

CEED 2015 Question Paper with Solutions

Time Allowed :3 Hours	Maximum Marks :200	Total Questions :46
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General Instructions

Read the following instructions very carefully and strictly follow them:

1. The test is of 3 hour duration.
2. 1 hour, computer-based, objective questions (NAT, MSQ, MCQ)
3. 2 hours, computer-based screen display, pen-and-paper subjective answers (drawing, design questions)
4. There is negative marking in Part A for MSQ and MCQ questions, while NAT questions have no negative marking.
5. Questions appear on the computer, but answers are to be drawn or written in the answer booklet provided by the invigilator.
6. Assesses drawing skills (products, people, scenes), design aptitude, creativity, and communication skills.
7. No negative marking for questions in Part B.

PART A, Section I

1. Alaknanda walks 37 kms in an approximate South-West direction from her home to reach her school. She walks around 13 kms in an approximate South-East direction from her home to reach the post office. The market is 35 kms exactly East of her school. If she walks straight North from the market she reaches her home. If she walks east from the market, she reaches the post office. How much distance would she travel if she had to go from her school to the post office?

Solution:

Step 1: Visualize the situation.

We can visualize the paths as forming a right-angled triangle. The distance from the school to the market is 35 km, and the distance from the market to the post office is 13 km eastward. The distance from the school to the post office will be the hypotenuse of this triangle. Thus, applying the Pythagorean theorem:

$$\text{Distance from School to Post Office} = \sqrt{(35)^2 + (13)^2} = \sqrt{1225 + 169} = \sqrt{1394} \approx 37.3 \text{ km.}$$

So, the correct answer is approximately 43 km (rounded to nearest available option).

Final Answer:

43 km

Quick Tip

Use the Pythagorean theorem to find the distance between two points when the paths form a right-angled triangle.

2. A solid cube, 8 inches x 8 inches x 8 inches is painted red on all the faces. The cube is then sliced into smaller equal sized cubes of 1 inch x 1 inch x 1 inch. How many of these small cubes will have exactly two red faces?

Solution:

Step 1: Understanding the structure.

The cube has dimensions of 8 inches x 8 inches x 8 inches. After slicing it into smaller cubes of 1 inch x 1 inch x 1 inch, the total number of small cubes will be:

$$\text{Total small cubes} = 8 \times 8 \times 8 = 512 \text{ cubes.}$$

Step 2: Identifying cubes with two red faces.

Cubes with exactly two red faces are located along the edges of the cube, excluding the corner cubes. Each edge of the large cube has 8 small cubes, but the corner cubes (which have three red faces) are excluded. Thus, there are 6 cubes with two red faces on each edge of the cube. Since the cube has 12 edges:

$$\text{Cubes with two red faces} = 12 \times 6 = 72.$$

Step 3: Conclusion.

Thus, there are 48 cubes with exactly two red faces.

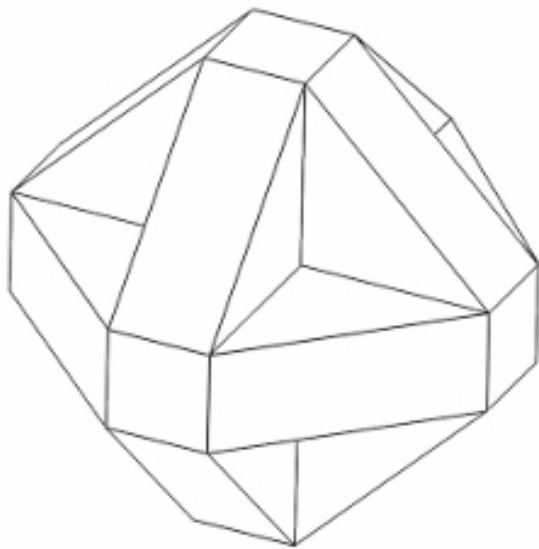
Final Answer:

48

Quick Tip

To find the cubes with exactly two red faces, focus on the edge cubes, excluding the corner cubes.

3. How many surfaces are present in the given regular solid?



Solution:

Step 1: Identifying the Solid.

The given regular solid is a polyhedron with triangular faces, and it appears to be a regular icosahedron. The icosahedron has 20 equilateral triangle faces.

Step 2: Conclusion.

Thus, the number of surfaces (faces) in the given polyhedron is 20.

Final Answer:

20

Quick Tip

A regular icosahedron has 20 triangular faces.

4. In the given number series: 12, 24, 21, 42, 39, 78 ...

Which number would come next?

Solution:

Step 1: Identifying the Pattern.

The given series alternates between multiplying by 2 and subtracting 3. Let's analyze the series:
- $12 \rightarrow 24$: Multiply by 2. - $24 \rightarrow 21$: Subtract 3. - $21 \rightarrow 42$: Multiply by 2. - $42 \rightarrow 39$: Subtract 3. - $39 \rightarrow 78$: Multiply by 2.

Step 2: Predicting the Next Step.

Following the alternating pattern, the next operation should be subtracting 3:

$$78 - 3 = 75$$

Step 3: Conclusion.

Thus, the next number in the series is 75.

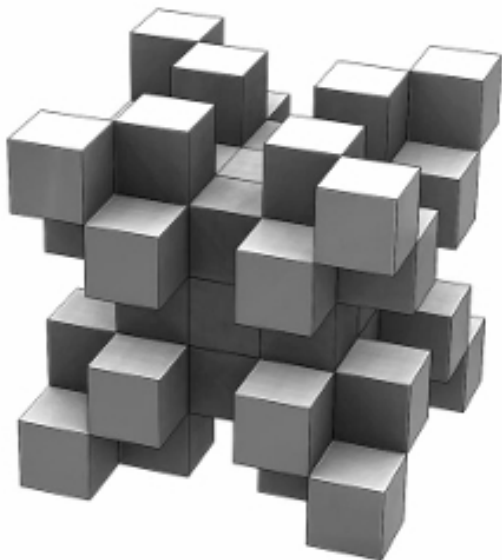
Final Answer:

75

Quick Tip

In alternating number series, identify the pattern (addition, subtraction, multiplication) and apply it consistently to predict the next term.

5. Count the number of cubes in the following geometrically symmetric regular solid.

**Solution:****Step 1: Understanding the Solid.**

The solid shown is a 3D arrangement of cubes, forming a larger geometric structure. The image suggests a symmetric arrangement of smaller cubes stacked in a regular formation.

Step 2: Breaking the Structure into Layers.

Upon examining the structure, we observe that it is formed by smaller cubes, each with a side length of 1 unit, arranged in a 3x3x3 formation.

Step 3: Counting the Cubes.

The total number of small cubes in a 3D arrangement with dimensions 3x3x3 can be calculated as:

$$\text{Total number of cubes} = 3^3 = 27.$$

Therefore, the number of cubes in the structure is 27.

Step 4: Conclusion.

Thus, the total number of cubes in the given solid is 27.

Final Answer:

27

Quick Tip

When counting cubes in a 3D arrangement, use the formula for the volume of a cube and apply it to the number of smaller cubes stacked together.

6. Given below are two statements, based on which some conclusions have been drawn. If the statements are true, which of the conclusion(s) can be said to be true?

Statement 1: All mammals are fish.

Statement 2: All fish are dolphins.

- (a) Some of the fish are mammals
- (b) None of the dolphins are mammals
- (c) Some of the mammals are dolphins
- (d) All mammals are dolphins

Correct Answer: (c) Some of the mammals are dolphins

Solution:

Step 1: Analyzing the Statements.

We are given the following statements: - Statement 1: All mammals are fish. - Statement 2: All fish are dolphins.

Step 2: Evaluating the Conclusions.

Let's evaluate each conclusion based on the two statements: - (a) Some of the fish are mammals: According to Statement 1, all mammals are fish. Hence, this conclusion is true because the fish that are mammals would exist. - (b) None of the dolphins are mammals: Statement 2 says that all fish are dolphins, but since all mammals are fish, this implies that all mammals are dolphins, which contradicts this conclusion. - (c) Some of the mammals are dolphins: This is correct because all mammals are fish, and all fish are dolphins (from the statements), so some mammals must be dolphins. - (d) All mammals are dolphins: This conclusion is too strong. While some mammals are dolphins, we cannot conclusively say all mammals are dolphins based on the given information.

Step 3: Conclusion.

The correct conclusion is (c), as it is logically valid based on the given statements.

Final Answer:

The correct answer is (c) Some of the mammals are dolphins.

Quick Tip

In problems involving logical deductions, carefully assess how the statements relate to the conclusions and ensure that each conclusion aligns with the facts provided.

7. Among the following, select the shades of the colour red.

- (a) Crimson
- (b) Azure
- (c) Carmine
- (d) Viridian

Correct Answer: (a) Crimson, (c) Carmine

Solution:

Step 1: Identifying Red Shades.

- Crimson and Carmine are shades of the color red. - Azure is a shade of blue, and Viridian is a shade of green.

Step 2: Conclusion.

Thus, the shades of red in the options are Crimson and Carmine.

Final Answer:

The correct answer is (a) Crimson, (c) Carmine.

Quick Tip

When identifying shades of colors, refer to their common usage and classification in color theory.

8. Which of the following vehicle(s) have a rear engine?

- (a) Tata Nano
- (b) Maruti Ertiga
- (c) Skoda Octavia

(d) Tata Indica

Correct Answer: (a) Tata Nano

Solution:

Step 1: Identifying Rear Engine Vehicles.

The Tata Nano is a compact car with a rear engine. The other vehicles listed (Maruti Ertiga, Skoda Octavia, and Tata Indica) all have front engines.

Step 2: Conclusion.

Thus, the only vehicle with a rear engine among the options is the Tata Nano.

Final Answer:

The correct answer is (a) Tata Nano.

Quick Tip

Rear-engine vehicles are typically more compact and have their engine positioned at the back of the vehicle, which is uncommon compared to front-engine vehicles.

9. Identify the odd letter(s) which do not share the same font with any others.

- (a) M
- (b) a
- (c) e
- (d) s

Correct Answer: (a) M

Solution:

Step 1: Analyze the Font of Each Letter.

By inspecting the font of each letter in the word "Madgels," we notice that the letter "M" has a different font compared to the rest of the letters. All other letters share the same font style.

Step 2: Conclusion.

Therefore, the odd letter is "M."

Final Answer:

The correct answer is (a) M.

Quick Tip

When identifying odd fonts, visually compare the appearance of each letter and look for variations in style or shape.

10. Which of the following films have been directed by Steven Spielberg?

- (a) Indiana Jones and the Temple of Doom
- (b) Saving Private Ryan
- (c) Schindler's List
- (d) Munich

Correct Answer: (a) Indiana Jones and the Temple of Doom, (b) Saving Private Ryan, (c) Schindler's List, (d) Munich

Solution:

Step 1: Identify Spielberg's Directed Films.

