ್ರದ (ಫ್ರಿಡ್ಜ್‌ನ) ಆಕಾರ

ನಂತರ ಅವನು ಆಲೋಚಿಸುತ್ತಾನೆ...



ನಿಮಗೇನು ಅನ್ನಿಸುತ್ತದೆ?

ಈ ಎಲ್ಲಾ ವಸ್ತುಗಳ ಆಕಾರದಲ್ಲಿ ಏನಾದರೂ ಸಾಮ್ಯತೆ ಇದೆಯೇ?



8

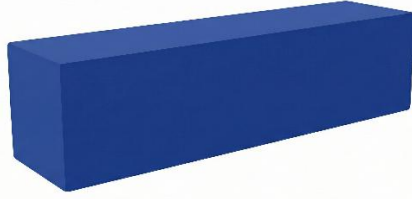


ಮರುದಿನ, ಅವನು ಶಾಲೆಗೆ ಹೋಗಿ ತನ್ನ
ಶಿಕ್ಷಕಿಯಲ್ಲಿ ಟಿಫಿನ್ ಬಾಕ್ಸ್ (ಊಟದ ಡಬ್ಬ),
ಶಾಲಾ ಬಸ್ಸು, ಇಟ್ಟಿಗೆ, ರಟ್ಟಿನ ಪೆಟ್ಟಿಗೆ (ಕಾರ್ಟನ್
ಬಾಕ್ಸ್) ಮತ್ತು ರೆಫ್ರಿಜರೇಟರ್‌ಗಳ (ಫ್ರಿಡ್ಜ್)
ಆಕಾರಗಳ ನಡುವೆ ಏನಾದರೂ ಹೋಲಿಕೆ ಇದೆಯೇ
ಎಂದು ಕೇಳುತ್ತಾನೆ.

9



ಅವೆಲ್ಲವೂ 'ಆಯತಘನ' ಎಂಬ ಒಂದೇ ರೀತಿಯ
ಆಕಾರವನ್ನು ಹೊಂದಿವೆ ಎಂದು ಶಿಕ್ಷಕರು ಅವನಿಗೆ
ತಿಳಿಸುತ್ತಾರೆ.

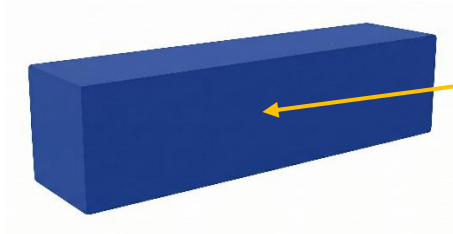


ಇದು ಒಂದು ಆಯತಘನ

ಮುಖಗಳು, ಅಂಚುಗಳು ಮತ್ತು ಶೃಂಗಗಳು

(i) ಮುಖ

ಒಂದು ಘನ ಆಕೃತಿಯ ಸಮತಟ್ಟಾದ ಅಥವಾ ಬಾಗಿದ ಮೇಲ್ಮೈಯನ್ನು ಮುಖ ಎನ್ನುತ್ತಾರೆ

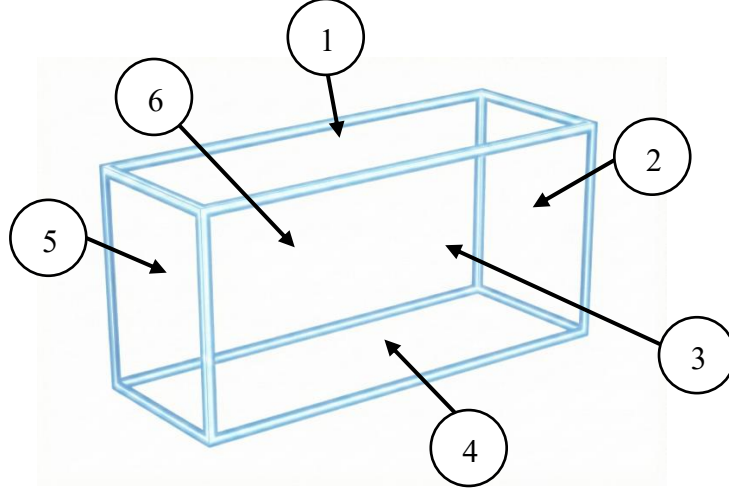


ಮುಖ

ಈಗ ಒಂದು ಆಯತಘನದ
ಮುಖಗಳ ಸಂಖ್ಯೆಯನ್ನು
ಎಣಿಸಿ ಮತ್ತು ಅದಕ್ಕೆ ಎಷ್ಟು
ಮುಖಗಳಿವೆ ಎಂದು ಊಹಿಸಿ.



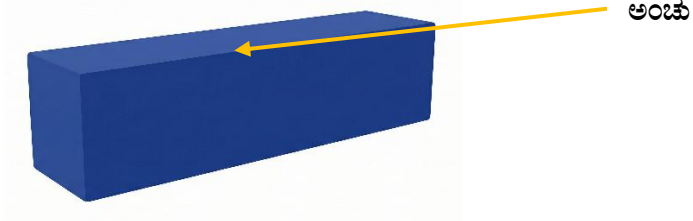
ಹೌದು, ನೀವು ಹೇಳಿದ್ದು ಸರಿ!
6 ಮುಖಗಳಿವೆ.



ಒಂದು ಆಯತಘನವು 6 ಮುಖಗಳನ್ನು ಹೊಂದಿರುತ್ತದೆ..

(ii) ಅಂಚು

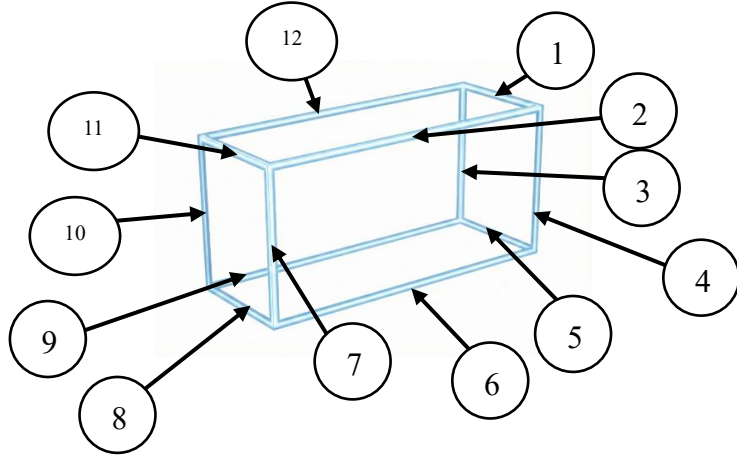
ಒಂದು ಘನ ಆಕೃತಿಯ ಎರಡು ಮುಖಗಳು ಸಂಧಿಸುವ ರೇಖಾಖಂಡವನ್ನು ಅಂಚು ಎನ್ನುತ್ತಾರೆ



ಈಗ ಒಂದು ಆಯತಘನದ
ಅಂಚುಗಳನ್ನು ಎಣಿಸಿ ಮತ್ತು
ಅದಕ್ಕೆ ಎಷ್ಟು ಅಂಚುಗಳಿವೆ
ಎಂದು ಊಹಿಸಿ.



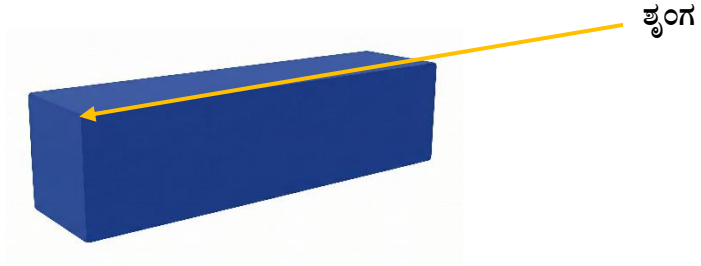
ಹೌದು, ನೀವು ಹೇಳಿದ್ದು ಸರಿ!
12 ಅಂಚುಗಳಿವೆ.



ಒಂದು ಆಯತಘನವು 12 ಅಂಚುಗಳನ್ನು ಹೊಂದಿರುತ್ತದೆ.

(iii)ಶೃಂಗಗಳು

ಎರಡು ಅಥವಾ ಎರಡಕ್ಕಿಂತ ಹೆಚ್ಚು ಅಂಚುಗಳು ಸಂಧಿಸುವ ಮೂಲೆ ಅಥವಾ ಬಿಂದುವನ್ನು ಶೃಂಗವೆನ್ನುತ್ತಾರೆ

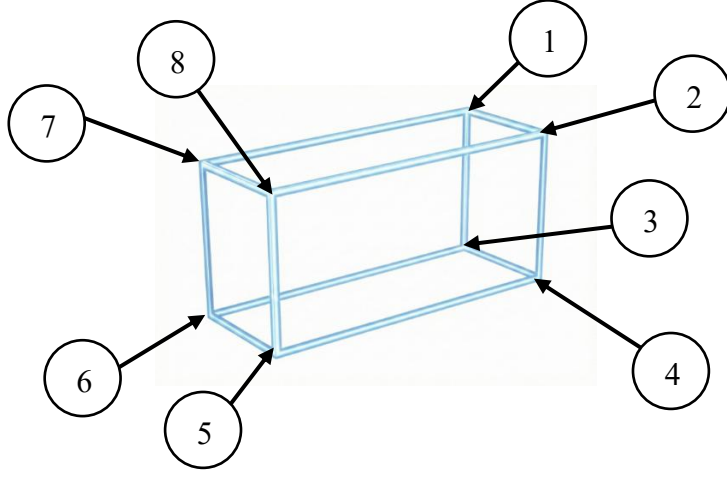


ಆಯತಘನದ ಶೃಂಗಗಳ
ಸಂಖ್ಯೆಯನ್ನು ಎಣಿಸಿ ಮತ್ತು
ಅದಕ್ಕೆ ಎಷ್ಟು ಶೃಂಗಗಳಿವೆ
ಎಂದು ಊಹಿಸಬಲ್ಲರಾ?



ಹೌದು, ನೀವು ಹೇಳಿದ್ದು ಸರಿ!

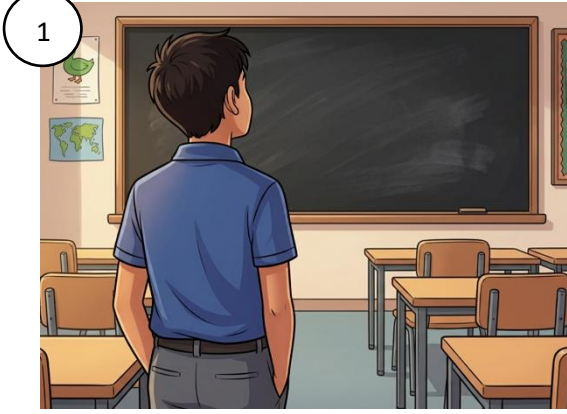
8 ಶೃಂಗಗಳಿವೆ



ಒಂದು ಆಯತಘನವು 8 ಶೃಂಗಗಳನ್ನು ಹೊಂದಿರುತ್ತದೆ

ಆಯತ ಮತ್ತು ಆಯತಘನದ ನಡುವಿನ ವ್ಯತ್ಯಾಸ

ಸನ್ನಿವೇಶ-2: ಅಮನ್ ತನ್ನ ತರಗತಿಯಲ್ಲಿರುವ ಕೆಲವು ವಸ್ತುಗಳನ್ನು ಗಮನಿಸುತ್ತಾನೆ.



ಅಮನ್ ಆಯತಾಕಾರದ ಕಪ್ಪುಹಲಗೆಯನ್ನು ನೋಡುತ್ತಿದ್ದಾನೆ.



ಈಗ ಅವನು ಆಯತಘನದ ಆಕಾರದಲ್ಲಿರುವ ಡಸ್ಟರನ್ನು ನೋಡುತ್ತಿದ್ದಾನೆ



ಅವನು ಯೋಚಿಸುತ್ತಾನೆ, "ಇವುಗಳು ಒಂದೇ ರೀತಿ ಕಾಣುತ್ತವೆ, ಆದರೆ ಇವುಗಳು ಒಂದೇ ಆಗಿವೆಯೇ?"



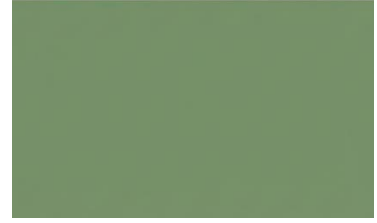
ಅಮನ್ ತನ್ನ ಶಿಕ್ಷಕಿಯ ಬಳಿ ಹೋಗಿ ಕಪ್ಪುಹಲಗೆ ಮತ್ತು ಡಸ್ಟರಿನ ನಡುವೆ ಏನಾದರೂ ಸಾಮ್ಯತೆ ಇದೆಯೇ ಎಂದು ಕೇಳುತ್ತಾನೆ.



ಅವುಗಳು ಒಂದೇ ಅಲ್ಲ ಎಂದು ಶಿಕ್ಷಕಿಯು
ಸ್ಪಷ್ಟಪಡಿಸುತ್ತಾರೆ. ಏಕೆಂದರೆ ಕಪ್ಪುಹಲಗೆಯು 'ಆಯತ'
ಆಗಿದ್ದರೆ, ಡಸ್ಟರ್ 'ಆಯತ ಘನ' ಆಗಿದೆ.



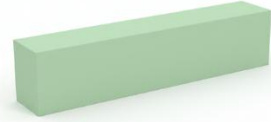
ಕಪ್ಪುಹಲಗೆ



ಆಯತ



ಡಸ್ಟರ್

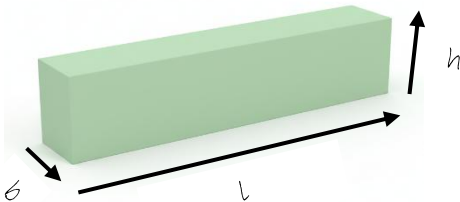


ಆಯತಘನ



ಉದ್ದ

(a) ಒಂದು ಆಯತವು 2 ಆಯಾಮಗಳನ್ನು
ಹೊಂದಿದೆ:



ಒಂದು ಆಯತಘನವು 3 ಆಯಾಮಗಳನ್ನು ಹೊಂದಿದೆ:

(ಅ) l = ಉದ್ದ (Length)

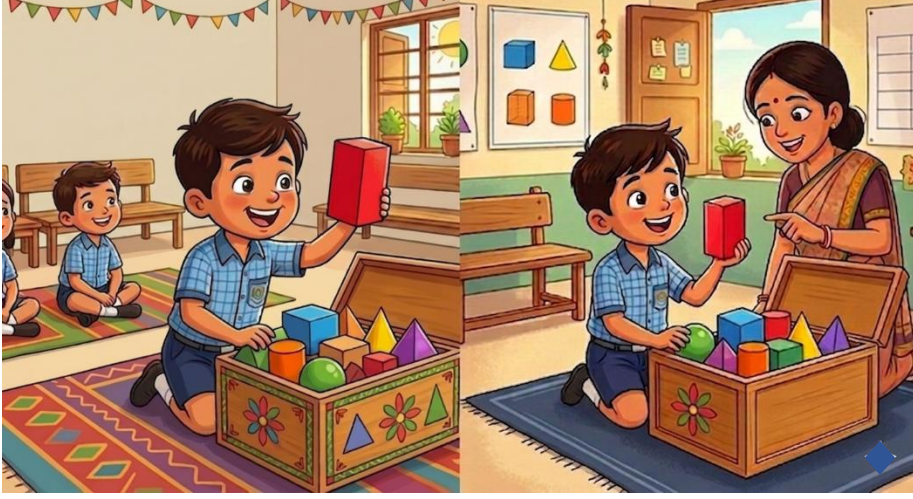
(ಆ) b = ಅಗಲ (Breadth)

(ಇ) h = ಎತ್ತರ (Height)

ಸೂಚಿಸಲಾದ ಚಟುವಟಿಕೆಗಳ ಪಟ್ಟಿ:

(1) ಪೆಟ್ಟಿಗೆಯಿಂದ ಆಯತಘನವನ್ನು ಆರಿಸುವುದು

- ಒಂದು ಪೆಟ್ಟಿಗೆಯಲ್ಲಿ ಚೌಕಘನ , ಆಯತಘನ , ಗೋಳ , ಶಂಕು, ಪ್ರಿಸ್ಮ , ಸ್ತಂಭಾಕೃತಿಯಂತಹ ವಿವಿಧ 3-ಆಯಾಮದ ಆಕಾರಗಳನ್ನು ಹಾಕಿ.
- ವಿದ್ಯಾರ್ಥಿಯು ಪೆಟ್ಟಿಗೆಯಲ್ಲಿ ಲಭ್ಯವಿರುವ ಆಕಾರಗಳಿಂದ ಆಯತಘನವನ್ನು ಆರಿಸಿ ಶಿಕ್ಷಕರಿಗೆ ನೀಡಬೇಕು.



(2) ಆಯತಘನದಂತೆ ಕಾಣುವ ವಸ್ತುಗಳನ್ನು ಗುರುತಿಸುವುದು

- ಒಂದು ಮೇಜಿನ ಮೇಲೆ ವಿವಿಧ ವಸ್ತುಗಳನ್ನು ಹರಡಿ ಇಡಿ.
- ಮೇಜಿನ ಮೇಲೆ ಹರಡಿರುವ ವಸ್ತುಗಳಲ್ಲಿ, ಆಯತಘನದ ಆಕಾರವನ್ನು ಹೊಂದಿರುವ ವಸ್ತುಗಳನ್ನು ವಿದ್ಯಾರ್ಥಿಯು ಆರಿಸಬೇಕು.