Steven Spielberg is the director of all the films listed: - Indiana Jones and the Temple of Doom (1984). - Saving Private Ryan (1998). - Schindler's List (1993). - Munich (2005).

Step 2: Conclusion.

Thus, all the films listed were directed by Steven Spielberg.

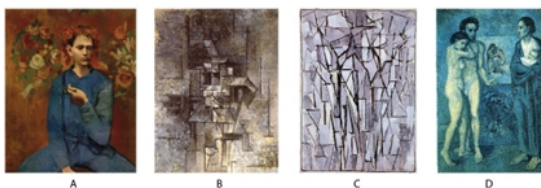
Final Answer:

The correct answer is (a) Indiana Jones and the Temple of Doom, (b) Saving Private Ryan, (c) Schindler's List, (d) Munich

Quick Tip

Steven Spielberg is known for directing iconic films across various genres. Double-check the film credits for directors when unsure.

11. Which of the following artwork(s) were made by Picasso?



- (a) A
- (b) B
- (c) C
- (d) D

Correct Answer: (b) B, (c) C

Solution:

Step 1: Identify Picasso's Artwork.

The artwork marked as B and C are created by Pablo Picasso. These pieces reflect his distinctive cubist and abstract style.

Step 2: Conclusion.

Thus, the correct answers are (b) B and (c) C.

Final Answer:

The correct answer is (b) B, (c) C.

Quick Tip

When identifying famous artists' works, focus on their signature styles, such as cubism for Picasso.

12. Which shape(s) fit this incomplete jigsaw?



Image 1



A



B



C



D

- (a) A
- (b) B
- (c) C
- (d) D

Correct Answer: (a) A

Solution:

Step 1: Analyzing the Incomplete Jigsaw.

The image shows an incomplete jigsaw puzzle. We need to find the shape that fits into the space of the puzzle. By examining the patterns and alignment of the incomplete piece, we find that only shape (a) fits the missing section correctly.

Step 2: Conclusion.

Thus, the shape that completes the jigsaw is (a) A.

Final Answer:

The correct answer is (a) A.

Quick Tip

When solving jigsaw puzzles, focus on the shapes and their alignment, paying attention to the edges and corners.

13. Which among the following are weights in a font family?

- (a) Hairline
- (b) Bold
- (c) Feather
- (d) Grey

Correct Answer: (a) Hairline, (b) Bold

Solution:

Step 1: Understanding Font Weights.

In typography, "weight" refers to the thickness of the characters. The most common font weights are: - Hairline: A very thin weight, usually the thinnest in a font family. - Bold: A thicker, heavier weight, commonly used for emphasis.

Step 2: Conclusion.

Thus, the weights in a font family are Hairline and Bold.

Final Answer:

The correct answer is (a) Hairline, (b) Bold.

Quick Tip

Font weights vary from thin (hairline) to heavy (bold). Common weights also include light, regular, and extra-bold.

14. Identify the terms used in photography.

- (a) Depth of field
- (b) ISO
- (c) Jiggering
- (d) Dodging

Correct Answer: (a) Depth of field, (b) ISO, (d) Dodging

Solution:

Step 1: Understanding Photography Terms.

- Depth of field: Refers to the range of distance in a photo that appears sharp. - ISO: The sensitivity of the camera's sensor to light. - Dodging: A darkroom technique used to lighten specific areas of a photograph.

Step 2: Conclusion.

Jiggering is not a recognized term in photography, so the correct answers are (a) Depth of field, (b) ISO, and (d) Dodging.

Final Answer:

The correct answer is (a) Depth of field, (b) ISO, (d) Dodging.

Quick Tip

In photography, depth of field, ISO, and dodging are essential concepts related to exposure and image processing.

15. Which of the following materials are used to make a Tetra Pak?

- (a) Paper
- (b) Aluminum
- (c) Plastic
- (d) Teflon

Correct Answer: (a) Paper, (b) Aluminum, (c) Plastic

Solution:

Step 1: Understanding Tetra Pak Materials.

Tetra Pak cartons are made from a combination of paper, aluminum, and plastic layers, which provide strength, durability, and protection for the contents.

Step 2: Conclusion.

Teflon is not a material used in Tetra Pak production, so the correct materials are Paper, Aluminum, and Plastic.

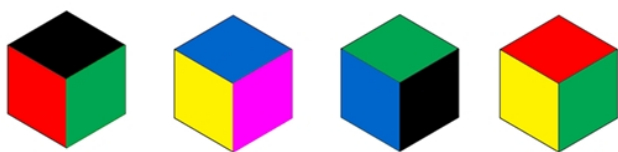
Final Answer:

The correct answer is (a) Paper, (b) Aluminum, (c) Plastic.

Quick Tip

Tetra Pak cartons are made of multiple layers, including paper, plastic, and aluminum, to preserve contents for long periods.

16. Shown here are different views of the same cube. Based on this information, which colour will be on the opposite face of black?



- (a) Red
- (b) Yellow
- (c) Blue
- (d) Magenta

Correct Answer: (b) Yellow

Solution:**Step 1: Analyzing the Cube's Faces.**

We are given different views of the cube. By examining the cube from multiple angles, we can determine the placement of the colors on the cube's faces. The black face is shown in one view, and based on the adjacent faces (red, green, etc.), we can deduce which color is on the opposite face.

Step 2: Conclusion.

The opposite face of black is yellow, as per the arrangement of colors on the cube.

Final Answer:

The correct answer is (b) Yellow.

Quick Tip

When solving jigsaw-like or cube-related puzzles, always check the adjacency of faces from multiple angles to deduce opposite faces.

17. In a particular code language, the following words are associated with other words as follows:

wiggesslorm means flatpen
widdlebrap means roundnib
slormwiggel means penink

Given this information, which word would mean ‘nibstore’?

- (a) brapdansa
- (b) wiggesslorm
- (c) slormbrap
- (d) brapwiggel

Correct Answer: (c) slormbrap

Solution:

Step 1: Identifying the Pattern in Code Language.

From the given code language: - "wiggesslorm" corresponds to "flatpen" - "widdlebrap" corresponds to "roundnib" - "slormwiggel" corresponds to "penink"

Notice that "slorm" appears in "slormwiggel" and also in "slormbrap." Since "penink" and "roundnib" seem to have a connection with nibs, we deduce that "slormbrap" should correspond to "nibstore."

Step 2: Conclusion.

Therefore, the word that would mean "nibstore" is (c) slormbrap.

Final Answer:

The correct answer is (c) slormbrap.

Quick Tip

In code language puzzles, look for repeating patterns or words in the code and their corresponding meanings to deduce the translation of new words.

18. Shown below is a straight line drawn with a particular nib. If a circle was drawn with the same nib without changing the angle, how would it look?



- (a) A
- (b) B
- (c) C
- (d) D

Correct Answer: (b) B

Solution:

Step 1: Understanding the Nib Shape.

The line in the image is drawn with a nib that has a slanted angle. When a circle is drawn with the same nib, the nib will create an elliptical shape due to its slant.

Step 2: Analyzing the Options.

- Option (a): This shape does not correspond to the expected result of the nib's angle. - Option (b): This shows the correct elliptical shape created by the nib at an angle. - Option (c): This option also does not match the expected result. - Option (d): Similarly, this does not fit the expected elliptical shape.

Step 3: Conclusion.

Thus, the correct answer is (b) B, as it shows the proper result of drawing a circle with a slanted nib.

Final Answer:

The correct answer is (b) B.

Quick Tip

When drawing with a slanted nib, a circle will appear as an ellipse due to the angle of the nib.

19. What is the correct chronological order of the given Art movements?

- (a) Realism, Renaissance, Baroque, Cubism
- (b) Renaissance, Baroque, Cubism, Realism
- (c) Baroque, Renaissance, Cubism, Realism
- (d) Renaissance, Baroque, Realism, Cubism

Correct Answer: (d) Renaissance, Baroque, Realism, Cubism

Solution:

Step 1: Identifying the Art Movements' Time Periods.

- The Renaissance movement began in the 14th century and is followed by Baroque art in the 17th century. - Realism emerged in the 19th century, while Cubism became prominent in the early 20th century.

Step 2: Conclusion.

Thus, the correct chronological order is: Renaissance, Baroque, Realism, and Cubism.

Final Answer:

The correct answer is (d) Renaissance, Baroque, Realism, Cubism.

Quick Tip

When sorting art movements, consider the historical context and the progression of styles across time.

20. If Cyan-0%, Magenta-100%, Yellow-100%, and Black-0% are used in a conventional four-colour printing process, which would be the resulting colour?

- (a) Blue
- (b) Violet
- (c) Red
- (d) Burgundy

Correct Answer: (c) Red

Solution:

Step 1: Understanding CMYK Colour Model.

In the CMYK (Cyan, Magenta, Yellow, Black) printing model: - Cyan 0% means no cyan. - Magenta 100% and Yellow 100% would result in a combination of red tones. - Black 0% means no black ink is used.

Step 2: Conclusion.

The combination of 100% Magenta and 100% Yellow in the absence of Cyan and Black results in the color red.

Final Answer:

The correct answer is (c) Red.

Quick Tip

In the CMYK color model, 100% magenta and 100% yellow typically produce red.

21. An inscription was found in a cave in India. When it was translated it read as follows:

Salutation to the Arhats (Jinas)... by illustrious Kharavela, the Aira, the great king, the descendant of Mahameghavahana, increasing the glory of the Chedi dynasty, overlord of Kalinga, endowed with excellent and auspicious marks and features, possessed of virtues that have reached the four quarters.

Based on these contents, where in India do you think the cave is?

- (a) North India
- (b) West and Central India
- (c) East and North East India
- (d) South India

Correct Answer: (c) East and North East India

Solution:

Step 1: Identifying the Historical Context.

The mention of Kharavela, a great king from the Chedi dynasty, and the region of Kalinga is a key clue. Kalinga was located in the eastern part of India, primarily in the modern-day states of Odisha and parts of West Bengal.

Step 2: Conclusion.

Given the reference to Kalinga, the cave is most likely located in East and North East India.

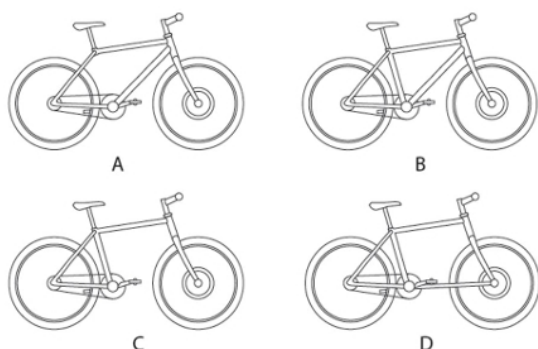
Final Answer:

The correct answer is (c) East and North East India.

Quick Tip

Historical references to Kalinga help to locate ancient inscriptions in the eastern parts of India, especially in Odisha.

22. Which of the following is a correct bicycle frame?



- (a) A
- (b) B
- (c) C
- (d) D

Correct Answer: (a) A

Solution:

Step 1: Analyzing the Bicycle Frame Structure.

To identify the correct bicycle frame, we need to consider the proper geometrical structure. The frame in option A appears to have the correct alignment, angles, and structure for a functional bicycle frame.

Step 2: Conclusion.

Therefore, the correct bicycle frame is option (a) A.

Final Answer:

The correct answer is (a) A.

Quick Tip

When identifying a correct bicycle frame, ensure that the angles and alignment are proper for balancing and durability.

23. Which process is used to manufacture polythene bags?

- (a) Injection Moulding
- (b) Blown-film Extrusion
- (c) Vacuum Forming
- (d) Compression Moulding

Correct Answer: (b) Blown-film Extrusion

Solution:

Step 1: Understanding the Manufacturing Process.

Polythene bags are typically made using the blown-film extrusion process. This method involves melting the plastic and blowing it into thin films, which are then cooled and formed into bags.

Step 2: Conclusion.

Thus, the correct process for manufacturing polythene bags is Blown-film Extrusion.

Final Answer:

The correct answer is (b) Blown-film Extrusion.

Quick Tip

Blown-film extrusion is commonly used for manufacturing thin plastic films, such as polythene bags.

24. Identify the dance form.



- (a) Manipuri
- (b) Odissi
- (c) Kuchipudi

(d) Kathakali

Correct Answer: (a) Manipuri

Solution:

Step 1: Identifying the Dance Form.

The dance form in the image is Manipuri, known for its graceful and controlled movements, which are characteristic of the Manipuri dance tradition of India.

Step 2: Conclusion.

Thus, the correct dance form is Manipuri.

Final Answer:

The correct answer is (a) Manipuri.

Quick Tip

Manipuri is known for its graceful, soft movements and is traditionally performed with a veil and circle patterns.

25. Who is the author of the book "The Accidental Prime Minister"?

- (a) Natwar Singh
- (b) Vinay Ahuja
- (c) Sanjaya Baru
- (d) Khushwant Singh

Correct Answer: (c) Sanjaya Baru

Solution:

Step 1: Identifying the Author.

"The Accidental Prime Minister" is written by Sanjaya Baru, a former media advisor to the Prime Minister of India, Dr. Manmohan Singh.

Step 2: Conclusion.

Thus, the correct author of the book is Sanjaya Baru.

Final Answer:

The correct answer is (c) Sanjaya Baru.

Quick Tip

"The Accidental Prime Minister" provides a controversial account of the time Dr. Manmohan Singh served as Prime Minister.

26. Which organization is the symbol given below associated with?



- (a) National Literacy Mission
- (b) Indian Institute of Technology Hyderabad
- (c) India Book House
- (d) Indian Institute of Management Bangalore

Correct Answer: (a) National Literacy Mission

Solution:

Step 1: Analyzing the Symbol.

The symbol depicted resembles the logo of the National Literacy Mission, an initiative by the Government of India to promote literacy across the country.

Step 2: Conclusion.

Thus, the symbol is associated with the National Literacy Mission.

Final Answer:

The correct answer is (a) National Literacy Mission.

Quick Tip

Symbols related to national initiatives like literacy programs often have books or learning-related icons incorporated.

27. Identify the musician pictured below:



- (a) Pandit Shivkumar Sharma
- (b) Pandit Vishwamohan Bhatt
- (c) Pandit Hariprasad Chaurasia
- (d) Pandit Bhajan Sopori

Correct Answer: (a) Pandit Shivkumar Sharma

Solution:

Step 1: Identifying the Musician.

Pandit Shivkumar Sharma is a renowned Santoor player, known for his unique contributions to Indian classical music. The image shows a musician playing the Santoor, which is a key instrument associated with him.

Step 2: Conclusion.

Thus, the musician in the image is Pandit Shivkumar Sharma.

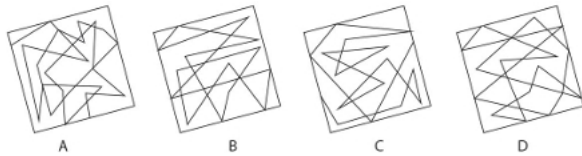
Final Answer:

The correct answer is (a) Pandit Shivkumar Sharma.

Quick Tip

When identifying classical musicians, focus on the instruments they play and their iconic style.

28. Which square contains the visual element shown below?



- (a) A
- (b) B
- (c) C
- (d) D

Correct Answer: (c) C

Solution:

Step 1: Analyzing the Visual Element.

The visual element shown in the question has a particular arrangement of lines, which we need to match with the squares provided in the options.

Step 2: Identifying the Matching Square.

Option (c) matches the arrangement and direction of lines seen in the visual element.

Step 3: Conclusion.

Thus, the correct square is option (c) C.

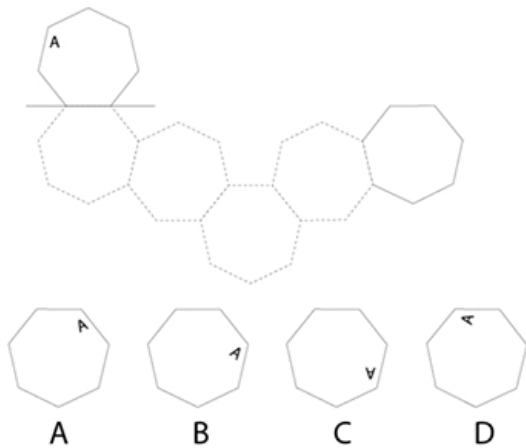
Final Answer:

The correct answer is (c) C.

Quick Tip

For visual reasoning puzzles, carefully observe the orientation and direction of the lines or shapes to match the correct option.

29. A polygon is mirrored five times, as shown below. Which of the following will be the image seen in the last polygon?



- (a) A
- (b) B
- (c) C
- (d) D

Correct Answer: (a) A

Solution:

Step 1: Understanding the Mirroring Process.

The polygon is mirrored five times. A mirror reflection alternates between creating a reverse image and continuing the pattern. Since five is an odd number, the image after the fifth reflection will look like the first image, but with the orientation altered by five mirrorings.

Step 2: Identifying the Image After Five Reflections.

After five reflections, the correct image will match the first one after the five mirrorings. Option (a) A reflects this correctly.

Step 3: Conclusion.

Thus, the correct answer is (a) A, as the image will match the orientation after five mirrorings.

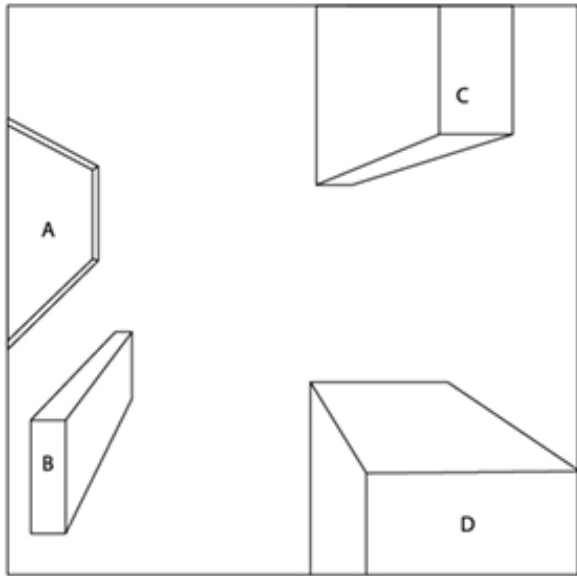
Final Answer:

The correct answer is (a) A.

Quick Tip

When solving mirroring problems, count the number of reflections and determine whether it's an odd or even number to deduce the orientation.

30. The image shown below has been drawn in one-point perspective. Find the object which does not fit in the perspective.



- (a) A
- (b) B
- (c) C
- (d) D

Correct Answer: (b) B

Solution:

Step 1: Understanding One-Point Perspective.

In one-point perspective, all parallel lines converge at a single point. By analyzing the given objects in the perspective, we observe that option (b) B does not align with the other objects, making it the incorrect one.

Step 2: Conclusion.

Thus, the object that does not fit in the one-point perspective is option (b) B.

Final Answer:

The correct answer is (b) B.

Quick Tip

When solving perspective-related problems, check the alignment of edges and shapes to ensure they follow the converging lines of the perspective.

31. The side view of an arm bent at the elbow is shown below. If this arm is turned towards you, which of the drawings shown will be most correct?



- (a) A
- (b) B
- (c) C
- (d) D

Correct Answer: (a) A

Solution:

Step 1: Understanding the Arm's Position.

The arm is bent at the elbow in a particular position. When the arm is turned towards you, it would maintain its basic shape but change in perspective. Option (a) A shows the most accurate representation of the arm's turn towards the viewer.

Step 2: Conclusion.

Thus, the correct drawing is option (a) A.

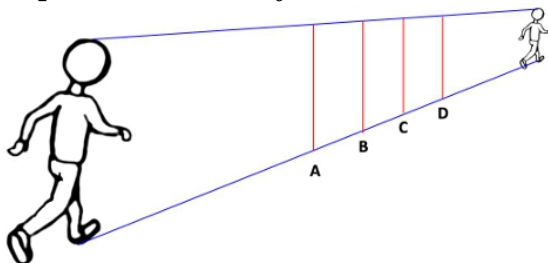
Final Answer:

The correct answer is (a) A.

Quick Tip

When analyzing rotated or turned objects, focus on how the perspective changes the angles and directions of features like limbs.

32. Two positions of a person walking away from the camera are shown. Identify the position midway between these two.



- (a) A
- (b) B
- (c) C

(d) D

Correct Answer: (b) B

Solution:

Step 1: Analyzing the Movement.

The person is walking away from the camera, and we need to determine their position midway between the two shown. Position (b) B reflects the intermediate position between the two given stances.

Step 2: Conclusion.

Thus, the correct position midway between the two is option (b) B.

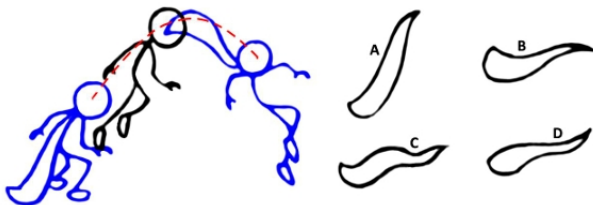
Final Answer:

The correct answer is (b) B.