(3) ಆಯತಘನ ಮತ್ತು ಆಯತದ ನಡುವಿನ ವ್ಯತ್ಯಾಸವನ್ನು ಗುರುತಿಸುವುದು.

- ಒಂದು ಚೀಲದಲ್ಲಿ ಆಯತಘನದ ಆಕಾರವನ್ನು ಹೊಂದಿರುವ 4-5 ವಸ್ತುಗಳನ್ನು ಮತ್ತು ಆಯತದ ಆಕಾರವನ್ನು ಹೊಂದಿರುವ ಮತ್ತೊಂದು 4-5 ವಸ್ತುಗಳನ್ನು ಇಡಬೇಕು.
- ಒಂದು ಮೇಜಿನ ಮೇಲೆ 2 ಖಾಲಿ ಟ್ರೇಗಳನ್ನು ಇಡಬೇಕು, ಅದರಲ್ಲಿ ಒಂದು ಟ್ರೇಗೆ 'ಆಯತಘನ' ಎಂಬ ಹೆಸರಿನ ಬೋರ್ಡ್ ಮತ್ತು ಮತ್ತೊಂದು ಟ್ರೇಗೆ 'ಆಯತ' ಎಂಬ ಹೆಸರಿನ ಬೋರ್ಡ್ ಇರಬೇಕು.

- ಪ್ರತಿ ವಿದ್ಯಾರ್ಥಿಯು ಚೀಲದಿಂದ ವಸ್ತುಗಳನ್ನು ಆರಿಸಿ, ಆಯತಘನದ ಆಕಾರವನ್ನು ಹೊಂದಿರುವ ವಸ್ತುಗಳನ್ನು 'ಆಯತಘನ' ಎಂಬ ಹೆಸರಿನ ಬೋರ್ಡ್ ಇರುವ ಖಾಲಿ ಟ್ರೇನಲ್ಲಿ ಮತ್ತು ಆಯತದ ಆಕಾರವನ್ನು ಹೊಂದಿರುವ ವಸ್ತುಗಳನ್ನು 'ಆಯತ' ಎಂಬ ಹೆಸರಿನ ಬೋರ್ಡ್ ಇರುವ ಖಾಲಿ ಟ್ರೇನಲ್ಲಿ ಇಡಬೇಕು.



ಮೌಲ್ಯಮಾಪನ

ಒಟ್ಟು ಅಂಕಗಳು: 10

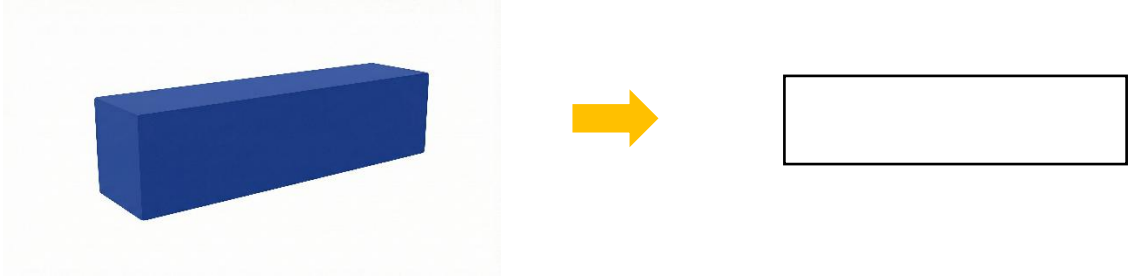
ಸಮಯ: 10 ನಿಮಿಷಗಳು

ಸೂಚನೆಗಳು:

- ಎಲ್ಲಾ ಪ್ರಶ್ನೆಗಳನ್ನು ಎಚ್ಚರಿಕೆಯಿಂದ ಓದಿ ಮತ್ತು ಉತ್ತರಿಸಿ.
- ಈ ಮೌಲ್ಯಮಾಪನದ ಒಟ್ಟು ಅಂಕಗಳು 10 ಮತ್ತು ನಿಗದಿಪಡಿಸಿದ ಒಟ್ಟು ಸಮಯ 10 ನಿಮಿಷಗಳು.
- ಪ್ರತಿ ಪ್ರಶ್ನೆಯ ನಿರ್ದೇಶನದಂತೆ ಎಲ್ಲಾ ಪ್ರಶ್ನೆಗಳನ್ನು ಪ್ರಯತ್ನಿಸಿ ಮತ್ತು ಅಗತ್ಯವಿರುವಂತೆ ಹೆಸರು ಅಥವಾ ಸಂಖ್ಯೆಯನ್ನು ತಿಳಿಸಿ.

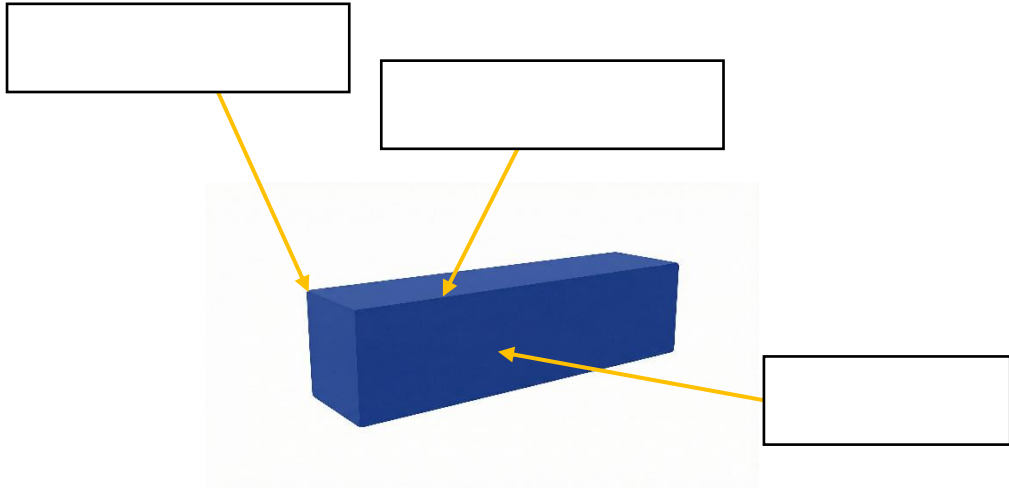
I. ಈ ಕೆಳಗಿನ ಚಿತ್ರವನ್ನು ಹೆಸರಿಸಿ:

(1x1 ಅಂಕ = 1)



II. ಈ ಕೆಳಗಿನ ಪ್ರತಿಯೊಂದರ ಹೆಸರನ್ನು ತಿಳಿಸಿ:

(3x1 ಅಂಕ = 3)



III. ಈ ಕೆಳಗಿನ ಪ್ರತಿಯೊಂದರ ಹೆಸರನ್ನು ತಿಳಿಸಿ:

ಮುಖಗಳು	→	
ಅಂಚುಗಳು	→	
ಶೃಂಗಗಳು	→	

IV. ಈ ಕೆಳಗಿನ ಸನ್ನಿವೇಶದಿಂದ ವಸ್ತುವಿನ ಆಕಾರವನ್ನು ಗುರುತಿಸಿ:

(1x1 ಅಂಕ = 1)



V. ಒಂದು ಆಯತಘನದ ಚಿತ್ರವನ್ನು ಬರೆಯಿರಿ ಮತ್ತು ಅದರ ಮುಖ, ಅಂಚು ಹಾಗೂ ಶೃಂಗವನ್ನು ಗುರುತಿಸಿ:

(1 x 2 ಅಂಕ = 2)



ಉಪ-ಘಟಕ (ಆ): ಚೌಕಘನ

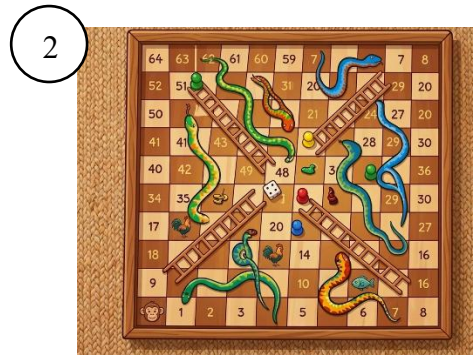
ಕಲಿಕಾಉದ್ದೇಶಗಳು:

- ಚೌಕಘನದ ಆಕಾರವನ್ನು ವಿವರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಶಕ್ತರನ್ನಾಗಿಸುವುದು..
- ಚೌಕಘನದ ಮುಖಗಳು, ಅಂಚುಗಳು ಮತ್ತು ಶೃಂಗಗಳ ಸಂಖ್ಯೆಯನ್ನು ಗುರುತಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಶಕ್ತರನ್ನಾಗಿಸುವುದು.
- ಚೌಕ ಮತ್ತು ಚೌಕಘನದ ನಡುವಿನ ವ್ಯತ್ಯಾಸವನ್ನು ತಿಳಿಯಪಡಿಸುವುದು
- ಚೌಕಘನದಂತೆ ಕಾಣುವ ವಸ್ತುಗಳನ್ನು ಗುರುತಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಶಕ್ತರನ್ನಾಗಿಸುವುದು.

ಸನ್ನಿವೇಶ-1: ಅನಿತ ಹಾವು-ಎಣಿ ಆಟವಾಡುತ್ತಿದ್ದಾಳೆ.



ಅನಿತ, ಹಾವು-ಎಣಿ ಆಟವಾಡುತ್ತಿದ್ದಾಳೆ.



ಅವಳು ಆಟದ ಮಣೆಯ ಆಕಾರವನ್ನು ನೋಡುತ್ತಾಳೆ.



ನಂತರ ಅವಳು ದಾಳವನ್ನು ನೋಡುತ್ತಾಳೆ.



ಅವೆರಡೂ ಒಂದೇ ತರಹಕಾಣುವುದರಿಂದ, ಅವು ಒಂದೇ ಆಗಿವೆಯೇ ಎಂದು ಅವಳು ಯೋಚಿಸುತ್ತಾಳೆ.



ಇದರ ಬಗ್ಗೆ ಯೋಚಿಸಿ



ಇದು ಒಂದು ಚೌಕ



ಇದು ಒಂದು ಚೌಕಘನ

ಆದ್ದರಿಂದ, ಅವುಗಳು ಒಂದೇ ಅಲ್ಲ.

ಹಾವು-ಏಣಿ ಆಟದ ಮಣೆಯ ಆಕಾರವು ಚೌಕವಾಗಿರುತ್ತದೆ.



ಹಾವು-ಏಣಿ ಆಟದ ಮಣೆ



ಚೌಕ

ದಾಳದ ಆಕಾರವು ಚೌಕಘನ

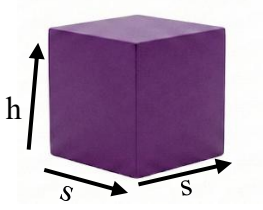
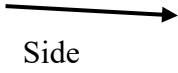
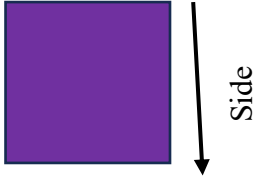


ದಾಳ



ಚೌಕಘನ

ಚೌಕ ಮತ್ತು ಚೌಕಘನದ ನಡುವಿನ ವ್ಯತ್ಯಾಸ



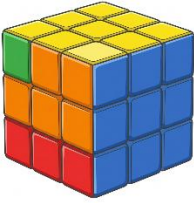
ಒಂದು ಚೌಕವು 2 ಆಯಾಮಗಳನ್ನು ಹೊಂದಿದೆ:

ಸಮಾನ ಅಳತೆಯ 2 'ಬಾಹುಗಳು

ಒಂದು ಚೌಕಘನವು 3 ಆಯಾಮಗಳನ್ನು ಹೊಂದಿದೆ:

2 ಸಮಾನಅಳತೆಯ "ಬಾಹುಗಳು" ಮತ್ತು " h =ಎತ್ತರ".

ಚೌಕಘನದಂತೆ ಕಾಣುವ ವಸ್ತುಗಳು:



ರೂಬಿಕ್ಸ್ ಕ್ಯೂಬ್



ಮಂಜುಗಡ್ಡೆಯ ತುಂಡು

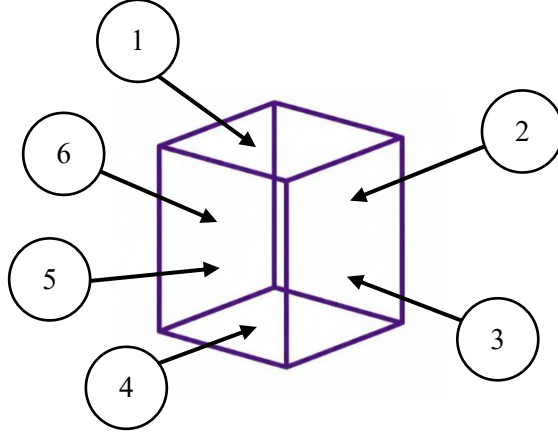
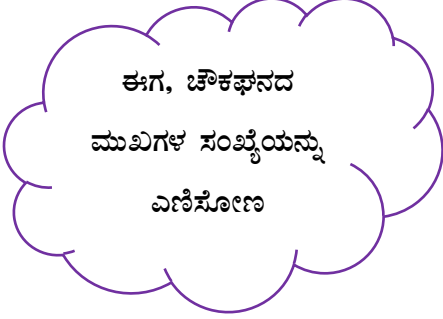


ದಾಳ

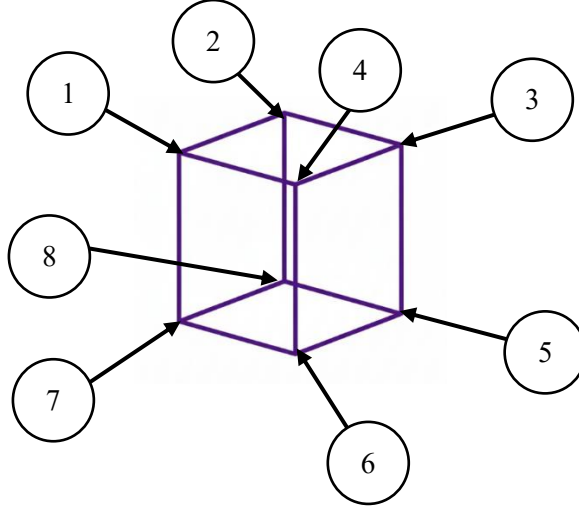
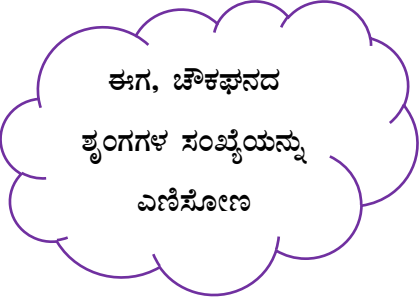
ಈಗ ನಾವು ಚೌಕಘನದ, ಮುಖಗಳು, ಅಂಚುಗಳು ಮತ್ತು ಶೃಂಗಗಳ ಬಗ್ಗೆ ಕಲಿಯೋಣ.

ಚೌಕಘನದ ಮುಖಗಳು, ಅಂಚುಗಳು ಮತ್ತು ಶೃಂಗಗಳು

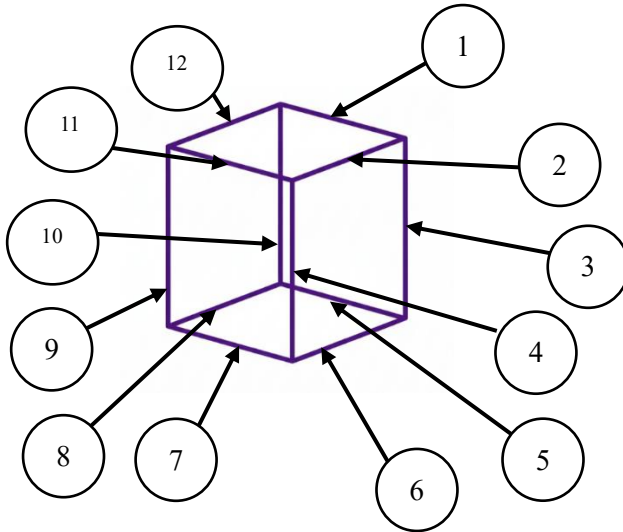
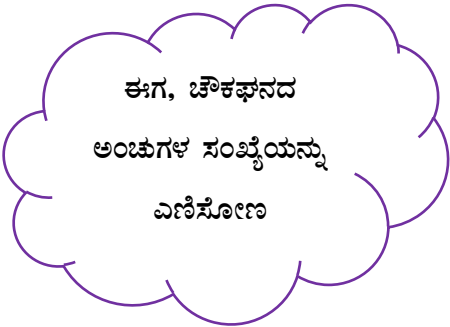
1. ಮುಖಗಳು



ಒಂದು ಚೌಕಘನವು 6 ಮುಖಗಳನ್ನು ಹೊಂದಿರುತ್ತದೆ



ಒಂದು ಚೌಕಘನವು 8 ಶೃಂಗಗಳನ್ನು ಹೊಂದಿರುತ್ತದೆ.