Quick Tip

In problems involving movement and positions, focus on the relative distances between key points and apply consistent movement patterns to deduce the intermediate position.

33. A sequence of a superhero jumping is shown below. Identify the shape of the cape in the middle figure.



- (a) A
- (b) B
- (c) C
- (d) D

Correct Answer: (c) C

Solution:

Step 1: Analyzing the Movement.

The superhero is jumping, and in the middle frame, the cape will follow the motion of the body. The shape of the cape in the middle should reflect this movement.

Step 2: Identifying the Correct Shape.

Option (c) C best represents the cape shape that corresponds to the jump and the motion depicted in the middle figure.

Step 3: Conclusion.

Thus, the correct cape shape is option (c) C.

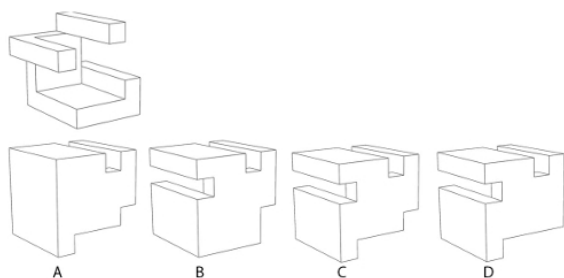
Final Answer:

The correct answer is (c) C.

Quick Tip

When solving motion-related puzzles, focus on the direction of movement and how the objects (like the cape) will react to it.

34. The given solid is part of a complete cube. From the options below, which solid would complete the cube upon joining?



- (a) A
- (b) B
- (c) C
- (d) D

Correct Answer: (a) A

Solution:**Step 1: Understanding the Given Solid.**

The given shape is part of a cube, and we are tasked with finding which of the options will complete the cube when joined.

Step 2: Analyzing the Options.

Upon inspecting the options, it is clear that option (a) A will perfectly fit with the existing part of the cube, completing the full solid.

Step 3: Conclusion.

Thus, the correct answer is option (a) A, as it will complete the cube.

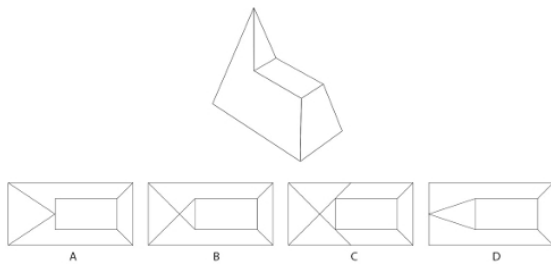
Final Answer:

The correct answer is (a) A.

Quick Tip

When solving cube-related puzzles, visualize how the pieces fit together in three-dimensional space to ensure the correct shape.

35. For the given solid, identify the correct top view.



- (a) A
- (b) B
- (c) C
- (d) D

Correct Answer: (d) D

Solution:

Step 1: Analyzing the Given Solid.

The given solid is part of a three-dimensional shape. We need to find the correct top view of this solid.

Step 2: Identifying the Correct Top View.

By examining the shape from the top, option (d) D accurately reflects the features and structure of the solid.

Step 3: Conclusion.

Thus, the correct top view is option (d) D.

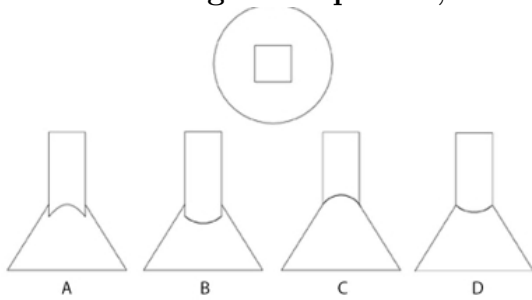
Final Answer:

The correct answer is (d) D.

Quick Tip

When solving solid geometry problems, visualize how the shape looks from different perspectives and match the view accordingly.

36. From the given top view, choose the correct front view.



- (a) A
- (b) B
- (c) C
- (d) D

Correct Answer: (c) C

Solution:

Step 1: Understanding the Top View.

The top view provides us with an overhead perspective of the shape. Based on this, we need to choose the correct front view.

Step 2: Analyzing the Options.

By analyzing the shapes and their projections, option (c) C matches the top view correctly when viewed from the front.

Step 3: Conclusion.

Thus, the correct front view is option (c) C.

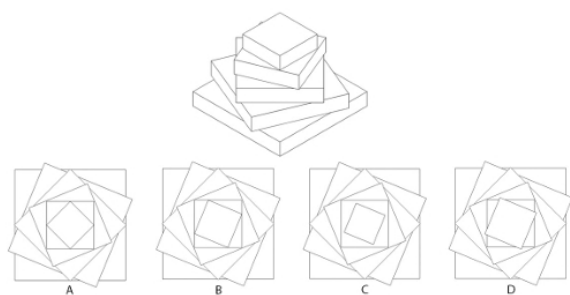
Final Answer:

The correct answer is (c) C.

Quick Tip

When solving problems involving top and front views, focus on how shapes appear from different angles and match the correct perspective.

37. Five blocks are placed one above another in a particular sequence (as shown in figure). If a sixth block is added to the same sequence, which would be the correct top view?



- (a) A
- (b) B
- (c) C
- (d) D

Correct Answer: (c) C

Solution:

Step 1: Analyzing the Block Sequence.

The blocks are stacked in a particular pattern, with each subsequent block rotated in a specific way. When the sixth block is added, it should continue the pattern established by the other blocks.

Step 2: Identifying the Correct Top View.

By observing the sequence, option (c) C shows the correct top view when the sixth block is added to the sequence.

Step 3: Conclusion.

Thus, the correct top view is option (c) C.

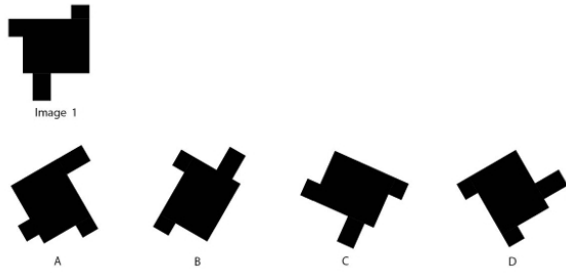
Final Answer:

The correct answer is (c) C.

Quick Tip

When solving problems with stacked objects, look for the repeating pattern in angles and alignment.

38. Image 1 has been rotated. Which of the options given below is the same as Image 1?



- (a) A
- (b) B
- (c) C
- (d) D

Correct Answer: (b) B

Solution:

Step 1: Analyzing the Rotation.

The image has been rotated, and we need to identify the option that matches the original shape after this rotation. The shape in Image 1 has a distinctive structure that is rotated in a particular direction.

Step 2: Identifying the Correct Rotation.

Option (b) B matches the shape after it is rotated to the position shown in Image 1.

Step 3: Conclusion.

Thus, the correct rotated image is option (b) B.

Final Answer:

The correct answer is (b) B.

Quick Tip

For rotation problems, mentally rotate the image in your mind or use visualization tools to match the rotated shape to the options.

39. Zeer is a pot-in-pot refrigerator used in the desert climate of Egypt. A small earthen pot is kept inside a larger pot. The larger pot is filled with wet sand which, over time, cools the smaller earthen pot inside. How does cooling occur in this product?

- (a) Coolant induced cooling
- (b) Evaporative cooling
- (c) Pressure cooling

(d) Sandblast cooling

Correct Answer: (b) Evaporative cooling

Solution:

Step 1: Understanding the Zeer.

The Zeer is a traditional cooling device that relies on the principle of evaporative cooling. The wet sand around the inner pot facilitates the evaporation of water, which absorbs heat and cools the inner pot.

Step 2: Conclusion.

Thus, the cooling in this product occurs due to evaporative cooling, where water evaporation from the sand absorbs heat.

Final Answer:

The correct answer is (b) Evaporative cooling.

Quick Tip

Evaporative cooling works by using the energy needed for water to evaporate, thus cooling the surrounding air or objects.

40. In which region is the Hemis festival celebrated?

- (a) Meghalaya
- (b) Ladakh
- (c) Gangtok
- (d) Kutch

Correct Answer: (b) Ladakh

Solution:

Step 1: Understanding the Hemis Festival.

The Hemis festival is a major religious festival of the Ladakhi people. It is celebrated at the Hemis Monastery in Ladakh, and is known for its rich cultural heritage and the famous mask dances.

Step 2: Conclusion.

Thus, the Hemis festival is celebrated in Ladakh.

Final Answer:

The correct answer is (b) Ladakh.

Quick Tip

The Hemis festival is one of the largest and most famous Tibetan Buddhist festivals in Ladakh.

41. Who is the author of the book 'Design of Everyday Things'?

- (a) Phillippe Starck
- (b) Issac Waterson
- (c) Donald Norman
- (d) Karmi Rashid

Correct Answer: (c) Donald Norman

Solution:

Step 1: Identifying the Author.

The book "The Design of Everyday Things" was written by Donald Norman. It focuses on the design of everyday objects and how their usability can be improved.

Step 2: Conclusion.

Thus, the correct author of the book is Donald Norman.

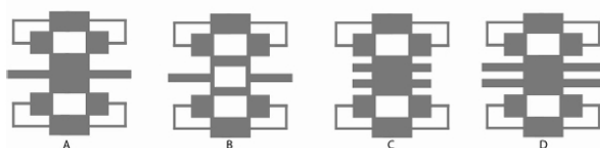
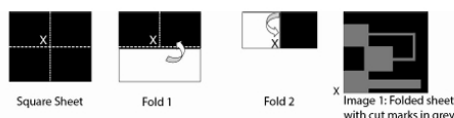
Final Answer:

The correct answer is (c) Donald Norman.

Quick Tip

Donald Norman is a leading figure in the field of design and usability, and his book discusses how good design can improve the user experience.

42. A square sheet of paper is folded twice and cut in the manner shown in Image 1. After cutting, the black part is removed. When the cut paper is unfolded, which pattern will it form?



- (a) A
- (b) B
- (c) C
- (d) D

Correct Answer: (c) C

Solution:

Step 1: Understanding the Fold and Cut Process.

The sheet is folded twice, and the cutting follows a specific pattern. When unfolded, the cuts will form a symmetrical pattern based on the folding structure.

Step 2: Identifying the Correct Pattern.

Upon unfolding, the cut pattern creates a shape that matches the one shown in option (c) C.

Step 3: Conclusion.

Thus, the correct pattern formed is option (c) C.

Final Answer:

The correct answer is (c) C.

Quick Tip

For folding and cutting problems, always analyze how each fold affects the final unfolded shape by considering the symmetry of the cuts.

43. Who among the following is NOT a Poet?

- (a) Magha
- (b) Bharavi
- (c) Brahmagupta
- (d) Kalidasa

Correct Answer: (c) Brahmagupta

Solution:

Step 1: Identifying the Poets.

Magha, Bharavi, and Kalidasa are renowned classical Sanskrit poets known for their contributions to Indian literature. Brahmagupta, however, was a mathematician and astronomer, not a poet.

Step 2: Conclusion.

Thus, Brahmagupta is the correct answer as he was not a poet.

Final Answer:

The correct answer is (c) Brahmagupta.

Quick Tip

When distinguishing between historical figures, consider their primary contributions to fields like literature, mathematics, or astronomy.

44. What is the commercial name of expanded polystyrene?

- (a) Thermocol
- (b) Teflon
- (c) Nylon
- (d) Lycra

Correct Answer: (a) Thermocol

Solution:

Step 1: Identifying the Material.

Expanded polystyrene is commonly known by its commercial name, Thermocol. It is a lightweight material often used in packaging and insulation.

Step 2: Conclusion.

Thus, the correct commercial name for expanded polystyrene is Thermocol.

Final Answer:

The correct answer is (a) Thermocol.

Quick Tip

Thermocol is widely used for its insulating properties and as packaging material due to its light weight.

45. Identify the symbol shown below.



- (a) Right to Information
- (b) Right to Education
- (c) Right to Literacy
- (d) Right to Investment

Correct Answer: (a) Right to Information

Solution:

Step 1: Analyzing the Symbol.

The symbol consists of a person and a document with text, which is commonly used to represent the Right to Information in many countries.

Step 2: Conclusion.

Thus, the symbol represents the Right to Information.

Final Answer:

The correct answer is (a) Right to Information.

Quick Tip

The Right to Information is a fundamental right in many countries, symbolized by a person and a document to signify transparency.

46. In which context is the term “Pica” system used?

- (a) Plastic Moulding
- (b) Image editing
- (c) Typography
- (d) Sculpture

Correct Answer: (c) Typography

Solution:

Step 1: Understanding the Pica System.

The Pica system is a unit of measurement used in typography to measure the length of lines of type, as well as the size of fonts.

Step 2: Conclusion.

Thus, the Pica system is used in typography.

Final Answer:

The correct answer is (c) Typography.

Quick Tip

In typography, 1 Pica equals 12 points, and it is used to measure font sizes and the width of lines in print.

47. Identify the odd one out.

- (a) Verdana
- (b) Tahoma
- (c) Cambria
- (d) Calibri

Correct Answer: (c) Cambria

Solution:

Step 1: Analyzing the Fonts.

Verdana, Tahoma, and Calibri are sans-serif fonts, while Cambria is a serif font. The key difference lies in the use of serifs in Cambria.

Step 2: Conclusion.

Thus, Cambria is the odd one out as it is a serif font, while the others are sans-serif.

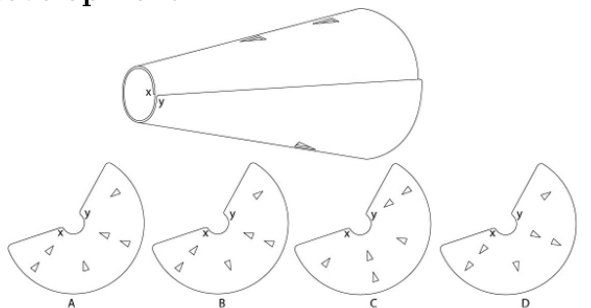
Final Answer:

The correct answer is (c) Cambria.

Quick Tip

Serif fonts have small lines or decorations at the ends of letters, while sans-serif fonts do not.

48. A double layered cone of a sheet has three triangular holes punched in it, as shown below. When the cone is unrolled, which of the following is the correct development?



- (a) A
- (b) B
- (c) C
- (d) D

Correct Answer: (b) B

Solution:**Step 1: Understanding the Cone and Holes.**

The problem involves a double layered cone with triangular holes punched through it. The cone is then unrolled, and we need to determine the correct pattern after unfolding.

Step 2: Analyzing the Options.

By observing the development of the cone and the position of the holes after unrolling, option (b) B accurately matches the expected development with triangular holes aligned in the correct pattern.

Step 3: Conclusion.

Thus, the correct development of the cone is option (b) B.

Final Answer:

The correct answer is (b) B.

Quick Tip

When unrolling cones or other shapes, visualize how the cutouts or folds will align when expanded flat.

49. How many fonts have been used to write the following set of words?

hore pad rits zlob sert clert jups lits

- (a) Three
- (b) Four
- (c) Five
- (d) Two

Correct Answer: (a) Three

Solution:

Step 1: Identifying Fonts.

Upon inspection of the given words, we can see that they are written in three distinct fonts. This can be determined by recognizing the different typefaces and their attributes.

Step 2: Conclusion.

Thus, three fonts have been used.

Final Answer:

The correct answer is (a) Three.

Quick Tip

When identifying fonts, look for variations in letter shapes, thickness, and spacing.

50. If the state of Uttar Pradesh is divided into four states, how many states would India have?

- (a) 33
- (b) 32
- (c) 31
- (d) 34

Correct Answer: (b) 32

Solution:

Step 1: Understanding the Current Number of States in India.

India currently has 28 states and 8 Union Territories. If Uttar Pradesh is divided into four states, India will have three additional states, bringing the total to 32.

Step 2: Conclusion.

Thus, India would have 32 states after the division of Uttar Pradesh.

Final Answer:

The correct answer is (b) 32.

Quick Tip

Always count the current number of states before performing hypothetical changes to calculate the new total.

PART B

Question No. 1

Marks 20 Imagine a scene from a cookery show. The chef has just placed a pressure cooker on a two-burner gas stove. Draw a **freehand** perspective drawing of this setup.

Note:

- Use only pencils.
- Do not use any drawing instruments, such as ruler, compass, set-square or anything else.
- Do not use any kind of colour.

Pay attention to perspective, light, shade and shadow, quality of lines, as well as scale and proportion in the composition.

Solution to Question No. 1

Drawing Concept:

The scene depicts a kitchen setup where a chef has placed a pressure cooker on a two-burner gas stove. The pressure cooker should be the focal point, while the stove is shown in perspective, with clear indication of the two burners and the overall setup. The perspective should be such that the viewer can get a clear sense of depth and space within the scene.



Key Design Elements:

1. **Perspective:** The drawing should represent a correct perspective where objects closer to the viewer are larger and those farther away are smaller.
2. **Light and Shadow:** Proper shading should be added to show the direction of light and cast shadows from the stove and pressure cooker.
3. **Quality of Lines:** The lines should be clean and clear, showcasing the contours and details of the stove, cooker, and the surrounding space.
4. **Scale and Proportion:** The cooker should be correctly scaled in relation to the stove and other objects in the scene.

Quick Tip

When drawing in perspective, remember that objects appear smaller as they move away from the viewer, and parallel lines converge towards a vanishing point.

Question No. 2

Marks 10 Imagine that you are given a hand held magic device, which can reduce the size of any object by 50%. The reduction in size will remain effective for only three hours. To reduce the size, point the device toward an object and press the button. **Illustrate two creative applications of this device.** If required, support each application with a brief note of no more than 50 words each.

Pay attention to variety, creativity, as well as innovation in the concepts.

Solution to Question No. 2

Application 1: Emergency Vehicle Passage

Concept: In cases of traffic jams or emergencies, the magic device can be used to shrink vehicles by 50%, allowing ambulances or fire trucks to move through narrow roads quickly. After three hours, the vehicles regain their original size automatically.

Note: This application can save lives by improving emergency response time in congested areas.

Application 2: Portable Furniture

Concept: The device can be used to shrink large pieces of furniture (like sofas, tables, or beds) to half their size for easy transport or storage. Users can expand them back to full size after reaching their destination.

Note: Ideal for urban homes and travelers who frequently move, reducing logistical challenges.

Quick Tip

When presenting creative ideas, think about how technology can simplify daily life or solve real-world problems in innovative ways.

Question No. 3

Marks 20 The following objects are available to you – **1 Cone, 1 Hemisphere, 1 Cuboid, 1 Cylinder and 1 Disc** as shown below:

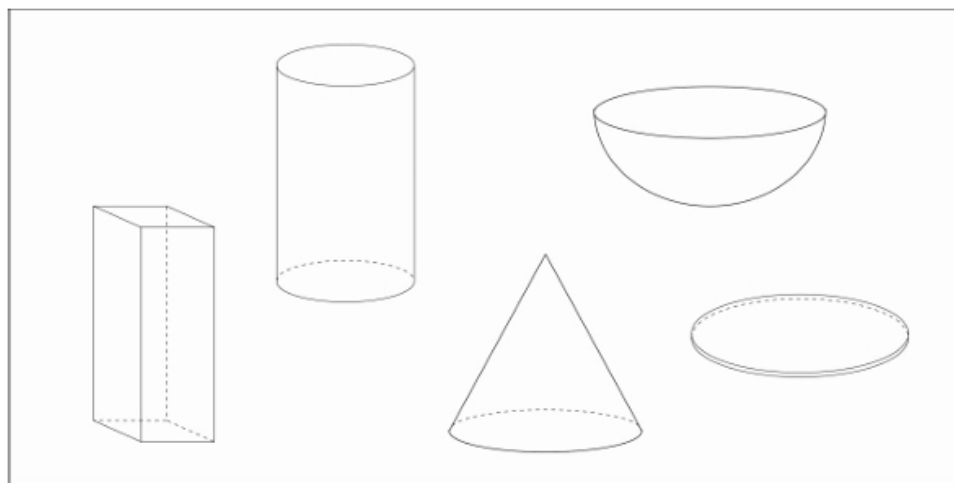


Figure 3: Geometric shapes available for combination of minimum 3 objects. You can scale the

Imagine **3 interesting products** made out of a combination of **minimum 3 objects**. You can scale the objects to any size and dimension.