ಒಂದು ಚೌಕಘನವು 12 ಅಂಚುಗಳನ್ನು ಹೊಂದಿರುತ್ತದೆ

ಸೂಚಿಸಲಾದ ಚಟುವಟಿಕೆಗಳ ಪಟ್ಟಿ:

(1) ಚೌಕಘನವನ್ನು ಗುರುತಿಸುವುದು

- ವಿವಿಧ ಆಕಾರಗಳನ್ನು ಹೊಂದಿರುವ ಸುಮಾರು 10 ವಸ್ತುಗಳನ್ನು ಸುತ್ತಲೂ ಹರಡಿ ಇಡಿ. ಅವುಗಳಲ್ಲಿ 4-5 ವಸ್ತುಗಳು ಘನದ ಆಕಾರವನ್ನು ಹೊಂದಿರಬೇಕು.
- ಪ್ರತಿ ವಿದ್ಯಾರ್ಥಿಯು ಘನದ ಆಕಾರವನ್ನು ಹೊಂದಿರುವ ವಸ್ತುಗಳನ್ನು ಆರಿಸಿ ಶಿಕ್ಷಕರಿಗೆ ನೀಡಬೇಕು.



(2) ಚೌಕಘನ ಮತ್ತು ಆಯತಘನಗಳನ್ನು ಪ್ರತ್ಯೇಕಿಸುವುದು

- ಒಂದು ಪಾತ್ರೆಯಲ್ಲಿ (ಅಥವಾ ಡಬ್ಬಿಯಲ್ಲಿ) ಘನದ ಆಕಾರವನ್ನು ಹೊಂದಿರುವ 4-5 ವಸ್ತುಗಳನ್ನು ಮತ್ತು ಆಯತಘನದ ಆಕಾರವನ್ನು ಹೊಂದಿರುವ 4-5 ವಸ್ತುಗಳನ್ನು ಹಾಕಿ.
- 'ಚೌಕಘನ' ಎಂಬ ಹೆಸರಿರುವ ಒಂದು ಚೀಲವನ್ನು ಮತ್ತು 'ಆಯತಘನ' ಎಂಬ ಹೆಸರಿರುವ ಮತ್ತೊಂದು ಚೀಲವನ್ನು ಇಡಿ.
- ಪ್ರತಿ ವಿದ್ಯಾರ್ಥಿಯು ಘನದ ಆಕಾರವನ್ನು ಹೊಂದಿರುವ ವಸ್ತುಗಳನ್ನು 'ಚೌಕಘನ' ಎಂಬ ಹೆಸರಿರುವ ಚೀಲದಲ್ಲಿ ಮತ್ತು ಆಯತಘನದ ಆಕಾರವನ್ನು ಹೊಂದಿರುವ ವಸ್ತುಗಳನ್ನು 'ಆಯತಘನ' ಎಂಬ ಹೆಸರಿರುವ ಚೀಲದಲ್ಲಿ ಇಡಬೇಕು.



ಮೌಲ್ಯಮಾಪನ

ಒಟ್ಟುಅಂಕಗಳು = 10

ಸಮಯ = 10 ನಿಮಿಷಗಳು

ಸೂಚನೆಗಳು:

- ಎಲ್ಲಾ ಪ್ರಶ್ನೆಗಳನ್ನು ಎಚ್ಚರಿಕೆಯಿಂದ ಓದಿ ಮತ್ತು ಉತ್ತರಿಸಿ.
- ಈ ಮೌಲ್ಯಮಾಪನದ ಒಟ್ಟು ಅಂಕಗಳು 10 ಮತ್ತು ನಿಗದಿಪಡಿಸಿದ ಒಟ್ಟು ಸಮಯ 10 ನಿಮಿಷಗಳು.
- ಪ್ರತಿ ಪ್ರಶ್ನೆಯ ನಿರ್ದೇಶನದಂತೆ ಎಲ್ಲಾ ಪ್ರಶ್ನೆಗಳನ್ನು ಪ್ರಯತ್ನಿಸಿ; ಅಗತ್ಯವಿರುವಂತೆ ಹೆಸರು, ಸಂಖ್ಯೆಯನ್ನು ತಿಳಿಸಿ ಅಥವಾ ವ್ಯತ್ಯಾಸವಾಗಿ ಗುರುತಿಸಿ.

I. ಈ ಕೆಳಗಿನ ಚಿತ್ರವನ್ನು ಹೆಸರಿಸಿ:

(1x1 ಅಂಕ = 1)



ಇದರ ಹೆಸರು _____

II. ಈ ಕೆಳಗಿನವುಗಳ ಸಂಖ್ಯೆಯನ್ನು ತಿಳಿಸಿ:

(3x1 ಅಂಕ = 3)



ಮುಖಗಳ ಸಂಖ್ಯೆ _____

ಅಂಚುಗಳ ಸಂಖ್ಯೆ _____

ಶೃಂಗಗಳ ಸಂಖ್ಯೆ _____

III. ಈ ಕೆಳಗಿನ ಸನ್ನಿವೇಶವನ್ನು ಗಮನಿಸಿ ಮತ್ತು ವ್ಯತ್ಯಾಸದಲ್ಲಿ ಗುರುತಿಸಲಾದ ವಸ್ತುವಿನ ಆಕಾರವನ್ನು ಗುರುತಿಸಿ:

(1 x 1 ಅಂಕ = 1)

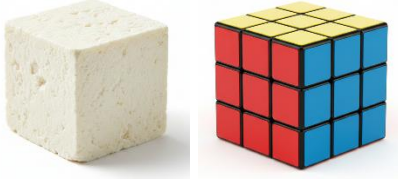


ವಸ್ತುವಿನ ಆಕಾರ: _____

- IV. ಒಬ್ಬ ಸಣ್ಣ ಹುಡುಗ ಮನೆಯಲ್ಲಿ ಆಟವಾಡುತ್ತಿರುವ ಈ ಕೆಳಗಿನ ಸನ್ನಿವೇಶವನ್ನು ಗಮನಿಸಿ ಮತ್ತು ಚೌಕಫನಾಕೃತಿಯಲ್ಲಿ ಕಾಣುವ ವಸ್ತುಗಳ ಸುತ್ತ ವೃತ್ತಾಕಾರವಾಗಿ ಗುರುತಿಸಿ: (2x1 ಅಂಕ = 2)



- V. ಚೌಕಫನಾಕೃತಿಯಲ್ಲಿ ಕಾಣುವ ಎಲ್ಲಾ ವಸ್ತುಗಳನ್ನು ಹೊಂದಿರುವ ಬ್ಲಾಕ್‌ಗಳನ್ನು ಗುರುತಿಸಿ ಮತ್ತು ಪ್ರತಿಯೊಂದು ಬ್ಲಾಕ್‌ನ ಕೆಳಗೆ ನೀಡಿರುವ ಜಾಗದಲ್ಲಿ ಸರಿ ಗುರುತು (✓) ಹಾಕಿ: (3x1 ಅಂಕ = 3)

 ☐	 ☐
 ☐	 ☐
 ☐	 ☐

ಉಪ-ಘಟಕ (ಇ): ಸ್ತಂಭಾಕೃತಿ

ಕಲಿಕಾ ಉದ್ದೇಶಗಳು:

- ವಿದ್ಯಾರ್ಥಿಗಳು ಸ್ತಂಭಾಕೃತಿಯ ಆಕಾರವನ್ನು ವಿವರಿಸಲು ಶಕ್ತರನ್ನಾಗಿಸುವುದು
- ವಿದ್ಯಾರ್ಥಿಗಳು ಸ್ತಂಭಾಕೃತಿಯ ಚಿತ್ರವನ್ನು ಬಿಡಿಸಲು ಶಕ್ತರನ್ನಾಗಿಸುವುದು.
- ಸ್ತಂಭಾಕೃತಿಯ ಆಕಾರವನ್ನು ಹೋಲುವ ವಸ್ತುಗಳನ್ನು ಗುರುತಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಶಕ್ತರನ್ನಾಗಿಸುವುದು.

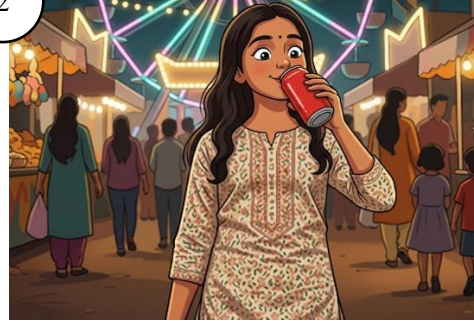
ಸನ್ನಿವೇಶ-1: ಅಕ್ಷತ ಜಾತ್ರೆಗೆ ಹೋಗುತ್ತಾಳೆ.

1



ಅಕ್ಷತ ಜಾತ್ರೆಗೆ ಹೋಗುತ್ತಾಳೆ

2



ಆಕೆ ಜ್ಯೂಸ್ ಕ್ಯಾನ್‌ನಿಂದ ಜ್ಯೂಸ್ ಕುಡಿದಳು

3



ಅಕ್ಷತ ಜ್ಯೂಸ್ ಕ್ಯಾನನ್ನು ಕಸದ ಬುಟ್ಟಿಗೆ ಹಾಕುತ್ತಾಳೆ.

4

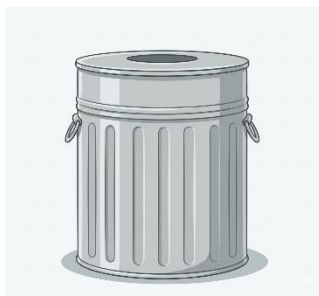


ಜಾತ್ರೆಯಿಂದ ಮನೆಗೆ ಬಂದ ನಂತರ, ಅವಳು ಮನೆಯಲ್ಲಿರುವ ಗ್ಯಾಸ್ ಸಿಲಿಂಡರನ್ನು ಗಮನಿಸುತ್ತಾಳೆ.

ಈಗ ಈ ಎಲ್ಲಾ ವಸ್ತುಗಳನ್ನು ನೋಡಿ.



ಜ್ಯೂಸ್ ಕ್ಯಾನ್



ಕಸದ ಬುಟ್ಟಿ



ಗ್ಯಾಸ್ ಸಿಲಿಂಡರ್

ಈ ಮೂರು ವಸ್ತುಗಳ ನಡುವೆ ಏನಾದರೂ ಸಾಮ್ಯತೆ ಇದೆಯೇ?

ಅದರ ಬಗ್ಗೆ ಯೋಚಿಸಿ



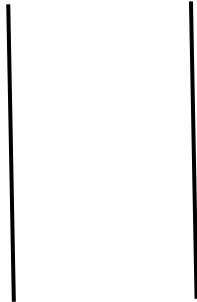
ನೀವು ಸೂಕ್ಷ್ಮವಾಗಿ ಗಮನಿಸಿದರೆ, ಅವುಗಳು ಒಂದೇ ರೀತಿಯ ಆಕಾರವನ್ನು ಹೊಂದಿರುವುದನ್ನು ನೀವು ಕಾಣಬಹುದು
ಜ್ಯೂಸ್ಟಾನ್, ಕಸದಬುಟ್ಟಿ ಮತ್ತು ಗ್ಯಾಸ್ಪಿಲಿಂಡರ್‌ಗಳ ಆಕಾರವನ್ನು 'ಸ್ತಂಭಾಕೃತಿ' ಎಂದು ಕರೆಯಲಾಗುತ್ತದೆ.



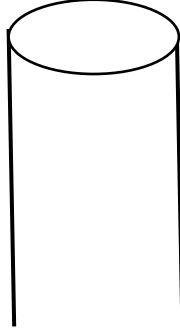
ಇದು ಒಂದು ಸ್ತಂಭಾಕೃತಿ

ಬನ್ನಿ, ಹಂತ ಹಂತವಾಗಿ ಸ್ತಂಭಾಕೃತಿಯನ್ನು ಬಿಡಿಸುವುದನ್ನು ಕಲಿಯೋಣ!

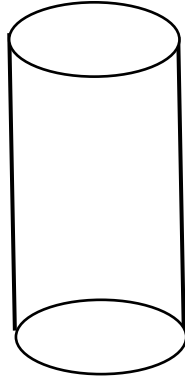
ಹಂತ-1: ಎರಡು ಸಮಾನಾಂತರ ಸರಳರೇಖೆಗಳನ್ನು ಎಳೆಯಿರಿ.



ಹಂತ-2: ರೇಖೆಗಳ ಮೇಲ್ಭಾಗದ ಎರಡು ತುದಿಗಳನ್ನು ಸೇರಿಸಿ ಒಂದು ಅಂಡಾಕಾರವನ್ನು ಬಿಡಿಸಿ.



ಹಂತ-3: ರೇಖೆಗಳ ಕೆಳಭಾಗದ ಎರಡು ತುದಿಗಳನ್ನು ಸೇರಿಸಿ ಮತ್ತೊಂದು ಅಂಡಾಕಾರವನ್ನು ಬಿಡಿಸಿ.



ಸೂಚಿಸಲಾದ ಚಟುವಟಿಕೆಗಳ ಪಟ್ಟಿ:

(1) ಸ್ತಂಭಾಕೃತಿಯನ್ನು ಇತರ ಆಕಾರಗಳಿಂದ ಪ್ರತ್ಯೇಕಿಸುವುದು

- ಒಂದು ಸಣ್ಣ ಗೋಣಿಚೀಲದಲ್ಲಿ ಸ್ತಂಭಾಕೃತಿಯ ಆಕಾರದ ವಸ್ತುಗಳು ಸೇರಿದಂತೆ ವಿವಿಧ ಆಕಾರಗಳನ್ನು ಹೊಂದಿರುವ ವಸ್ತುಗಳನ್ನು ಹಾಕಿ.
- ವಿದ್ಯಾರ್ಥಿಯ ಮುಂಭಾಗದಲ್ಲಿರುವ ಒಂದು ಮೇಜಿನ ಮೇಲೆ ಸ್ತಂಭಾಕೃತಿಯ ಆಕಾರದ ಒಂದು ಪಾತ್ರೆ (ಡಬ್ಬಿ) ಮತ್ತು ಮತ್ತೊಂದು ಪೆಟ್ಟಿಗೆಯನ್ನು ಇಡಿ.
- ಪ್ರತಿ ವಿದ್ಯಾರ್ಥಿಯು ಸಣ್ಣ ಚೀಲದಿಂದ ವಸ್ತುಗಳನ್ನು ಆರಿಸಿ, ಸ್ತಂಭಾಕೃತಿ ಆಕಾರದ ವಸ್ತುಗಳನ್ನು ಸ್ತಂಭಾಕೃತಿ ಆಕಾರದ ಪಾತ್ರೆಯೊಳಗೆ ಮತ್ತು ಇತರ ಆಕಾರದ ವಸ್ತುಗಳನ್ನು ಪೆಟ್ಟಿಗೆಯೊಳಗೆ ಹಾಕಬೇಕು.



(2) ಸ್ತಂಭಾಕೃತಿ ತಯಾರಿಸುವುದು (ರೂಪಿಸುವುದು)

- ಪ್ರತಿ ವಿದ್ಯಾರ್ಥಿಗೆ ಸ್ತಂಭಾಕೃತಿ ಆಕಾರದ ಅಚ್ಚನ್ನು ನೀಡಿ.
- ಪ್ರತಿ ಮಗುವಿಗೆ ಸೂಕ್ತ ಪ್ರಮಾಣದ ಬೇಡಿಮಣ್ಣನ್ನು ಕೊಡಬೇಕು.
- ವಿದ್ಯಾರ್ಥಿಗಳು ಬೇಡಿಮಣ್ಣು ಮತ್ತು ಅಚ್ಚುಗಳನ್ನು ಬಳಸಿಕೊಂಡು ಸ್ತಂಭಾಕೃತಿಗಳನ್ನು ತಯಾರಿಸಬೇಕು.



ಮೌಲ್ಯಮಾಪನ

ಒಟ್ಟುಅಂಕಗಳು: 10

ಸಮಯ: 10 ನಿಮಿಷಗಳು

ಸೂಚನೆಗಳು:

- ಎಲ್ಲಾ ಪ್ರಶ್ನೆಗಳನ್ನು ಎಚ್ಚರಿಕೆಯಿಂದ ಓದಿ ಮತ್ತು ಉತ್ತರಿಸಿ.
- ಈ ಮೌಲ್ಯಮಾಪನದ ಒಟ್ಟು ಅಂಕಗಳು 10 ಮತ್ತು ನಿಗದಿಪಡಿಸಿದ ಒಟ್ಟು ಸಮಯ 10 ನಿಮಿಷಗಳು.
- ಪ್ರತಿ ಪ್ರಶ್ನೆಯ ನಿರ್ದೇಶನದಂತೆ ಎಲ್ಲಾ ಪ್ರಶ್ನೆಗಳನ್ನು ಪ್ರಯತ್ನಿಸಿ, ಅಗತ್ಯವಿರುವಂತೆ ಹೆಸರಿಸಿ ಅಥವಾ ಚಿತ್ರಬಿಡಿಸಿ.

I. ಈ ಕೆಳಗಿನ ವಸ್ತುವಿನ ಹೆಸರನ್ನು ತಿಳಿಸಿ:

(1x1 ಅಂಕ = 1)



ಈ ಕ್ರಯಾನ್‌ನ ಆಕಾರವು _____

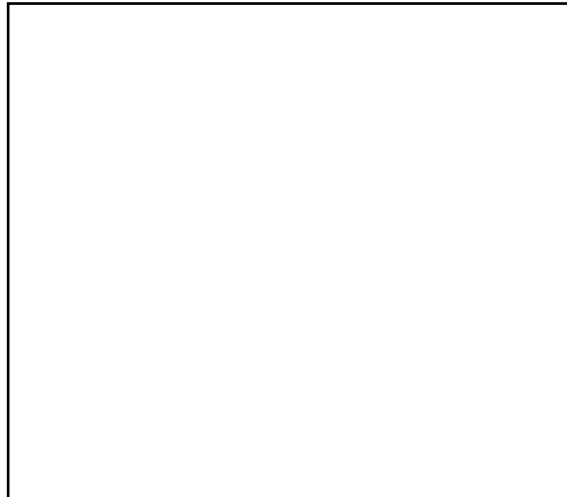
II. ಸ್ತಂಭಾಕೃತಿಯನ್ನು ಹೋಲುವ ವಸ್ತುಗಳ ಹೆಸರುಗಳನ್ನು ಬರೆಯಿರಿ:

(3 x 1 ಅಂಕ = 3)

- 1.
- 2.
- 3.

III. ಸ್ತಂಭಾಕೃತಿಯನ್ನು ಬಿಡಿಸಿ:

(1 x 6 ಅಂಕಗಳು = 6)



ಉಪ-ಘಟಕ(ಈ): ಶಂಕು

ಕಲಿಕಾ ಉದ್ದೇಶಗಳು:

- ಶಂಕುವಿನ ಆಕಾರವನ್ನು ವಿವರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಶಕ್ತರನ್ನಾಗಿಸುವುದು.
- ಶಂಕುವಿನ ಆಕಾರದಲ್ಲಿರುವ ವಸ್ತುಗಳನ್ನು ಗುರುತಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಶಕ್ತರನ್ನಾಗಿಸುವುದು.

ಸನ್ನಿವೇಶ-1: ಕೇತನ್ ತನ್ನ ನೆರೆಹೊರೆಯ ಸ್ನೇಹಿತೆಯ ಹುಟ್ಟುಹಬ್ಬಕ್ಕೆ ಹೋಗುತ್ತಾನೆ.



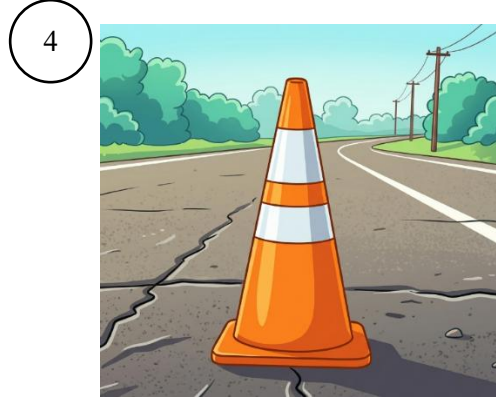
ಕೇತನ್ ತನ್ನ ಸ್ನೇಹಿತೆಯ ಹುಟ್ಟುಹಬ್ಬಕ್ಕೆ ಹೋದನು.



ತನ್ನ ಸ್ನೇಹಿತೆಯ ಒಂದು ಟೋಪಿಯನ್ನು ಧರಿಸಿದ್ದಳು.



ಹುಟ್ಟುಹಬ್ಬದ ಪಾರ್ಟಿಯಲ್ಲಿ, ಹುಡುಗ ಒಂದು ಐಸ್‌ಕ್ರೀಮ್ ತಿಂದನು.



ಮನೆಗೆ ವಾಪಸ್ ಬರುವಾಗ, ಅವನು ರಸ್ತೆಯಲ್ಲಿ 'ಟ್ರಾಫಿಕ್ ಕೋನ್' ಅನ್ನು ಕಂಡನು



ಕೇತನ್ ಯೋಚಿಸುತ್ತಾನೆ...

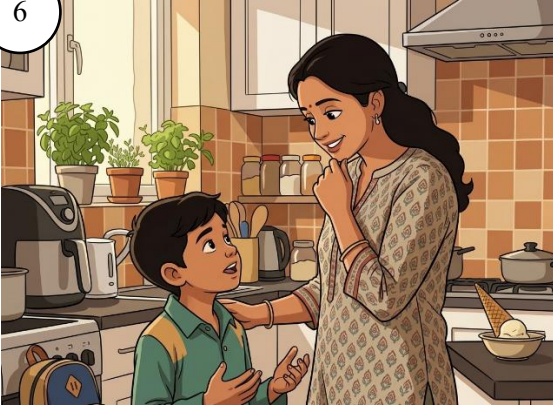


ಹುಟ್ಟುಹಬ್ಬದ ಟೋಪಿ, ಐಸ್ ಕ್ರೀಮ್ ಕೋನಿನ ಮತ್ತು ಟ್ರಾಫಿಕ್ ಕೋನಿನ ಆಕಾರಗಳು ಒಂದೇ ರೀತಿಯದಾಗಿವೆ.



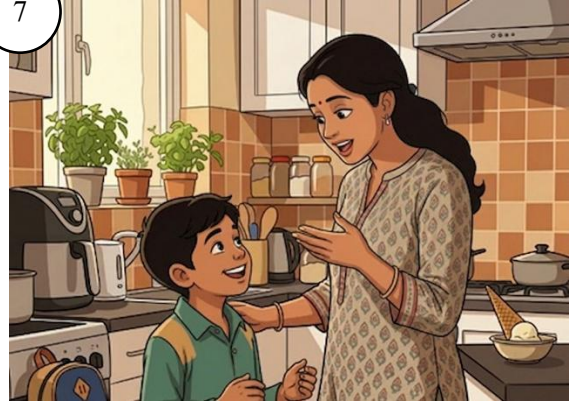
ನಿಮಗೆ ಏನು ಅನಿಸುತ್ತಿದೆ? ಈ ಆಕಾರಗಳ
ನಡುವೆ ಏನಾದರೂ ಹೋಲಿಕೆ ಇದೆಯೇ?

6



ಮನೆಗೆ ಬಂದ ನಂತರ, ಅವನು ಹುಟ್ಟುಹಬ್ಬದ ಟೋಪಿ,
ಐಸ್ ಕ್ರೀಮ್ ಕೋನ್ ಮತ್ತು ಟ್ರಾಫಿಕ್ ಕೋನ್‌ಗಳ
ಆಕಾರದಲ್ಲಿರುವ ಹೋಲಿಕೆಯ ಬಗ್ಗೆ ತನ್ನ ತಾಯಿಯನ್ನು
ಕೇಳುತ್ತಾನೆ.

7



ಅದಕ್ಕೆ ಅವನ ತಾಯಿ, ಈ ಎಲ್ಲಾ ವಸ್ತುಗಳ ಆಕಾರವು
ಒಂದೇ ಆಗಿರುತ್ತದೆ ಮತ್ತು ಆ ಆಕಾರವನ್ನು 'ಶಂಕು' ಎಂದು
ಕರೆಯಲಾಗುತ್ತದೆ ಎಂದು ಹೇಳುತ್ತಾಳೆ.

ಇದುವೇ "ಶಂಕು"!



ಶಂಕುವಿನ ಪಾದವು "ವೃತ್ತಾಕಾರದಲ್ಲಿರುತ್ತದೆ".

ಮೋಜಿನ ಚಟುವಟಿಕೆ: ಸೇಬನ್ನು ತಲುಪಲು ಹುಡುಗನಿಗೆ ಸಹಾಯ ಮಾಡಿ! ದಾರಿಯಲ್ಲಿ ಸಿಗುವ ಶಂಕು ಆಕಾರದ ವಸ್ತುಗಳಿಗೆ
ವೃತ್ತಾಕಾರವನ್ನು ಹಾಕುತ್ತಾಸಾಗಿ.



ಸೂಚಿಸಲಾದ ಚಟುವಟಿಕೆಗಳ ಪಟ್ಟಿ:

(1) ಉಂಟಾದ ವಸ್ತುವಿನ ಆಕಾರವನ್ನು ಗುರುತಿಸುವುದು

- ಒಂದು ಮೇಜಿನ ಮೇಲೆ, ಮರಳು ಒಂದು ಶಂಕುವಿನಾಕಾರದ ರಾಶಿಯಾಗುವಂತೆ ಒಂದೇ ಬಿಂದುವಿನಿಂದ ಕೆಳಗೆ ಸುರಿಯಿರಿ. (ಇದನ್ನು ಶಿಕ್ಷಕರೇ ಮಾಡಬಹುದು ಅಥವಾ ವಿದ್ಯಾರ್ಥಿಗಳೇ ರಾಶಿಯನ್ನು ಮಾಡುವಂತೆ ಅವರಿಗೆ ಮಾರ್ಗದರ್ಶನ ನೀಡಬಹುದು)
- ಆ ರಾಶಿಯ ಪಕ್ಕದಲ್ಲಿ ಇಟ್ಟಿರುವ ಟ್ರೇನಲ್ಲಿ ಶಂಕು, ಸ್ತಂಭಾಕೃತಿ, ಚೌಕ ಘನ, ಆಯತಘನ, ಆಯತ, ಚೌಕ, ವೃತ್ತ, ತ್ರಿಭುಜ ಮುಂತಾದ ವಿವಿಧ ಆಕಾರಗಳ ಹೆಸರುಗಳಿರುವ ಪದಗಳ ಕಾರ್ಡ್‌ಗಳನ್ನು ಹಾಕಿ.
- ಈಗ, ಆ ರಾಶಿಯನ್ನು ನೋಡಿ ವಿದ್ಯಾರ್ಥಿಯು ಅದು 'ಶಂಕು' ಆಕಾರದಲ್ಲಿದೆ ಎಂದು ಗುರುತಿಸಬೇಕು ಮತ್ತು 'ಶಂಕು' ಎಂಬ ಹೆಸರಿರುವ ಪದದ ಕಾರ್ಡ್ ಅನ್ನು ಆರಿಸಬೇಕು.



(3) ಕಾಗದವನ್ನು ಬಳಸಿ ಶಂಕುವನ್ನು ತಯಾರಿಸುವುದು

- ಒಂದು ಅರ್ಧವೃತ್ತಾಕಾರದ ಕಾಗದವನ್ನು ತೆಗೆದುಕೊಳ್ಳಿ.
- ಚಿತ್ರದಲ್ಲಿ ತೋರಿಸಿರುವಂತೆ ಅದನ್ನು ಮಡಚಿ.
- ಅದರ ತಳಭಾಗಕ್ಕೆ ಆಧಾರವಾಗಿ ಒಂದು ವೃತ್ತಾಕಾರದ ಕಾಗದವನ್ನು ಅಂಟಿಸಿ.
- ಈಗ ಕಾಗದವನ್ನು ಬಳಸಿದ ಒಂದು ಶಂಕು ಸಿದ್ಧವಾಗಿದೆ.



ಮೌಲ್ಯಮಾಪನ

ಒಟ್ಟುಅಂಕಗಳು: 10

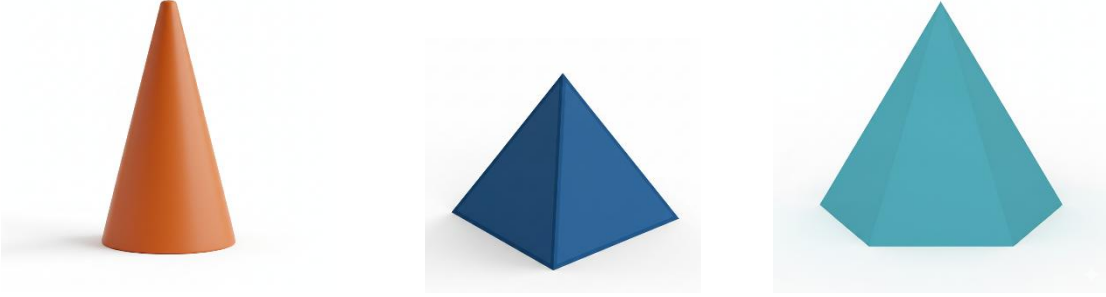
ಸಮಯ: 15 ನಿಮಿಷಗಳು

ಸೂಚನೆಗಳು:

- ಎಲ್ಲಾ ಪ್ರಶ್ನೆಗಳನ್ನು ಗಮನವಿಟ್ಟು ಓದಿ ಮತ್ತು ಉತ್ತರಿಸಿ.
- ಈ ಮೌಲ್ಯಮಾಪನದ ಒಟ್ಟು ಅಂಕಗಳು 10 ಮತ್ತು ನಿಗದಿಪಡಿಸಿದ ಸಮಯ 15 ನಿಮಿಷಗಳು.
- ಎಲ್ಲಾ ಪ್ರಶ್ನೆಗಳನ್ನು ಸೂಚನೆಯಂತೆ ಉತ್ತರಿಸಿ, ಅವಶ್ಯಕತೆಗನುಗುಣವಾಗಿ ಚಿತ್ರಬಿಡಿಸಿ ಅಥವಾ ವ್ಯತ್ಯಾಸವನ್ನು ಹಾಕಿ.

I. ಈ ಕೆಳಗಿನವುಗಳಲ್ಲಿ ಯಾವುದು ಶಂಕು ಆಕಾರದಲ್ಲಿದೆ? (ಅದಕ್ಕೆ ವೃತ್ತ ಹಾಕಿ)

(1x1 ಅಂಕ = 1)



II. ಶಂಕುವಿನಂತೆ ಕಾಣುವ ಯಾವುದಾದರೂ 3 ವಸ್ತುಗಳ ಚಿತ್ರಬಿಡಿಸಿ ಮತ್ತು ಅವುಗಳ ಹೆಸರನ್ನು ಬರೆಯಿರಿ:

(3x3 ಅಂಕಗಳು = 9)

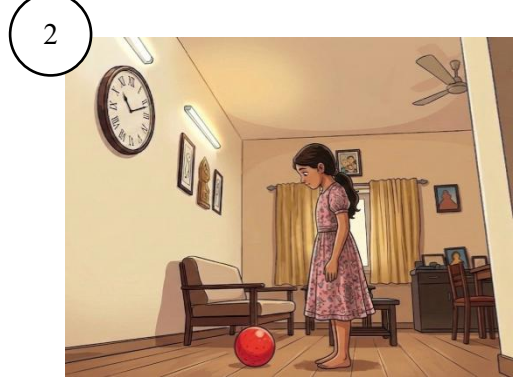
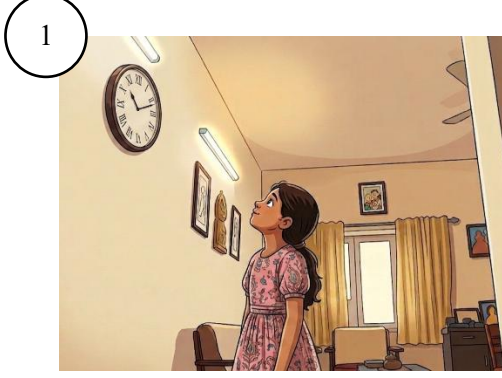
1. _____	2. _____	3. _____
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ಉಪ-ಘಟಕ (ಉ): ಗೋಳ

ಕಲಿಕಾ ಉದ್ದೇಶಗಳು:

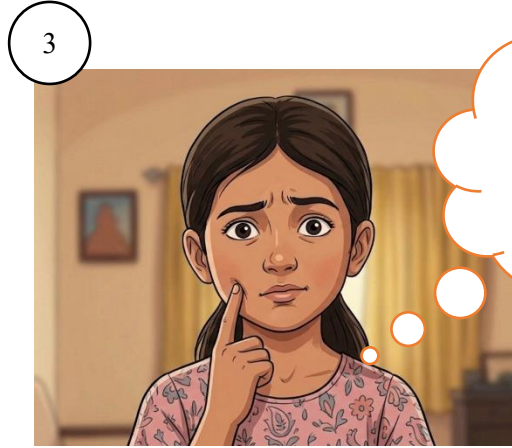
- ಗೋಳದ ಆಕಾರವನ್ನು ವಿವರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಸಜ್ಜುಗೊಳಿಸುವುದು.
- ಗೋಳದಂತೆ ಕಾಣುವ ವಸ್ತುಗಳನ್ನು ಗುರುತಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಶಕ್ತರಾಗುವಂತೆ ಮಾಡುವುದು.
- ವೃತ್ತ ಮತ್ತು ಗೋಳದ ನಡುವಿನ ವ್ಯತ್ಯಾಸವನ್ನು ತಿಳಿಯಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಶಕ್ತರಾಗುವಂತೆ ಮಾಡುವುದು.

ಸನ್ನಿವೇಶ-1: ರಿಯಾ ತನ್ನ ಮನೆಯಲ್ಲಿರುವ ಕೆಲವು ವಸ್ತುಗಳನ್ನು ನೋಡುತ್ತಾಳೆ.



ರಿಯಾ ಗೋಡೆಯ ಮೇಲೆ ವೃತ್ತಾಕಾರದ ಗಡಿಯಾರವನ್ನು
ನೋಡುತ್ತಾಳೆ.

ನೆಲದ ಮೇಲೆ ಅವಳಿಗೆ ಒಂದು ಕೆಂಪು ಬಣ್ಣದ ಚೆಂಡು
ಕಾಣಿಸುತ್ತದೆ.



ಎರಡೂ ಒಂದೇರೀತಿ
ಕಾಣುತ್ತವೆ, ಆದರೆ ಅವು
ಒಂದೇ ಆಗಿವೆಯೇ?

ನಂತರ ಅವಳು ಯೋಚಿಸುತ್ತಾಳೆ,



ನಿಮಗೆ ಏನು ಅನ್ನಿಸುತ್ತದೆ?

ಅವುಗಳೆರಡೂ ಒಂದೇ ಆಗಿವೆಯೇ

ಅಥವಾ ಬೇರೆ ಬೇರೆಯೇ?