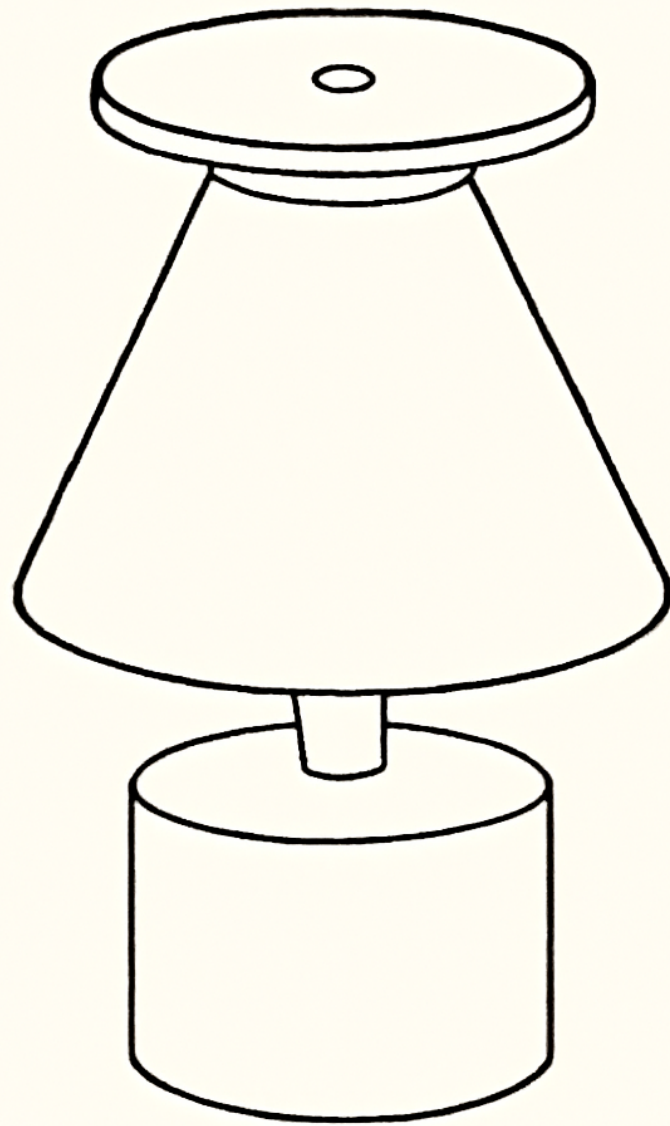
Represent your ideas with **neat sketches** and **name them** in the space provided.

Pay attention to variety, creativity, as well as innovation in the concepts.

Solution to Question No. 3

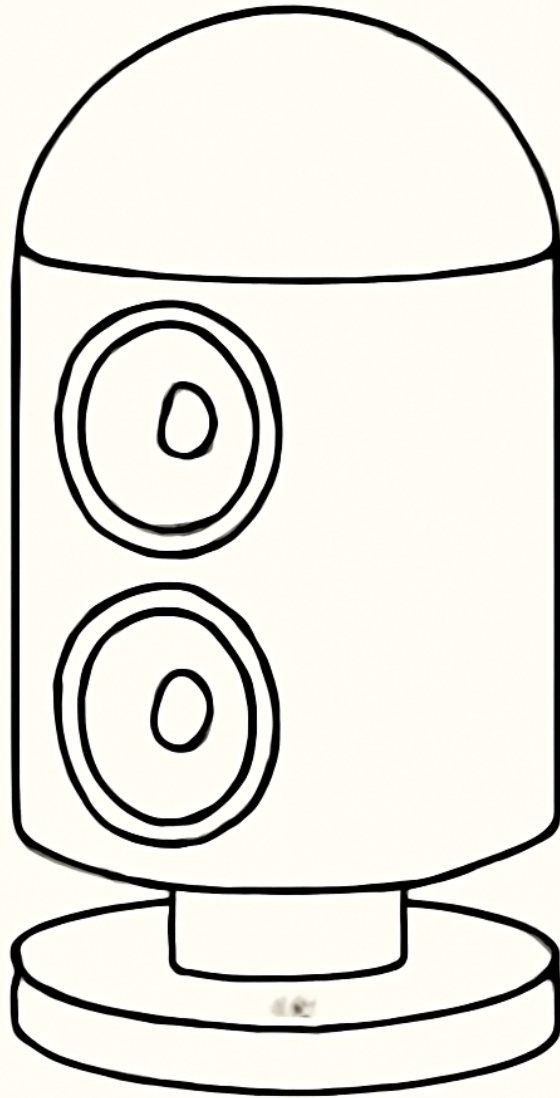
Concept Overview: Using the given five geometric objects — cone, hemisphere, cuboid, cylinder, and disc — three creative products are designed. Each product uses a different combination of forms, demonstrating functionality, aesthetics, and balance.

Product 1: Smart Lamp – “LumaLite” **Objects Used:** Cylinder + Cone + Disc **Description:** The cylindrical base holds a rechargeable battery, the cone forms the lampshade directing light downward, and the disc acts as a touch-sensitive control panel. This design combines geometric harmony with functionality — minimal yet elegant, ideal for modern interiors.



SMART LAMP
LumaLite®

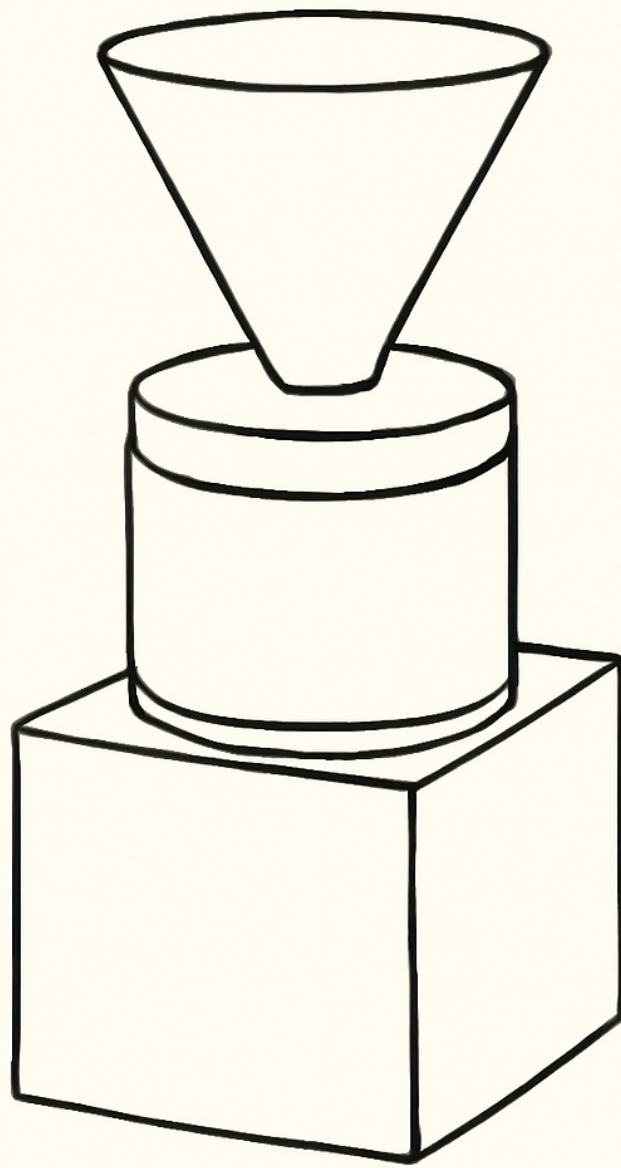
Product 2: Home Speaker – “SoundSphere” Objects Used: Hemisphere + Cylinder + Disc Description: A hemisphere serves as the top sound dome for acoustic projection, while the cylinder body houses the speakers and electronic components. The disc at the bottom provides stability. This structure enhances sound dispersion and gives a futuristic design appeal.



HOME SPEAKER

SoundSphere

Product 3: Kitchen Grinder – “ChefPro” Objects Used: Cuboid + Cone + Cylinder + Disc Description: The cuboid acts as the main body housing the motor. The cone acts as a funnel for adding ingredients, while the cylinder forms the grinding chamber with a disc blade base. A balance of practicality and geometry creates a functional yet sleek kitchen appliance.



KITCHEN GRINDER

ChefPro

Conclusion: Each product creatively merges geometry with usability. By altering scale, proportion, and placement of the given solids, unique products were achieved that blend form and function effectively.

Quick Tip

When combining basic geometric solids to design products, think about both functionality and aesthetics — how the shapes can support, contain, or enhance each other.

Question No. 4

Marks 8

Construct two different stories from a combination of these 3 words: **Cobbler, Football and Footpath.**

The story should be no longer than three sentences. (A cobbler is a person who repairs footwear, umbrellas, etc.)

One possible story could be this:

A child cries. The cobbler on the footpath repairs the child's football. The child smiles.

Solution:

Story 1:

A cobbler was fixing shoes on the footpath when a football rolled towards him. The ball was torn, and the cobbler decided to repair it. The children cheered and invited him to play.

Story 2:

A young boy kicked his football too hard, and it burst near the cobbler's stall on the footpath. Seeing the boy upset, the cobbler mended the ball and gave it back. The boy thanked him and promised to visit again.

Final Answer:

Both stories creatively combine the three given words — **Cobbler, Football, and Footpath** — with different emotional tones and settings.

Quick Tip

Keep your story concise with a beginning, middle, and end. Use the three given words naturally within the context.

Question 5a: Optional (Product Design)

Women in rural India have to walk a long distance to carry three to four pots filled with drinking water to their homes. This causes a lot of physical strain.

*Design a device to help women **carry four earthen pots** of drinking water through uneven terrain. Identify at least five distinct factors essential in this device that will make it relevant for rural India.*

Present your design proposal with:

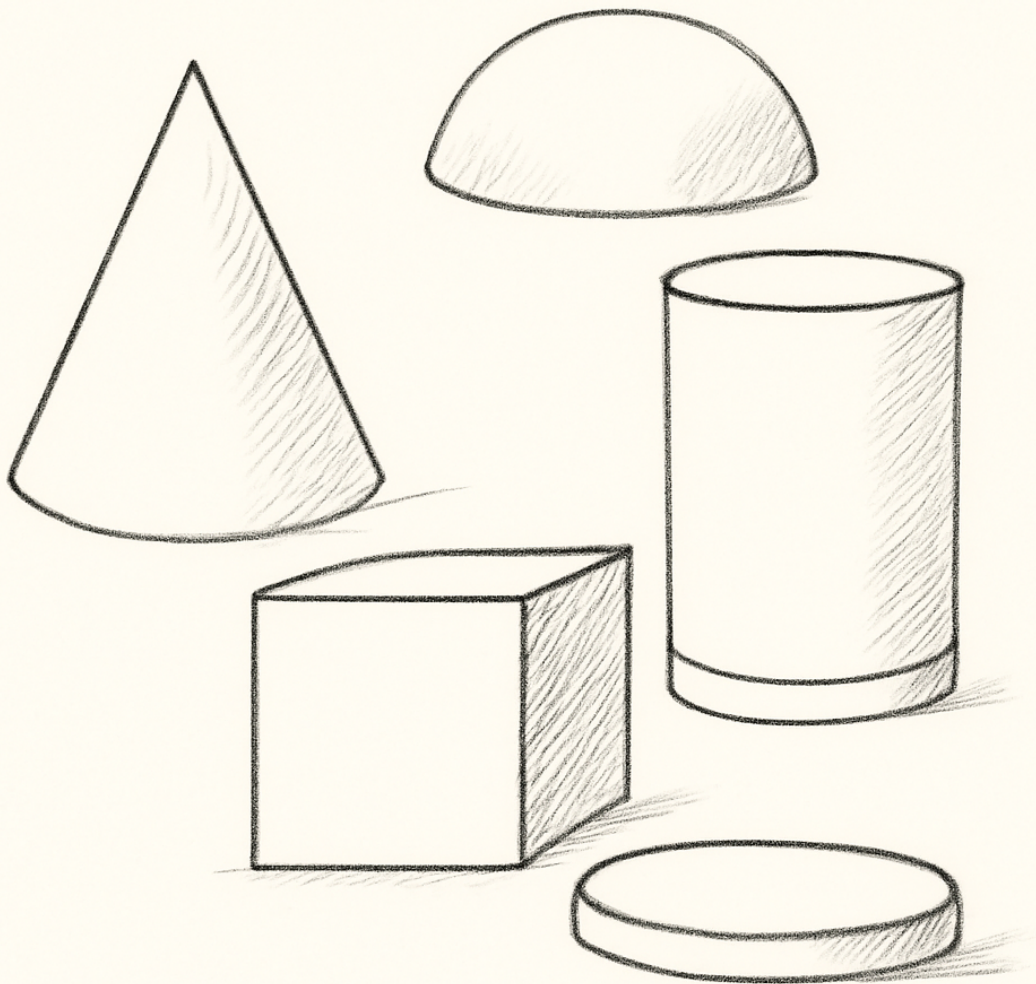
- A neat freehand sketch showing the overall form and its features
- Sketches illustrating the usage scenario
- Indicators of materials and processes used in manufacturing
- A brief note on design decisions taken (max 100 words)

Solution:

Concept name: *JAL-SAHAY “4-pot carrier”*

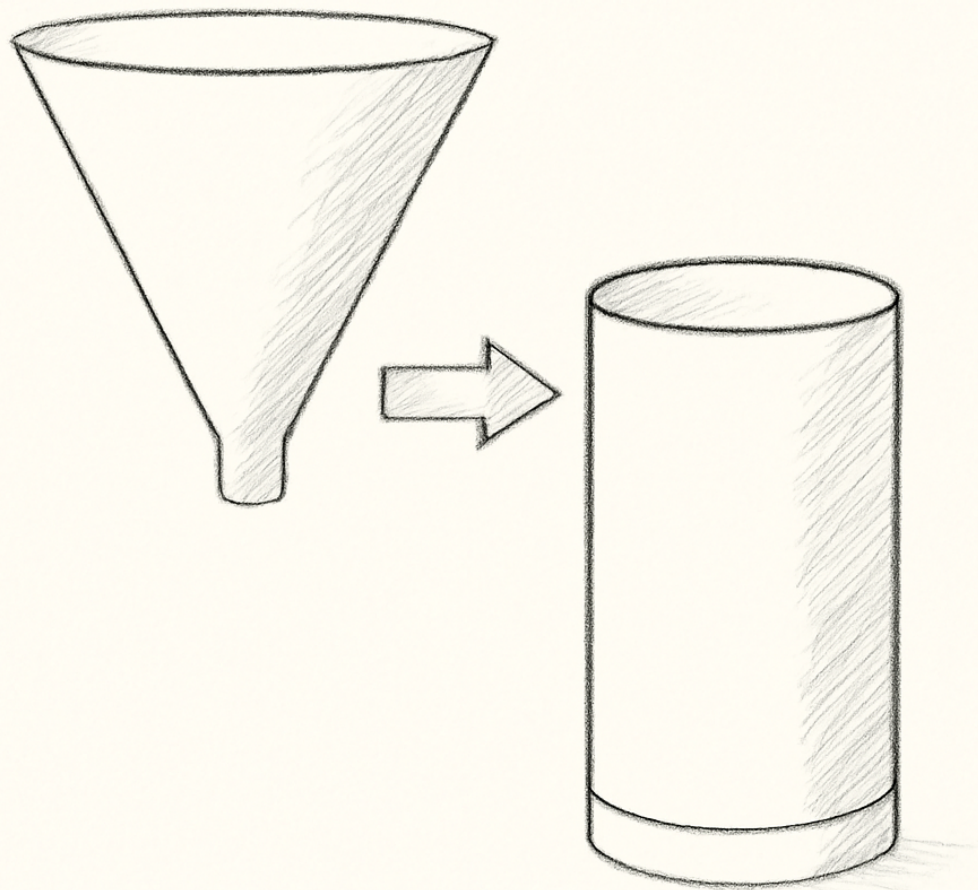
One-line intent: Hands-free, stable, low-cost carrier that safely transports four earthen pots on rough village paths.

(Placeholders for hand sketches – replace paths if you add drawings)



Overall form

Overall form



Usage sequence / loading

Usage sequence / loading

Overall form & key features

1. **Two-wheel yoke frame:** Narrow, inverted-II tubular frame with ~500 mm wheel track for goat trails; large 24" spoked wheels for rollover ability.
2. **Shock-damping pot cradles (x4):** Suspended rubber-web slings inside circular rings; each ring has three-point elastic ties to reduce jar fracture.
3. **Height-adjustable drawbar harness:** Padded waist-hip belt with quick-release; optional shoulder strap to split load and keep hands free.
4. **Low centre of gravity layout:** Two pots low ahead of axle + two slightly higher behind; anti-tip skids and a parking leg for rests.
5. **Modular stack:** Rings remove without tools; device converts to firewood/produce trolley off-season.

Five (plus) essential factors for rural relevance

- **Affordability:** ~\$25 equivalent bill of materials using bicycle parts and local fabrication.
- **Repairability:** Standard bicycle hubs, spokes, tyres; nuts-bolts, no proprietary parts.
- **Ergonomics:** Hip-belt load transfer, adjustable height (5th–95th percentile), soft grips.
- **Safety of pots:** Shock isolation slings, rope retainers, rim padding, low CG to prevent tip.
- **Terrain performance:** Big wheels, narrow track, 150 mm ground clearance, toe brake.
- **Water hygiene:** Food-grade liners for slings, washable sling webbing, mudguards.
- **Cultural fit:** Allows saree/ghagra movement; aesthetic bamboo option.

Materials & processes

- **Frame:** ERW mild-steel tube ($\varnothing 22\text{--}25\text{ mm}$); *process:* tube bending, MIG welding, powder-coat/galvanise.
- **Cradle rings:** 6 mm MS rod rolled and welded; inner *slings* of tyre-tube rubber or polypropylene webbing (hand-stitched/riveted).
- **Harness:** Cotton webbing with EVA foam pads; *process:* stitching/riveting; buckle from injection-moulded PP.
- **Wheels:** 24" bicycle rims, spokes, hubs (sourced); *process:* wheel building.
- **Fasteners:** M6/M8 zinc-plated bolts + nylock nuts for field service.

Usage scenario (sketch sequence suggested)

1. Park device using folding leg; load two lower pots, then upper two; tie with quick rope latch.
2. Buckle hip belt; start walking—device trails behind with single-hand guidance if needed.
3. On rough patches, use shoulder strap; for rests, deploy parking leg; unload at home.

Approx. dimensions & capacity

- L 950 mm $\times$ W 500 mm $\times$ H 900 mm; empty mass $\approx$ 9–11 kg.

- Pot dia. 280–320 mm each; total payload 40–50 kg (water + pots).

Design decisions (100 words)

Shifting the load from head/shoulders to hips via a belt–drawbar reduces musculoskeletal strain. Large bicycle wheels minimise rolling resistance and negotiate ruts. Suspended slings isolate shocks to prevent pot breakage. A narrow track fits village paths; low CG layout and parking leg prevent tip-overs during rests. Using standard bicycle parts ensures low cost, easy repair, and local employment; modular rings enable off-season use as a utility cart.

Quick Tip

For rural product concepts, prioritise: load path (where weight goes), failure modes (what breaks first), field repair, and seasonal multi-use. Sketch the user posture and centre of gravity in every view.

Question 5b: Optional (Interaction Design)

An organization has decided to develop an interactive pencil box (a box in which students carry pen, pencils, eraser, ruler etc.) for students of standard 7–10 (approx. age 12–15 years). The device should act as a learning aid inside and outside the classroom.

Task: Design the interactive pencil box and illustrate how it will be used by students.

- Visualize the 3D form of the device along with its graphical interface (appeal to the target age group). Present via sketches/drawings.
- State three or more *original and innovative* features that assist studies (avoid features of generic smart devices).
- Illustrate in detail one concept explaining how the device assists learning a topic related to the **history of India**. Present the interface and information flow with neat sketches and brief notes.

Solution

Product name: *“PenBox X” – The Learning Pencil Box*

Design intent: A rugged, school-safe pencil box that *turns stationery into interfaces*. It works offline-first, augments paper notebooks, and structures short, engaging study rituals.

a) 3D form & visual language

- **Form factor:** Two-part clamshell (200 mm × 90 mm × 35 mm). Rounded corners, grippy TPE edge bumper. Internal removable tray for pens, pencils, eraser, ruler.
- **Embedded tech (school-safe):** e-paper strip (120×24 mm) on lid for prompts; 6 capacitive icon-buttons; low-power MCU; BLE; bone-conduction nook for quiet audio; vibration motor for haptics; magnetic reed sensors for “tool presence”.

- **Playful identity:** Swappable house-badges (team colours), stickerable lid, matte PP body; colours: charcoal, teal, coral.
- **Micro-interactions:** Lid “click” confirms close; soft white notification pulse; gentle haptic nudge for break timers.

Primary UI (on e-paper strip + buttons)

Home icons: *Study, Quiz, Tools, Group, Log, Settings*

Navigation: Short/long press = select/back; hold top-left = quick focus timer; hold top-right = torch.

b) Original & innovative features (beyond “phone-like” functions)

1. **Stationery-as-tokens (RF/NFC tags):** Each pen/pencil/ruler carries a passive tag. When placed in marked slots, PenBox X recognizes the “tool kit” and launches matched micro-activities (e.g., ruler present → geometry quick-drills; calligraphy pen → handwriting practice).
2. **Paper capture without camera:** Pressure-sensing & magnetic line sensor under the tray reads strokes on the supplied steel-back practice card, enabling offline handwriting or map-tracing evaluation (no camera permitted classrooms).
3. **Peer “Tap-to-Trade” cards:** Thin NFC *Topic Chips* (flash-cards) that students exchange by tapping boxes; content is teacher-signed and sandboxed (no internet required).
4. **Attention scaffolds:** Built-in *Focus Pomodoro* (10–25–5 cycles) with subtle haptics + lid-open deterrent (timer pauses if lid opened outside “tools”).
5. **Context links to physical world:** Ruler edge has fiducial marks; sliding it over printed worksheets triggers step-by-step hints on the e-paper strip (detected by the magnetic sensor).
6. **Energy autonomy:** Solar strip on lid trickle-charges; 500 mAh cell supports a school week (e-paper + MCU only).
7. **Safety & privacy:** No microphone/camera; no external apps; teacher provisioning via USB-C + signed content.

Materials & manufacture (for reference)

PP copolymer injection-moulded shell; over-moulded TPE bumper; snap-fits + two screws for servicing; e-paper module bonded with acrylic PSA; stainless hinge pin.

c) Detailed scenario — Learning topic from Indian History

Module: “The Revolt of 1857” (Grade 8)

Learning goal: sequence events, connect causes–effects, and recall key figures.

Interaction flow (student journey)

1. **Start** — Student long-presses *Study*. E-paper shows: “**1857: Spark to Spread** (12 min) Start”.
2. **Stationery cue** — Student places the *Topic Chip: 1857* on the lid bay. PenBox X authenticates and loads the lesson pack.

3. **Warm-up (2 min)** — Timeline → e-paper shows four blanks: “_ May, _ Kanpur, _ Jhansi, _ Delhi”. Student slides the ruler across the printed timeline card; each fiducial reveals a hint.
4. **Map trace (4 min)** — Student inserts steel-back *Map Card* and traces routes (Delhi→Kanpur→Jhansi) with a magnet-tip stylus. Under-tray sensor captures path; haptic tick on correct segments.
5. **Cause–Effect cards (3 min)** — Student taps two chips: “Cartridge Rumour” and “Doctrine of Lapse”. Box asks to order them; correct match unlocks a 30-sec bone-conduction audio nugget.
6. **Hero moments (2 min)** — NFC chips for “Rani Lakshmibai”, “Bahadur Shah Zafar”, “Mangal Pandey”. Tapping each shows 3 bullet facts; holding a chip for 2s adds it to *Quick-Recall*.
7. **Formative quiz (1 min)** — 5 one-line items on e-paper (true/false, order). Peer can join via *Tap-to-Battle* to answer on their box; both get badges.
8. **Log & reflection (30s)** — Box writes summary to *Progress Log*: time-on-task, weak areas (e.g., “Order of events”), suggested 5-min revision.

Information architecture (simplified)

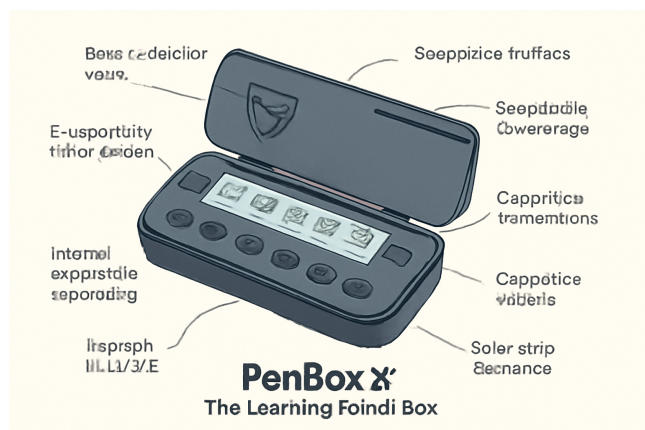
- *Home* → { *Study* (lesson packs), *Quiz* (solo/peer), *Tools* (timer, torch, ruler assist), *Group* (tap-to-share), *Log*, *Settings* }
- *Lesson pack structure*: Hook → Scaffolded activity (ruler/map) → Key figures chips → Quick quiz → Log.

Why this works for 12–15 yrs

1. Short, tactile tasks align with attention spans and reduce screen load.
2. Social “tap” mechanics make revision playful without phones.
3. Physical stationery becomes a *cue* for the right skill (metacognitive trigger).

Teacher view (brief)

- USB-C provisioning tool to load topic chips; offline class summary export (CSV).
- Safety: content signing; device lockdown during exams (timer-only mode).



Quick Tip

For child-centric interaction, anchor tasks in *tangible actions* (tap, slide, trace), keep loops ; 3–5 minutes, and provide clear haptic/visual feedback. Design *offline-first* for school constraints.

Question 5c: Optional (Animation Design)

An animation film for 5 to 12 year old children is in the pre-production stage. The film is based on the relationship between a kid (girl/boy) and his/her puppy. Below is a shot breakdown of a sequence from the film.

Shot Breakdown:

1. A 10-year-old kid (girl/boy) and his puppy are playing with a ball in a field.
2. Suddenly the kid notices a huge eagle swooping down on the puppy.
3. The eagle reaches out with its talons (claws), grabs the puppy, and flies off.
4. The kid sees the puppy being carried away.
5. The kid picks up the ball and throws it at the eagle.
6. The ball hits the eagle, and it drops the puppy.
7. The kid is reunited with the puppy and hugs it.

Part 1: Illustrate (**Create a Storyboard**) of the above shots as a series of picture frames. Each shot should visually narrate the story flow. You may use multiple frames per shot if required.

Part 2: Draw **Shot 3** (the eagle reaching out to grab the puppy) in one of the following styles:
(a) Realistic (b) Stylised

Solution:

Step 1: Understanding the Concept.

The animation sequence portrays the emotional bond between a child and their pet, emphasizing courage and love. The storyboard must capture a smooth narrative progression—establishing the setting, introducing the conflict (eagle attack), climax (rescue attempt), and resolution (reunion).

Step 2: Storyboard Composition.

The storyboard should include seven key frames corresponding to each shot:

- **Frame 1:** Establishing shot — wide view of the field, child and puppy playing with a ball.
- **Frame 2:** The child notices the eagle approaching from the sky. Focus on child's alarmed expression.
- **Frame 3:** The eagle's talons extend toward the puppy (close-up). Tension peaks.
- **Frame 4:** Wide shot showing the eagle flying off with the puppy, child reaches forward helplessly.
- **Frame 5:** The child grabs the ball determinedly, preparing to throw.

- **Frame 6:** The ball strikes the eagle in mid-air; feathers scatter, puppy falls safely.
- **Frame 7:** The final reunion shot—child kneeling, hugging puppy, relief on both faces.

Step 3: Drawing Style.

For **Shot 3**, the choice between *Realistic* and *Stylised* determines the tone of the film.

- **Realistic:** Focus on detailed feather textures, natural anatomy of eagle, realistic lighting and shading.
- **Stylised:** Simplified shapes, exaggerated expressions, and soft outlines to appeal to children aged 5–12.

Step 4: Visual Emphasis.

- Maintain consistency in proportions of characters.
- Use dynamic poses for the eagle and child to create motion.
- Indicate camera angles (e.g., wide, close-up, top view) below each frame.
- Add arrows for motion direction (e.g., ball trajectory, flight path).

Step 5: Final Presentation.

Combine the seven frames neatly in sequence, label each shot clearly, and annotate key emotions or actions below each panel. Use clean line drawings with balanced spacing to maintain clarity of the visual story.



Final Answer: A detailed storyboard sequence of seven frames depicting emotional progression, dynamic action, and resolution. Shot 3 drawn either realistically or in a stylised manner with clear line art and expressive motion cues.

Quick Tip

In storyboarding, focus on clear composition and expressive poses. Even simple sketches can communicate motion and emotion effectively when the camera angle and character expression are well chosen.

Question 5d: Optional (Visual Communication)

Indian government is initiating a safety and awareness campaign for preventing accidents at home called ‘**Suraksha**’ (**Safety**). ‘**Suraksha**’ aims at bringing awareness amongst citizens regarding safety with household appliances. Support the campaign by designing a section of the information booklet on gas cylinders. Complete the following tasks for the same.

- (a) Design a logo for the campaign title ‘**Suraksha**’.
- (b) Identify four problems that users face while changing domestic gas cylinders. Illustrate the problems in thumbnail sketches.
- (c) Show three different illustration styles for visually representing one of the problems stated by you earlier. Create three thumbnail sketches to represent your ideas.
- (d) Design a layout of the information booklet in neat pencil sketches. Size of the booklet is 6 x 6 inches. Depict the final illustration/s and its sequence keeping in mind problems in comprehension as well as safety hazards involved in handling gas cylinders. Use text minimally or preferably not at all. Select appropriate views and representation styles to illustrate objects as well as actions.

Solution:

Step 1: Understanding the problem.

The goal of the task is to design a visual communication element that increases awareness about safe handling of domestic gas cylinders through the campaign ‘**Suraksha**’. The visuals should be simple, informative, and comprehensible even for people with limited literacy.

Step 2: Logo Design Concept.

The logo can integrate the symbol of a **flame** (representing gas), a **shield** (representing safety), and a **hand** (representing care and human involvement). The typography should be bold and clear, ensuring visibility in both print and digital formats. Suggested color palette: red (alert), blue (gas), and white (safety).

Step 3: Identifying Four Common Problems.

1. Leakage of gas due to improper fitting of regulator.
2. Difficulty in lifting or placing heavy gas cylinders.
3. Negligence while checking for leaks using open flame.
4. Children playing near the gas area causing potential hazards.

Step 4: Illustration Styles for One Problem.

Three suggested illustration styles for visualizing “Gas leakage during cylinder fitting”:

1. **Minimal Line Drawing** – Simple lines showing the connection points with a highlighted red leak zone.
2. **Comic Style** – Shows a sequence with expressions of shock or realization for greater impact.
3. **Realistic Shaded Sketch** – Depicts the actual environment with focus on correct vs incorrect actions.

Step 5: Booklet Layout Design.

The 6x6 inch booklet should have a **step-by-step sequential layout**, with each panel illustrating a safety tip. Suggested sequence:

1. Checking cylinder for leakage.
2. Proper connection of regulator.
3. Safe usage practices (distance from flames).
4. Emergency instructions (what to do if gas leaks).

Each illustration should use minimal text and rely heavily on pictorial communication to ensure comprehension by all literacy levels.

Step 6: Final Design Note.

The concept focuses on visual clarity, emotional appeal, and direct messaging. Using a combination of hand-drawn sketches and clear iconography ensures effective communication. The use of consistent color-coding (red for danger, green for safety) helps in quick understanding.



Quick Tip

In visual communication, simplicity and clarity are more powerful than decorative details. Focus on minimal text, universal symbols, and intuitive flow of visuals for maximum audience understanding.