4



ಗಡಿಯಾರದ ಆಕಾರ ಮತ್ತು ಚೆಂಡಿನ ಆಕಾರ ಒಂದೇ
ಆಗಿದೆಯೇ ಎಂದು ಅವಳು ತನ್ನ ತಂದೆಯನ್ನು ಕೇಳುತ್ತಾಳೆ

5



ಅವು ಒಂದೇ ಅಲ್ಲ ಎಂದು ಅವಳ ತಂದೆ ಹೇಳುತ್ತಾರೆ.



ಗಡಿಯಾರದ ಆಕಾರ "ವೃತ್ತ"



ಚೆಂಡಿನ ಆಕಾರ "ಗೋಳ"

ಗೋಳವು ದುಂಡಗಿನ ಆಕಾರದಲ್ಲಿದೆ

ಗೋಳದಂತೆ ಕಾಣುವ ಕೆಲವು ವಸ್ತುಗಳನ್ನು ಗಮನಿಸೋಣ:

1.



ಭೂಮಿ

2.



ಗುಳ್ಳೆ(ಬಬಲ್)

3.



ಸೂರ್ಯ

4.



ಚಂದ್ರ

ಸೂಚಿಸಲಾದ ಚಟುವಟಿಕೆಗಳ ಪಟ್ಟಿ:

(1) ಗೋಳವನ್ನು ತಯಾರಿಸುವುದು

- ಪ್ರತಿ ಮಗುವಿಗೆ ಬೇಡಿಮಣ್ಣಿನ ಮುದ್ದೆಯನ್ನು ನೀಡಿ.
- ಶಿಕ್ಷಕರು ಬೇಡಿಮಣ್ಣಿನ ಮುದ್ದೆಯನ್ನು ಎರಡು ಅಂಗೈಗಳ ಮಧ್ಯೆ ಇಟ್ಟು ಉರುಳಿಸುವ ಮೂಲಕ, ಗೋಳವನ್ನು ಹೇಗೆ ತಯಾರಿಸಬೇಕು ಎಂಬುದನ್ನು ಎರಡೂ ಕೈಗಳನ್ನು ಬಳಸಿ ತೋರಿಸಿಕೊಡಬೇಕು.
- ವಿದ್ಯಾರ್ಥಿಗಳು ಶಿಕ್ಷಕರ ಮಾರ್ಗದರ್ಶನದಂತೆ ಬೇಡಿಮಣ್ಣಿನ ಮುದ್ದೆಯಿಂದ ಗೋಳವನ್ನು ತಯಾರಿಸಬೇಕು.



(2) ಗುಳ್ಳೆಗಳನ್ನು ಉದುವುದು ಮತ್ತು ಆಕಾರವನ್ನು ಗುರುತಿಸುವುದು

- ಶಿಕ್ಷಕರು ಗುಳ್ಳೆಗಳನ್ನು ಉದಬೇಕು ಅಥವಾ ಅವರು ವಿದ್ಯಾರ್ಥಿಗಳಿಂದ ಗುಳ್ಳೆಗಳನ್ನು ಉದಿಸಬೇಕು.
- ಈಗ, ವಿದ್ಯಾರ್ಥಿಗಳು ಚೌಕ ಘನ, ಆಯತಘನ, ಸ್ತಂಭಾಕೃತಿ, ಶಂಕು , ತ್ರಿಭುಜ, ಚೌಕ, ಆಯತ, ಪಂಚಭುಜಾಕೃತಿ, ಷಡ್ಭುಜಾಕೃತಿ ಮುಂತಾದ ಇತರ ಆಕಾರಗಳ ಹೆಸರುಗಳಿರುವ ವಿವಿಧ ಪದಗಳ ಕಾರ್ಡ್‌ಗಳಿಂದ 'ಗೋಳ' ಎಂಬ ಪದದ ಕಾರ್ಡ್ ಅನ್ನು ಆರಿಸುವ ಮೂಲಕ ಗುಳ್ಳೆಯ ಆಕಾರವನ್ನು ಗುರುತಿಸಬೇಕು.



(3) ಗೋಳವನ್ನು ಗುರುತಿಸುವುದು

- ಒಂದು ಪಾತ್ರೆಯಲ್ಲಿ ಚೌಕ ಘನ, ಆಯತಘನ, ಶಂಕು, ಸ್ತಂಭಾಕೃತಿ ಮತ್ತು ಗೋಳ ಆಕಾರಗಳನ್ನು ಹೊಂದಿರುವ ವಸ್ತುಗಳನ್ನು ಹಾಕಿ.
- ಚೌಕ ಘನ, ಆಯತಘನ, ಶಂಕು, ಸ್ತಂಭಾಕೃತಿ ಮತ್ತು ಗೋಳ ಎಂಬ ಹೆಸರುಗಳನ್ನು ಹೊಂದಿರುವ 5 ಬೇರೆ ಬೇರೆ ಪೆಟ್ಟಿಗೆಗಳನ್ನು ಇಡಿ.
- ಪ್ರತಿ ವಿದ್ಯಾರ್ಥಿಯು ಒಂದೊಂದೇ ವಸ್ತುವನ್ನು ಆರಿಸಿ, ಅವುಗಳನ್ನು ಆಯಾ ಆಕಾರದ ಹೆಸರಿರುವ ಪೆಟ್ಟಿಗೆಗಳಲ್ಲಿ ಹಾಕಬೇಕು.



ಮೌಲ್ಯಮಾಪನ

ಒಟ್ಟುಅಂಕಗಳು: 10

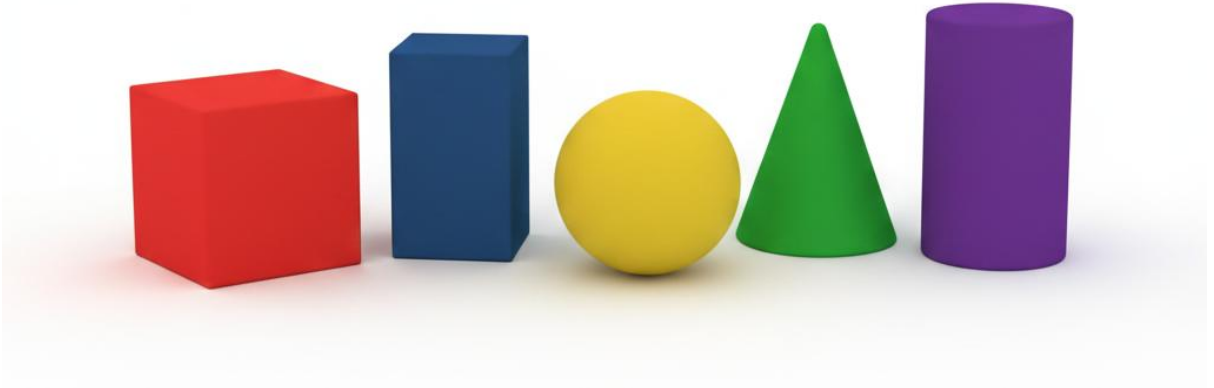
ನಿಗದಿಪಡಿಸಿದಸಮಯ: 10 ನಿಮಿಷಗಳು

ಸೂಚನೆಗಳು:

- ಎಲ್ಲಾ ಪ್ರಶ್ನೆಗಳನ್ನು ಎಚ್ಚರಿಕೆಯಿಂದ ಓದಿ ಮತ್ತು ಎಲ್ಲದಕ್ಕೂ ಉತ್ತರಿಸಿ.
- ಈ ಮೌಲ್ಯಮಾಪನದ ಒಟ್ಟು ಅಂಕಗಳು 10, ಮತ್ತು ಒಟ್ಟು ಸಮಯ 10 ನಿಮಿಷಗಳು.
- ಪ್ರತಿ ಪ್ರಶ್ನೆಯ ನಿರ್ದೇಶನದಂತೆ ಎಲ್ಲಾ ಪ್ರಶ್ನೆಗಳನ್ನು ಪ್ರಯತ್ನಿಸಿ, ಮತ್ತು ಅಗತ್ಯಕ್ಕೆ ಅನುಗುಣವಾಗಿ ವೃತ್ತಾಕಾರವಾಗಿ ಗುರುತಿಸಿ ಅಥವಾ ಬರೆಯಿರಿ.

I. "ಗೋಳ" ಆಕಾರವನ್ನು ಗುರುತಿಸಿ: (ಅದಕ್ಕೆ ವೃತ್ತ ಹಾಕಿ)

(1x2 ಅಂಕಗಳು =2)



II. ಗೋಳದಂತೆ ಕಾಣುವ ಯಾವುದಾದರೂ 4 ವಸ್ತುಗಳ ಹೆಸರುಗಳನ್ನು ಬರೆಯಿರಿ:

(4x1 ಅಂಕ = 4)

- 1.
- 2.
- 3.

III. ಗೋಳಾಕಾರದಲ್ಲಿರುವ ವಸ್ತುಗಳನ್ನು ಗುರುತಿಸಿ, ಅವುಗಳಿಗೆ ಸುತ್ತವರಿಯಿರಿ:

(5x1 ಅಂಕ = 5)



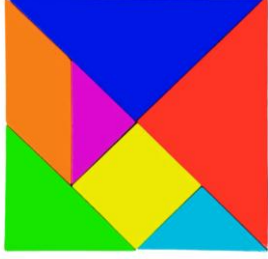
ಉತ್ತರಗಳು

ಅಧ್ಯಾಯ-1: ಟ್ಯಾನ್‌ಗ್ರಾಮ್ಸ್ ಮತ್ತು ವಿನ್ಯಾಸಗಳು

ಉಪ-ಘಟಕ (ಅ): ಟ್ಯಾನ್‌ಗ್ರಾಮ್‌ಗಳ ಪರಿಚಯ

I. ಈ ಕೆಳಗಿನ ಚಿತ್ರದ ಹೆಸರನ್ನು ತಿಳಿಸಿ:

(1x1 ಅಂಕ = 1)



ಇದರ ಹೆಸರು _____

II. ಈ ಕೆಳಗಿನ ಆಕಾರಗಳನ್ನು ಅವುಗಳ ಹೆಸರುಗಳೊಂದಿಗೆ ಹೊಂದಿಸಿ:

(3x1 ಅಂಕ = 3)

(1)



-

ತ್ರಿಭುಜ

(2)



-

ಚೌಕ

(3)



-

ಸಮಾಂತರ ಚತುರ್ಭುಜ

III. ಟ್ಯಾನ್‌ಗ್ರಾಮ್‌ನಲ್ಲಿರುವ ಈ ಕೆಳಗಿನ ಆಕಾರಗಳ ಸರಿಯಾದ ಸಂಖ್ಯೆಯನ್ನು ಆರಿಸಿ:

(3x1 ಅಂಕ = 3)

(1)



(b) 1 (b) 3 (c) 5 (d) 7

(2)



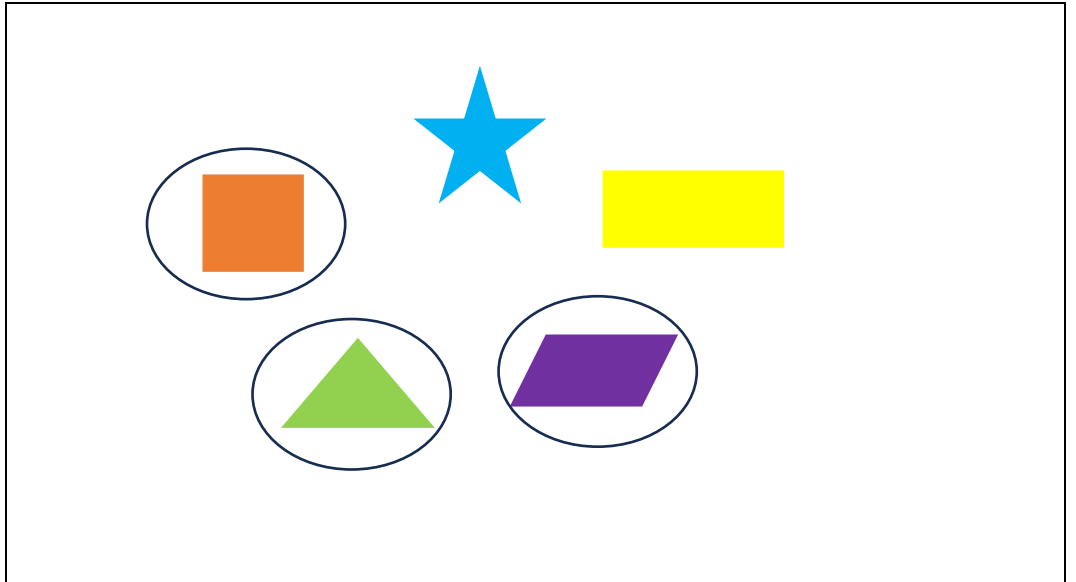
(b) 2 (b) 4 (c) 1 (d) 3

(3)



(b) 1 (b) 2 (c) 5 (d) 7

IV. ಟ್ಯಾನ್‌ಗ್ರಾಮ್‌ನಲ್ಲಿ ಕಂಡುಬರುವ ಆಕಾರಗಳನ್ನು ವೃತ್ತಾಕಾರವಾಗಿ ಸುತ್ತುವರಿಯಿರಿ :(3x1 ಅಂಕ = 3)



ಉಪ-ಘಟಕ (ಆ): ಟ್ಯಾನ್‌ಗ್ರಾಮ್ ಬಳಸಿ ವಿವಿಧ ವಿನ್ಯಾಸಗಳು

I. ಈ ಕೆಳಗಿನ ಟ್ಯಾನ್‌ಗ್ರಾಮ್ ಆಕಾರಗಳನ್ನು ಬಳಸಿ ಒಂದು ವಿನ್ಯಾಸವನ್ನು ಸಿದ್ಧಪಡಿಸಿ:

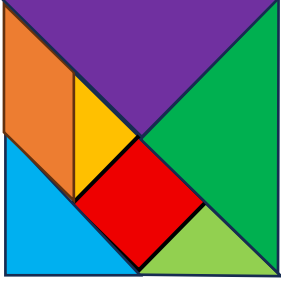
(1x5 ಅಂಕಗಳು = 5)

(ಅ) ಬಾಹುಕೋಳಿ (ಅಥವಾ)

(ಆ) ಮೊಲ (ಅಥವಾ)

(ಇ) ನಿಮ್ಮ ಆಯ್ಕೆಯ ಯಾವುದೇ ವಿನ್ಯಾಸ

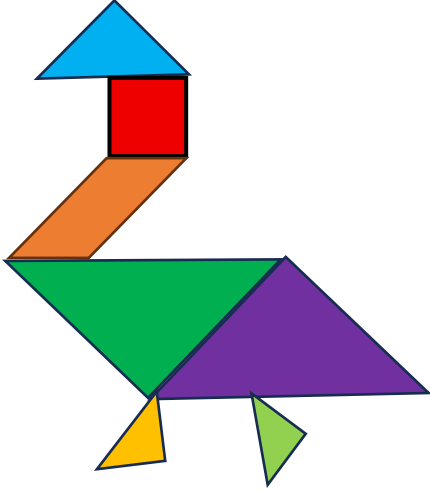
ಇದು ಟ್ಯಾಂಗ್ರಾಮ್



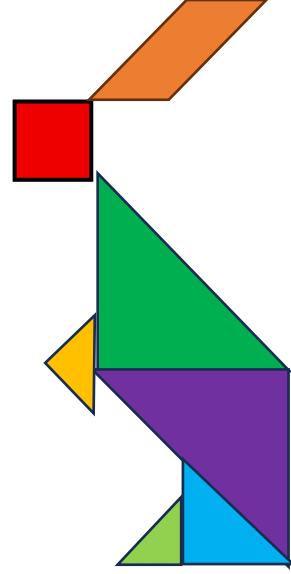
ಇವು ಟ್ಯಾಂಗ್ರಾಮ್‌ನ ವಿವಿಧ ಆಕಾರಗಳು



(ಅ) ಬಾತುಕೋಳಿ



(ಆ) ಮೊಲ



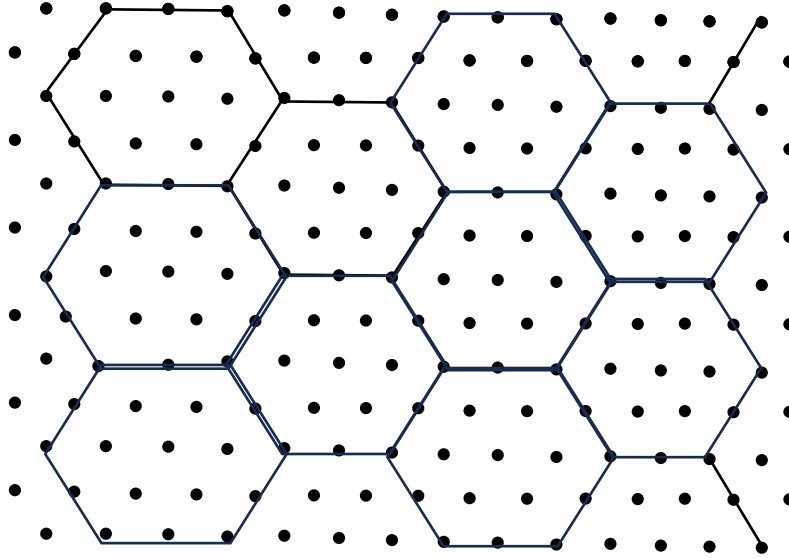
(ಇ) ನಿಮ್ಮ ಆಯ್ಕೆಯ ಯಾವುದೇ ವಿನ್ಯಾಸ

ಉಪ-ಘಟಕ (ಇ): ವಿನ್ಯಾಸಗಳು

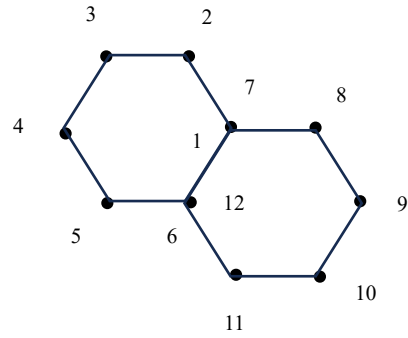
I. ಕೆಳಗಿನ ವಿನ್ಯಾಸಗಳನ್ನು ಪೂರ್ಣಗೊಳಿಸಿ:

(5x2 ಅಂಕಗಳು = 10)

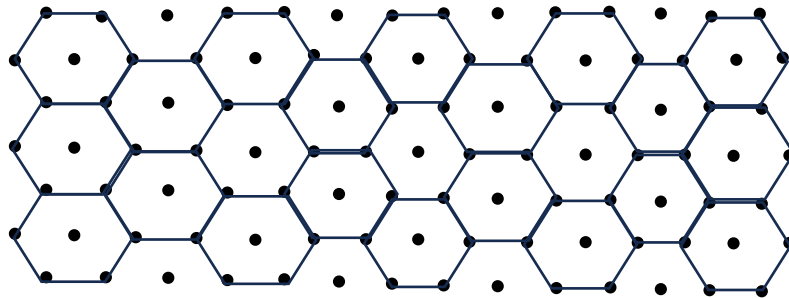
(1)



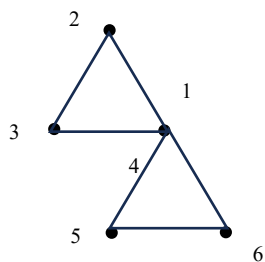
(1)



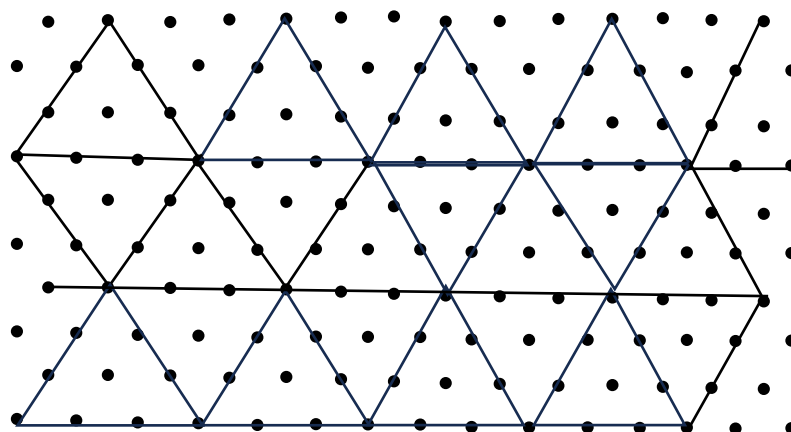
(3)



(4)



(5)

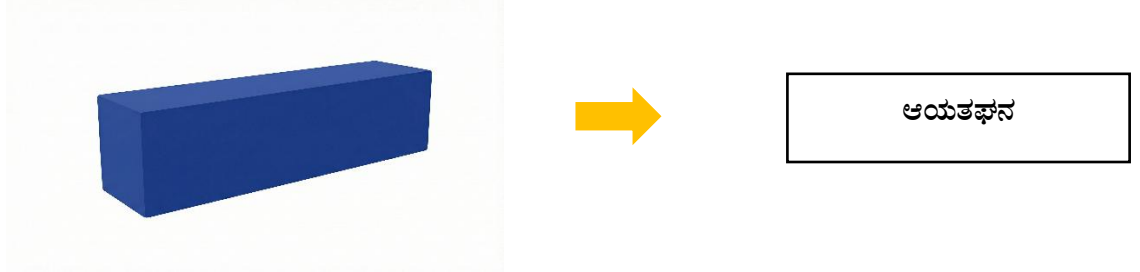


ಅಧ್ಯಾಯ-2: ಘನಾಕೃತಿಗಳು

ಉಪ-ಘಟಕ (ಅ): ಆಯತ ಘನ

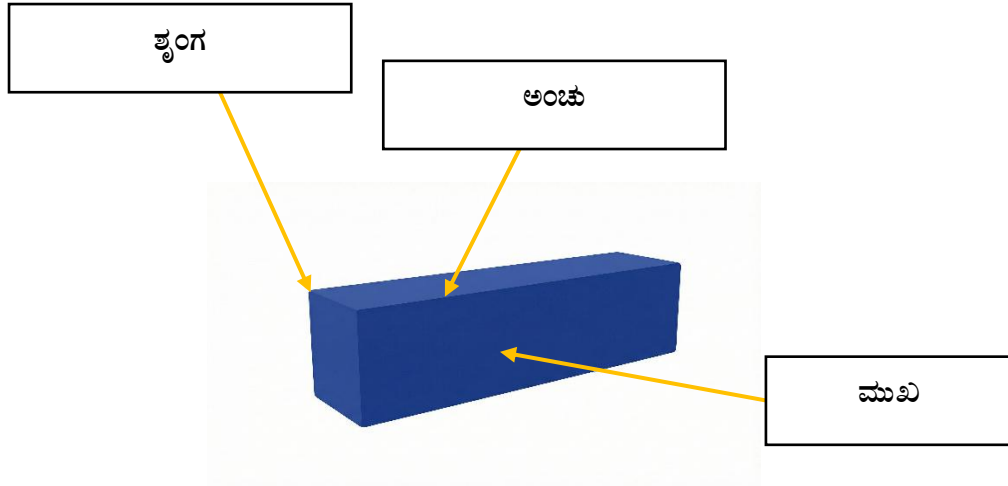
I. ಈ ಕೆಳಗಿನ ಚಿತ್ರವನ್ನು ಹೆಸರಿಸಿ:

(1x1 ಅಂಕ = 1)



II. ಈ ಕೆಳಗಿನ ಪ್ರತಿಯೊಂದರ ಹೆಸರನ್ನು ತಿಳಿಸಿ:

(3x1 ಅಂಕ = 3)



III. ಒಂದು ಆಯತಘನದಲ್ಲಿ ಈ ಕೆಳಗಿನವುಗಳ ಸಂಖ್ಯೆಯನ್ನು ತಿಳಿಸಿ:

(3x1 ಅಂಕ = 3)

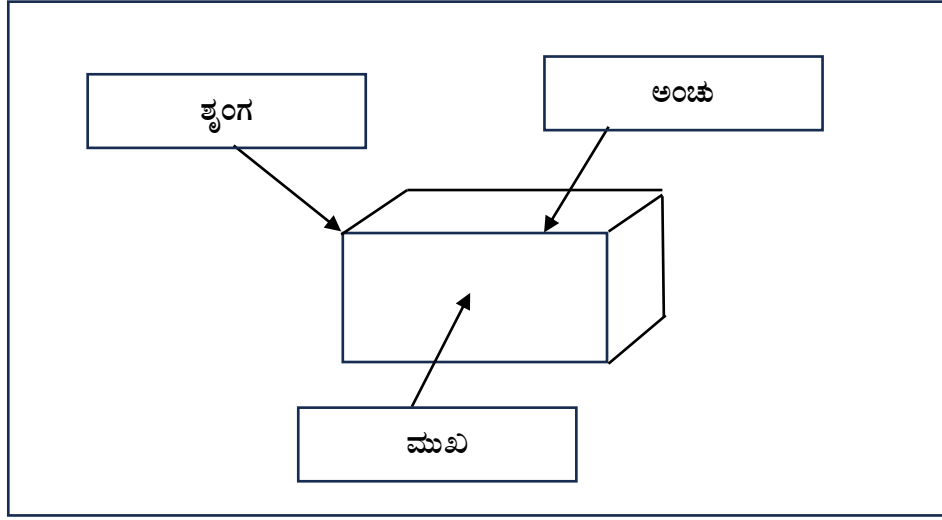
ಮುಖಗಳು	→	6
ಅಂಚುಗಳು	→	12
ಶೃಂಗಗಳು	→	8

IV. ಈ ಕೆಳಗಿನ ಸನ್ನಿವೇಶದಿಂದ ವಸ್ತುವಿನ ಆಕಾರವನ್ನು ಗುರುತಿಸಿ: (1x3 ಅಂಕ = 3)



ಆಯತಘನ

V. ಒಂದು ಆಯತಘನದ ಚಿತ್ರವನ್ನು ಬರೆಯಿರಿ ಮತ್ತು ಅದರ ಮುಖ, ಅಂಚು ಹಾಗೂ ಶೃಂಗವನ್ನು ಗುರುತಿಸಿ:
(1 x 2 ಅಂಕ = 2)



ಉಪ-ಘಟಕ (ಆ): ಚೌಕಘನ

I. ಈ ಕೆಳಗಿನ ಚಿತ್ರವನ್ನು ಹೆಸರಿಸಿ:

(1x1 ಅಂಕ = 1)



ಇದರ ಹೆಸರು_____

II. ಈ ಕೆಳಗಿನವುಗಳ ಸಂಖ್ಯೆಯನ್ನು ತಿಳಿಸಿ:

(3x1 ಅಂಕ = 3)



ಮುಖಗಳ ಸಂಖ್ಯೆ 6

ಅಂಚುಗಳ ಸಂಖ್ಯೆ 12

ಶೃಂಗಗಳ ಸಂಖ್ಯೆ 8

VI. ಈ ಕೆಳಗಿನ ಸನ್ನಿವೇಶವನ್ನು ಗಮನಿಸಿ ಮತ್ತು ವೃತ್ತಾಕಾರದಲ್ಲಿ ಗುರುತಿಸಲಾದ ವಸ್ತುವಿನ ಆಕಾರವನ್ನು ಗುರುತಿಸಿ:

(1 x 1 ಅಂಕ = 1)



ವಸ್ತುವಿನ ಆಕಾರ: _____

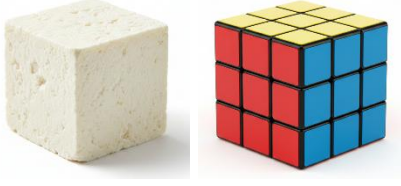
VII. ಒಬ್ಬ ಸಣ್ಣ ಹುಡುಗ ಮನೆಯಲ್ಲಿ ಆಟವಾಡುತ್ತಿರುವ ಈ ಕೆಳಗಿನ ಸನ್ನಿವೇಶವನ್ನು ಗಮನಿಸಿ ಮತ್ತು

ಚೌಕಫನಾಕೃತಿಯಲ್ಲಿ ಕಾಣುವ ವಸ್ತುಗಳ ಸುತ್ತ ವೃತ್ತಾಕಾರವಾಗಿ ಗುರುತಿಸಿ:

(2x1 ಅಂಕ = 2)



VIII. ಚೌಕಫನಾಕೃತಿಯಲ್ಲಿ ಕಾಣುವ ಎಲ್ಲಾ ವಸ್ತುಗಳನ್ನು ಹೊಂದಿರುವ ಬ್ಲಾಕ್‌ಗಳನ್ನು ಗುರುತಿಸಿ ಮತ್ತು ಪ್ರತಿಯೊಂದು ಬ್ಲಾಕ್‌ನ ಕೆಳಗೆ ನೀಡಿರುವ ಜಾಗದಲ್ಲಿ ಸರಿ ಗುರುತು (✓) ಹಾಕಿ: (3x1 ಅಂಕ = 3)

 ☒	 ☐
 ☒	 ☐
 ☐	 ☒

ಉಪ-ಘಟಕ (ಇ): ಸ್ತಂಭಾಕೃತಿ

I. ಈ ಕೆಳಗಿನ ವಸ್ತುವಿನ ಹೆಸರನ್ನು ತಿಳಿಸಿ:

(1x1 ಅಂಕ = 1)



ಈ ಕ್ರಯಾನ್‌ನ ಆಕಾರವು _____

II. ಸ್ತಂಭಾಕೃತಿಯ ವಸ್ತುವಿನ ಹೆಸರುಗಳನ್ನು ಬರೆಯಿರಿ:

(3 x 1 ಅಂಕ = 3)

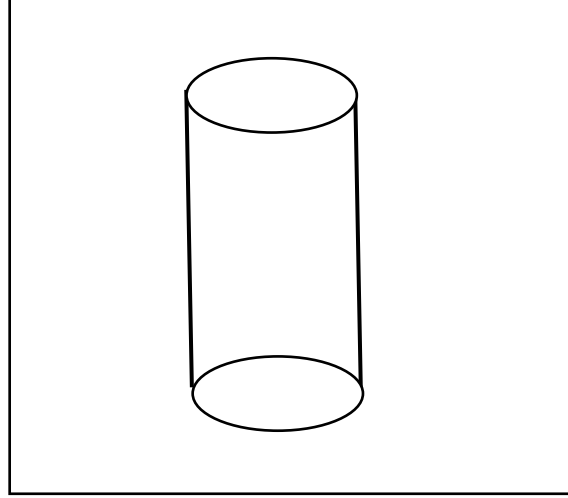
1. ಗ್ಯಾಸ್ ಸಿಲಿಂಡರ್

2. ಕಸದ ಬುಟ್ಟಿ

3. ಜ್ಯೂಸ್ ಕ್ಯಾನ್

III. ಸ್ತಂಭಾಕೃತಿಯನ್ನು ಬಿಡಿಸಿ:

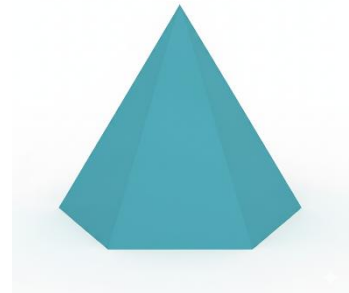
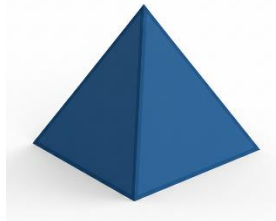
(1 x 6 ಅಂಕಗಳು = 6)



ಉಪ-ಘಟಕ(ಈ): ಶಂಕು

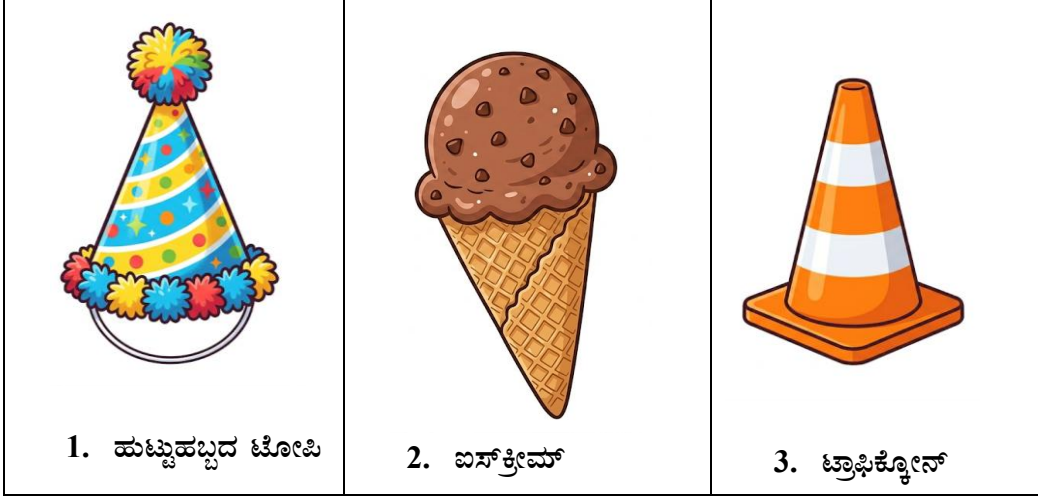
I. ಈ ಕೆಳಗಿನವುಗಳಲ್ಲಿ ಯಾವುದು ಶಂಕು ಆಕಾರದಲ್ಲಿದೆ? (ಅದಕ್ಕೆ ವೃತ್ತ ಹಾಕಿ)

(1x1 ಅಂಕ = 1)



II. ಶಂಕುವಿನಂತೆ ಕಾಣುವ ಯಾವುದಾದರೂ 3 ವಸ್ತುಗಳ ಚಿತ್ರಬಿಡಿಸಿ ಮತ್ತು ಅವುಗಳ ಹೆಸರನ್ನು ಬರೆಯಿರಿ:

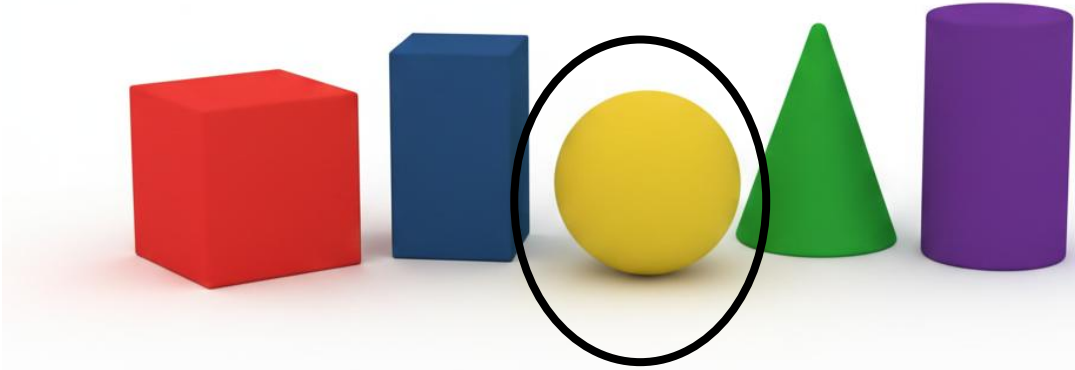
(3x3 ಅಂಕಗಳು = 9)



ಉಪ-ಘಟಕ (ಉ): ಗೋಳ

I. "ಗೋಳ" ಆಕಾರವನ್ನು ಗುರುತಿಸಿ: (ಅದಕ್ಕೆ ವೃತ್ತ ಹಾಕಿ)

(1x2 ಅಂಕಗಳು)



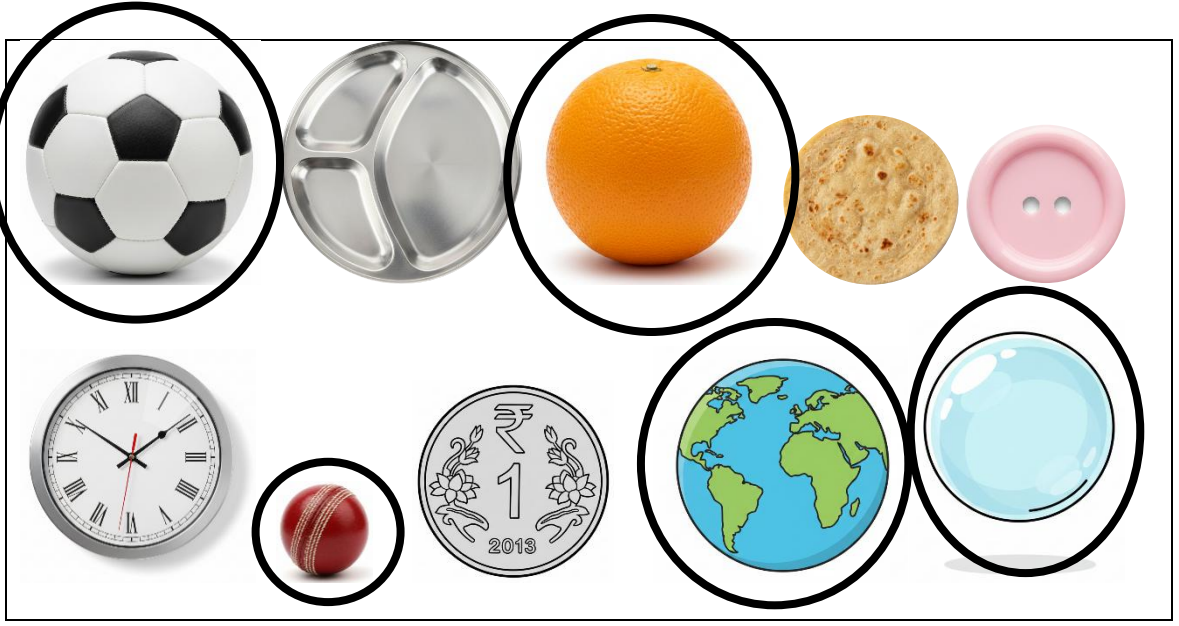
II. ಗೋಳದಂತೆ ಕಾಣುವ ಯಾವುದಾದರೂ 4 ವಸ್ತುಗಳ ಹೆಸರನ್ನು ಬರೆಯಿರಿ:

(3x1 ಅಂಕ = 3)

1. ಭೂಮಿ
2. ಗುಳ್ಳೆ(ಬಬಲ್)
3. ಸೂರ್ಯ
4. ಚಂದ್ರ

III. ಗೋಳಾಕಾರದಲ್ಲಿರುವ ವಸ್ತುಗಳನ್ನು ಗುರುತಿಸಿ, ಅವುಗಳಿಗೆ ಸುತ್ತವರಿಯಿರಿ:

(5x1 ಅಂಕ = 5)



APPENDIX – G
RESEARCHER MADE PRE-TEST(KANNADA VERSION)

ಪೂರ್ವಭಾವಿ ಪರೀಕ್ಷೆ

ಸಂಶೋಧಕ ನಿರ್ಮಿತ ಸಾಧನಾ ಪರೀಕ್ಷೆ

ಪರೀಕ್ಷಾರಂಭದ ಸಂಖ್ಯೆ: _____

ತರಗತಿ: 4

ವಿಷಯ: ಗಣಿತ

ಅಧ್ಯಾಯಗಳು: 1. “ಟ್ರಾನ್ಸ್‌ಗ್ರಾಫ್ಸ್ ಮತ್ತು ವಿನ್ಯಾಸಗಳು”

2. “ಘನಾಕೃತಿಗಳು”

ಸಮಯ: 1 ಗಂಟೆ

ಗರಷ್ಠ ಅಂಕಗಳು: 25

ವಿದ್ಯಾರ್ಥಿಯ ಹೆಸರು:ಕ್ರಮ ಸಂಖ್ಯೆ:

ಶಾಲೆಯ ಹೆಸರು:ವಿಕಲಚೇತನದ ವರ್ಗ:

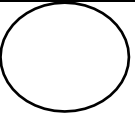
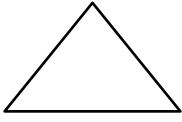
ಸೂಚನೆಗಳು: ಎಲ್ಲಾ ಪ್ರಶ್ನೆಗಳು ಕಡ್ಡಾಯವಾಗಿವೆ. ನೀವು ಯಾವುದೇ ಕ್ರಮದಲ್ಲಿ ಉತ್ತರಿಸಬಹುದು.

ಪ್ರಶ್ನೆ-1 ಕೆಳಗಿನವುಗಳನ್ನು ಹೆಸರಿಸಿ: (½ ಅಂಕ x 10 = 05 ಅಂಕಗಳು)

				
i.		ii.		iv.
				
v.		vi.		viii.
				
ix.		x.		

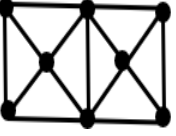
ಪ್ರಶ್ನೆ-2 ಸರಿಯಾದ ಆಕಾರದ ಹೆಸರಿನೊಂದಿಗೆ ಬಿಟ್ಟ ಸ್ಥಳಗಳನ್ನು ತುಂಬಿ: (½ ಅಂಕ x 5 = 2 ½ ಅಂಕಗಳು)

ಸೂಚನೆ: ಪೆಟ್ಟಿಗೆಯಲ್ಲಿ ನೀಡಲಾದ ಆಯ್ಕೆಗಳಿಂದ ಸರಿಯಾದ ಉತ್ತರವನ್ನು ಆರಿಸಿ ಮತ್ತು ಖಾಲಿ ಜಾಗದಲ್ಲಿ ಬರೆಯಿರಿ.

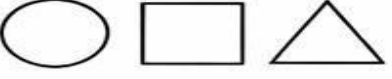
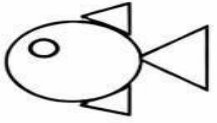
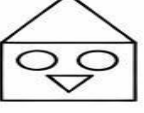
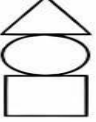
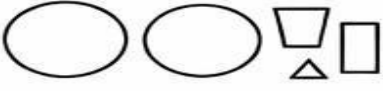
		 ವೃತ್ತ	 ಚೌಕ	 ತ್ರಿಭುಜ	 ಆಯತ	 ನಕ್ಷತ್ರ
	i	ಮೂರು ಬಾಹುಗಳು ಇರುವ ಆಕಾರವನ್ನು ನಾವು _____ ಎಂದು ಕರೆಯುತ್ತೇವೆ.				

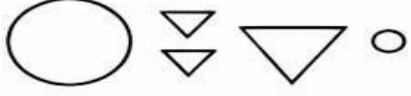
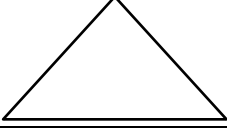
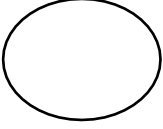
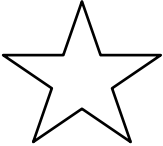
	ii	ಯಾವುದೇ ಮೂಲೆಗಳಿಲ್ಲದ ದುಂಡಗಿನ ಆಕಾರವನ್ನು _____ ಎನ್ನಲಾಗುತ್ತದೆ.
	iii	ನಾಲ್ಕು ಸಮನಾದ ಬಾಹುಗಳಿರುವ ಆಕಾರವನ್ನು _____ ಎನ್ನಲಾಗುತ್ತದೆ.
	iv	ನಾಲ್ಕು ಬಾಹುಗಳಿದ್ದು, ಎದುರು ಬದಿರು ಸಮನಾದ ಬಾಹುಗಳಿರುವ ಆಕಾರವನ್ನು ನಾವು _____ ಎನ್ನುತ್ತೇವೆ.
	v	ಐದು ಬಿಂದುಗಳು (ಕೋನಗಳು) ಇರುವ ಆಕಾರವನ್ನು _____ ಎನ್ನಲಾಗುತ್ತದೆ.

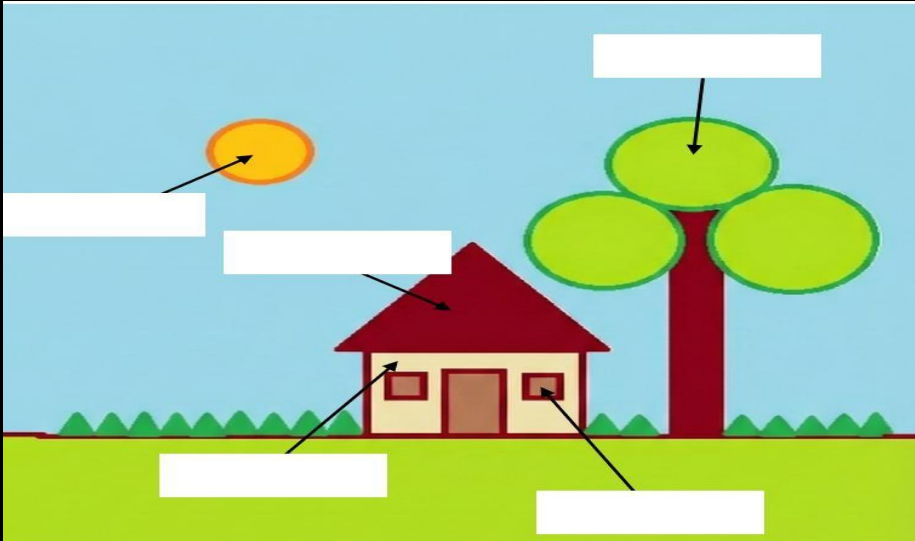
ಪ್ರಶ್ನೆ-3	ಈ ಕೆಳಗಿನ ಮಾದರಿಯನ್ನು ಪೂರ್ಣಗೊಳಿಸಿ: (2 ½ ಅಂಕಗಳು x 2 = 05 ಅಂಕಗಳು)				
-----------	---	--	--	--	--

(a)		(b)	
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ಪ್ರಶ್ನೆ-4	ಹಂದಿಸಿ ಬರೆಯಿರಿ: (½ ಅಂಕ x 5 = 2 ½ ಅಂಕಗಳು)				
-----------	--	--	--	--	--

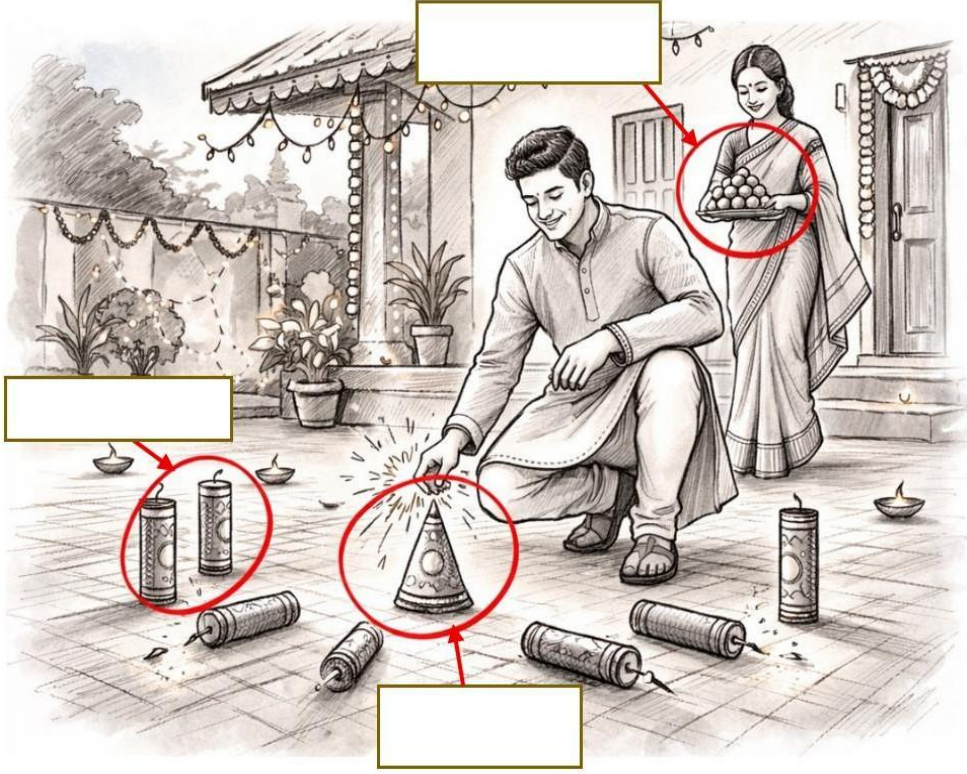
ಗುಂಪು-1 (ಆಕಾರಗಳು)			ಗುಂಪು-2 (ಆಕಾರಗಳ ವಿನ್ಯಾಸ)		
i			a		
ii			b		
iii			c		
iv			d		

	v		e	
ಪ್ರಶ್ನೆ-5	ಹೊಂದಿಸಿ ಬರೆಯಿರಿ:		(½ ಅಂಕ x 5 = 2 ½ ಅಂಕಗಳು)	
	ಗುಂಪು-1 (ಆಕಾರಗಳು)		ಗುಂಪು-2 (ವಸ್ತುಗಳ ಆಕಾರ)	
	i		a	
	ii		b	
	iii		c	
	iv		d	
	v		e	

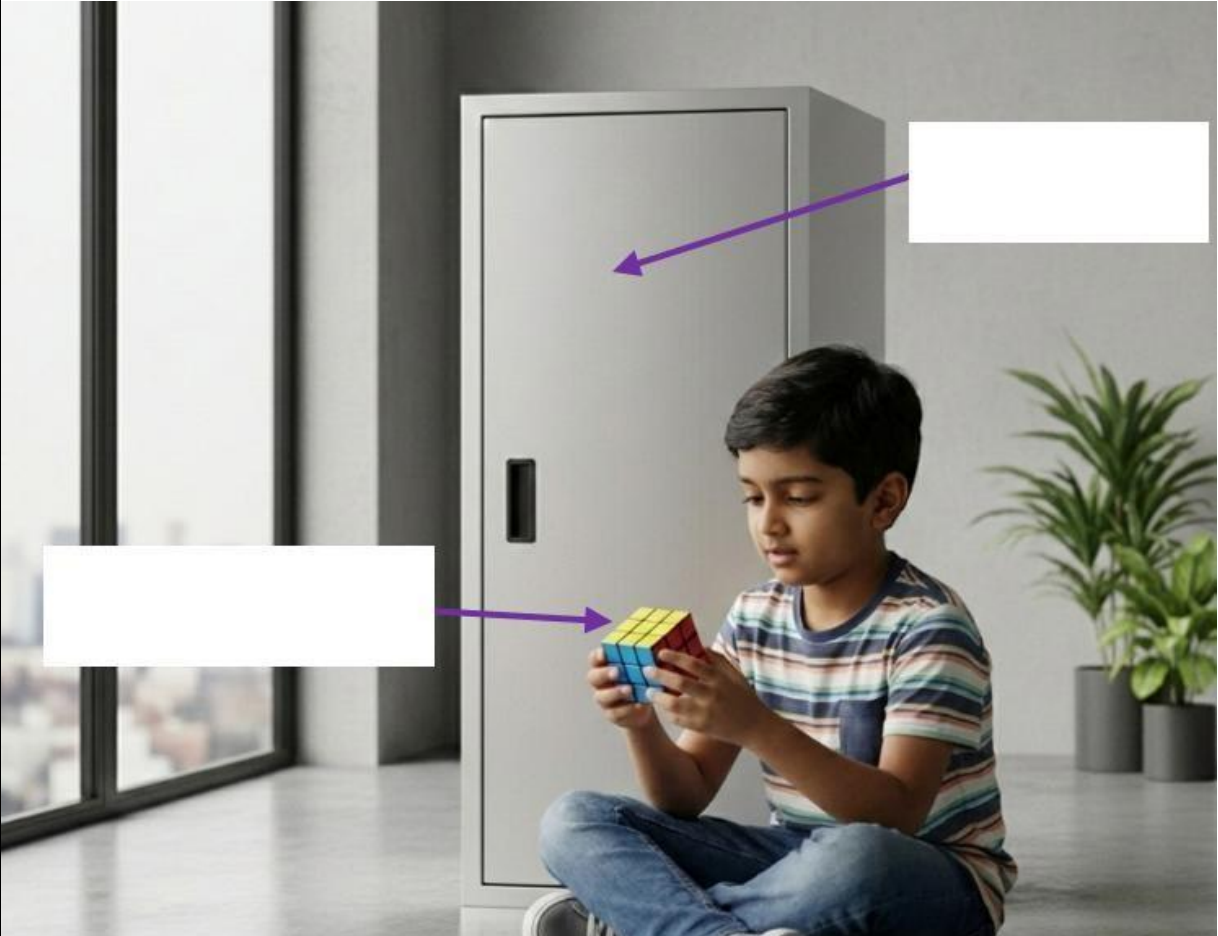
ಪ್ರಶ್ನೆ-6	ಚಿತ್ರವನ್ನು ಗಮನಿಸಿ ಮತ್ತು ಗುರುತಿಸಲಾದ ಆಕಾರಗಳ ಹೆಸರುಗಳನ್ನು ಬರೆಯಿರಿ:	(½ ಅಂಕ x 5 = 2 ½ ಅಂಕಗಳು)
		

ಪ್ರಶ್ನೆ-7 ಚಿತ್ರವನ್ನು ಜಾಗರೂಕತೆಯಿಂದ ಗಮನಿಸಿ ಮತ್ತು:

(i) ವೃತ್ತಾಕಾರದಲ್ಲಿ ಗುರುತಿಸಲಾದ ವಸ್ತುಗಳ ಆಕಾರಗಳ ಹೆಸರುಗಳನ್ನು ಬರೆಯಿರಿ: ($\frac{1}{2}$ ಅಂಕ x 3 = 1 $\frac{1}{2}$ ಅಂಕಗಳು)



(ii) ಬಾಣದ ಗುರುತು ಮಾಡಲಾದ ವಸ್ತುಗಳ ಆಕಾರಗಳ ಹೆಸರುಗಳನ್ನು ಬರೆಯಿರಿ: ($\frac{1}{2}$ ಅಂಕ x 2 = 01 ಅಂಕ)



ಪ್ರಶ್ನೆ- 8	ಗುಂಪಿಗೆ ಸೇರದವನ್ನು ಗುರುತಿಸಿ: (½ ಅಂಕ x 5 = 2 ½ ಅಂಕಗಳು)				
	ಸೂಚನೆ: ಪ್ರತಿ ಗುಂಪಿನಲ್ಲಿ ಒಂದು ಆಕಾರವು ವಿಭಿನ್ನವಾಗಿದೆ. ಗುಂಪಿಗೆ ಸೇರದ ಆಕಾರಕ್ಕೆ ಸರಿಯಾದ (✓) ಗುರುತು ಮಾಡಿ				
a	 ವೃತ್ತ	 ತ್ರಿಭುಜ	 ಚೌಕ	 ಚೆಂಡು	
b	 ಚೌಕ ಘನ	 ತಂಕು	 ಗೋಳ	 ತ್ರಿಭುಜ	
c	 ನಕ್ಷತ್ರ	 ಆಯತ	 ಚೌಕ	 ವೃತ್ತ	
d	 ದಾಳ	 ಚೆಂಡು	 ಐಸ್ ಕ್ರೀಮ್ ಕೋನ್	 ಚೌಕ	
e	 ಸ್ತಂಭಾಕೃತಿ	 ಚೌಕ ಘನ	 ಪೆಟ್ಟಿಗೆ	 ಆಯತ	
ದಿನಾಂಕ: ಸಹಿ:					

APPENDIX – H
RESEARCHER MADE POST-TEST (KANNADA VERSION)

ಪಶ್ಚಾತ್ ಪರೀಕ್ಷೆ

ಸಂಶೋಧಕ ನಿರ್ಮಿತ ಸಾಧನಾ ಪರೀಕ್ಷೆ

ಪ್ರತಿಕ್ರಿಯೆದಾರರ ಸಂಖ್ಯೆ: _____

ತರಗತಿ: 4

ವಿಷಯ: ಗಣಿತ

ಅಧ್ಯಾಯಗಳು: 1. “ಟ್ಯಾನ್‌ಗ್ರಾಮ್ ಮತ್ತು ವಿನ್ಯಾಸಗಳು”

2. “ಘನಾಕೃತಿಗಳು”

ಸಮಯ: 1 ಗಂಟೆ

ಗರಿಷ್ಠ ಅಂಕಗಳು: 25

ವಿದ್ಯಾರ್ಥಿಯ ಹೆಸರು:ಕ್ರಮ ಸಂಖ್ಯೆ:

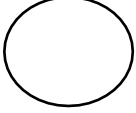
ಶಾಲೆಯ ಹೆಸರು:ವಿಕಲಚೇತನದ ವರ್ಗ:

ಸೂಚನೆಗಳು: ಎಲ್ಲಾ ಪ್ರಶ್ನೆಗಳು ಕಡ್ಡಾಯವಾಗಿವೆ. ನೀವು ಯಾವುದೇ ಕ್ರಮದಲ್ಲಿ ಉತ್ತರಿಸಬಹುದು.

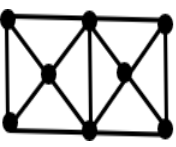
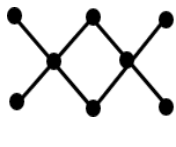
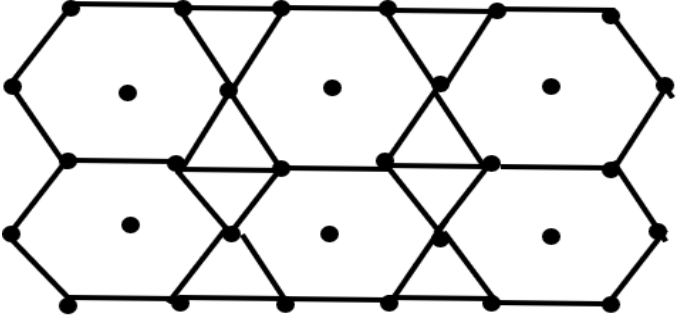
ಪ್ರಶ್ನೆ-1	ಕೆಳಗಿನವುಗಳನ್ನು ಹೆಸರಿಸಿ: (½ ಅಂಕ x 10 = 05 ಅಂಕಗಳು)			
				
	i.	ii.	iii.	iv.
				
	v.	vi.	vii.	viii.
				
	ix.	x.		

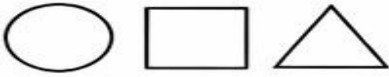
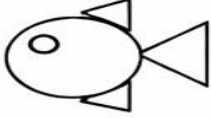
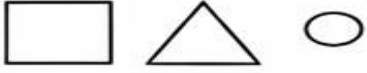
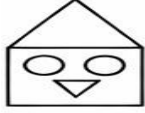
ಪ್ರಶ್ನೆ-2 ಸರಿಯಾದ ಆಕಾರದ ಹೆಸರಿನೊಂದಿಗೆ ಬಿಟ್ಟ ಸ್ಥಳಗಳನ್ನು ತುಂಬಿರಿ: (½ ಅಂಕ x 5 = 2 ½ ಅಂಕಗಳು)

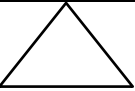
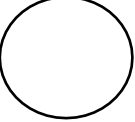
ಸೂಚನೆ: ಪೆಟ್ಟಿಗೆಯಲ್ಲಿ ನೀಡಲಾದ ಆಯ್ಕೆಗಳಿಂದ ಸರಿಯಾದ ಉತ್ತರವನ್ನು ಆರಿಸಿ ಮತ್ತು ಖಾಲಿ ಜಾಗದಲ್ಲಿ ಬರೆಯಿರಿ.

					
	ವೃತ್ತ	ಚೌಕ	ಆಯತಘನ	ಚೌಕಘನ	ನಕ್ಷತ್ರ

i	6 ಆಯತಾಕಾರದ ಮುಖಗಳು, 12 ಅಂಚುಗಳು ಮತ್ತು 8 ಶೃಂಗಗಳನ್ನು ಹೊಂದಿರುವ ಆಕಾರವನ್ನು _____ ಎಂದು ಕರೆಯಲಾಗುತ್ತದೆ.
ii	ಯಾವುದೇ ಮೂಲೆಗಳಿಲ್ಲದ ದುಂಡಗಿನ ಆಕಾರವನ್ನು _____ ಎನ್ನಲಾಗುತ್ತದೆ.
iii	ನಾಲ್ಕು ಸಮನಾದ ಬಾಹುಗಳಿರುವ ಆಕಾರವನ್ನು _____ ಎನ್ನಲಾಗುತ್ತದೆ.
iv	6 ಸಮಾನ ಚೌಕಾಕಾರದ ಮುಖಗಳು, 12 ಅಂಚುಗಳು ಮತ್ತು 8 ಶೃಂಗಗಳನ್ನು ಹೊಂದಿರುವ ಆಕಾರವನ್ನು _____ ಎಂದು ಕರೆಯಲಾಗುತ್ತದೆ.
v	ಐದು ಬಿಂದುಗಳು (ಕೋನಗಳು) ಇರುವ ಆಕಾರವನ್ನು _____ ಎನ್ನಲಾಗುತ್ತದೆ.

ಪ್ರಶ್ನೆ-3	ಈ ಕೆಳಗಿನ ಮಾದರಿಯನ್ನು ಪೂರ್ಣಗೊಳಿಸಿ:		05 ಅಂಕಗಳು
(a)		(b)	
	1 ಅಂಕ		1 ಅಂಕ
(c)			
	3 ಅಂಕಗಳು		

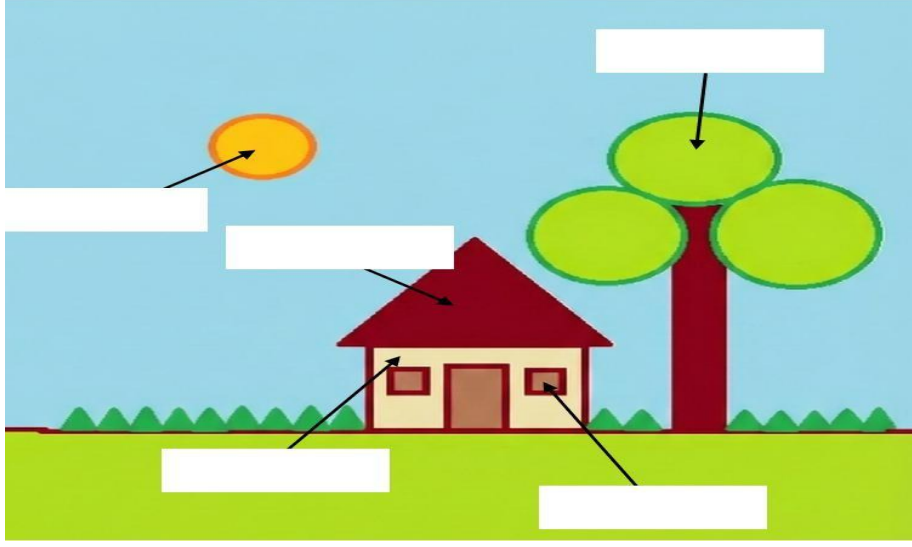
ಪ್ರಶ್ನೆ-4	ಹೊಂದಿಸಿ ಬರೆಯಿರಿ:	(½ ಅಂಕ x 5 = 2 ½ ಅಂಕಗಳು)
	ಗುಂಪು-1 (ಆಕಾರಗಳು)	ಗುಂಪು-2 (ಆಕಾರಗಳ ವಿನ್ಯಾಸ)
i		a 
ii		b 
iii		c 
iv		d 
v		e 

ಪ್ರಶ್ನೆ-5	ಹೊಂದಿಸಿ ಬರೆಯಿರಿ:	(½ ಅಂಕ x 5 = 2 ½ ಅಂಕಗಳು)
	ಗುಂಪು-1 (ಆಕಾರಗಳು)	ಗುಂಪು-2 (ವಸ್ತುಗಳ ಆಕಾರ)
i		a 
ii		b 
iii		c 
iv		d 
v		e 

ಪ್ರಶ್ನೆ-6

ಚಿತ್ರವನ್ನು ಗಮನಿಸಿ ಮತ್ತು ಗುರುತಿಸಲಾದ (ಬಾಣದ ಗುರುತು ಮಾಡಲಾದ) ಆಕಾರಗಳ ಹೆಸರುಗಳನ್ನು ಬರೆಯಿರಿ:

(½ ಅಂಕ x 5 = 2 ½ ಅಂಕಗಳು)

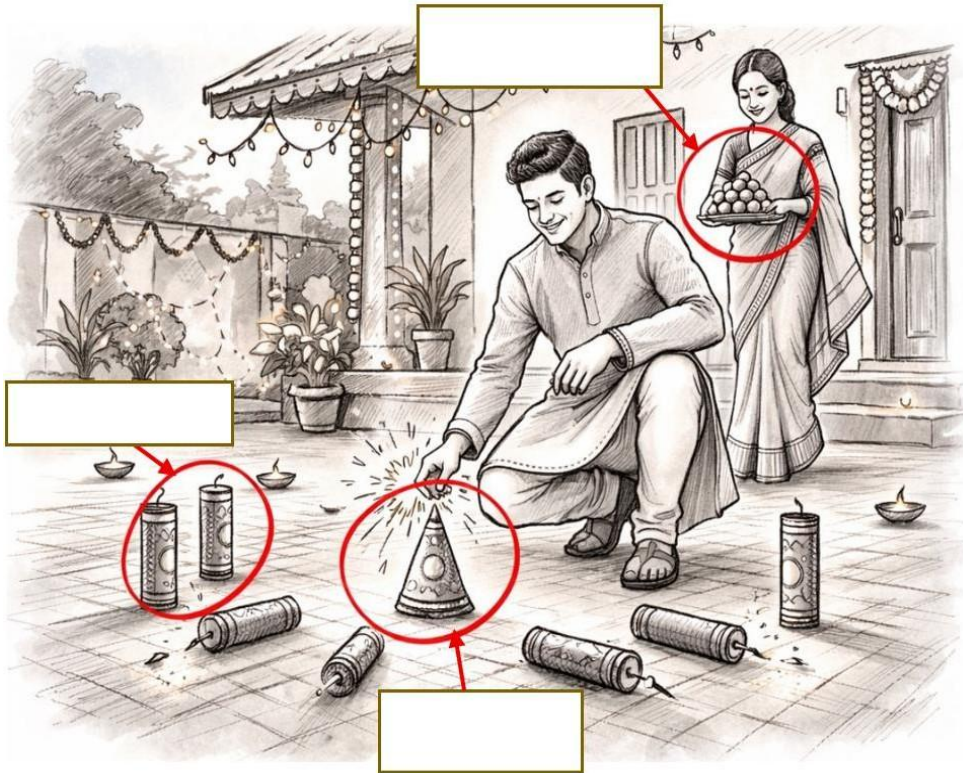


ಪ್ರಶ್ನೆ-7

ಚಿತ್ರವನ್ನು ಜಾಗರೂಕತೆಯಿಂದ ಗಮನಿಸಿ ಮತ್ತು ಅಥವಾ ಬಾಣದ ಗುರುತು ಮಾಡಲಾದ ವಸ್ತುಗಳ ಆಕಾರಗಳ ಹೆಸರುಗಳನ್ನು ಬರೆಯಿರಿ:

(i) ವೃತ್ತಾಕಾರದಲ್ಲಿ ಗುರುತಿಸಲಾದ ವಸ್ತುಗಳ ಆಕಾರಗಳ ಹೆಸರುಗಳನ್ನು ಬರೆಯಿರಿ:

½ ಅಂಕ x 3 = 1 ½ ಅಂಕಗಳು



(ii)

ಬಾಣದ ಗುರುತು ಮಾಡಲಾದ ವಸ್ತುಗಳ ಆಕಾರಗಳ ಹೆಸರುಗಳನ್ನು ಬರೆಯಿರಿ:

 $\frac{1}{2}$ ಅಂಕ x 2 = 01 ಅಂಕ

ಪ್ರಶ್ನೆ- 8 ಗುಂಪಿಗೆ ಸೇರದವನ್ನು ಗುರುತಿಸಿ ($\frac{1}{2}$ ಅಂಕ x 5 = 2 $\frac{1}{2}$ ಅಂಕಗಳು)

ಸೂಚನೆ: ಪ್ರತಿ ಗುಂಪಿನಲ್ಲಿ ಒಂದು ಆಕಾರವು ವಿಭಿನ್ನವಾಗಿದೆ. ಗುಂಪಿಗೆ ಸೇರದ ಆಕಾರಕ್ಕೆ ಸರಿಯಾದ (✓) ಗುರುತು ಮಾಡಿ

a	 ವೃತ್ತ	 ತ್ರಿಭುಜ	 ಚೌಕ	 ಚೆಂಡು
b	 ಚೌಕ ಘನ	 ಶಂಕು	 ಗೋಳ	 ತ್ರಿಭುಜ
c	 ನಕ್ಷತ್ರ	 ಆಯತ	 ಚೌಕ	 ವೃತ್ತ
d	 ದಾಳ	 ಚೆಂಡು	 ಐಸ್ ಕ್ರೀಮ್ ಕೋನ್	 ಚೌಕ
e	 ಸ್ತಂಭಾಕೃತಿ	 ಚೌಕ ಘನ	 ಪೆಟ್ಟಿಗೆ	 ಆಯತ

ದಿನಾಂಕ:

ಸಹಿ:

