# UCEED Sample Paper

**Duration: 180 Minutes** **Maximum Marks: 300**

## Instructions

- This is a full-length UCEED practice paper. **Part A** (Q1–Q57, 200 marks, computer-based) has three sections: **Section 1** NAT, Numerical Answer Type (Q1–Q14); **Section 2** MSQ, Multiple Select Questions (Q15–Q29); **Section 3** MCQ, Multiple Choice Questions (Q30–Q57). **Part B** (Q58–Q59, 100 marks, pen and paper) tests drawing and design aptitude.
- **Marking - Part A:** NAT: **+4**, no negative marking. MSQ: **+4** if all correct options and no wrong option are chosen; **+1** for each correct option chosen when no wrong option is chosen; **−1** if any wrong option is chosen. MCQ: **+3** for correct, **−0.71** for wrong.
- **Marking - Part B:** each of the two questions carries **50 marks**, evaluated on your drawing and design response. There is no negative marking in Part B.
- Tap **View Solution** (Part A) or **View Model Approach** (Part B) under any question to jump to its worked explanation. Calculators and electronic gadgets are not allowed.

## Section 1: Numerical Answer Type (NAT)

**Q1.** In print, the typographic point is defined so that 1 inch equals 72 points. A book designer sets the outer page margin to 1.25 inches. What is this margin in points?

*(Numerical Answer Type - enter a numerical value; no options.)*

View Solution

**Q2.** A screen-printer mixes gold ink and blue ink in the ratio $3 : 5$ to get a fixed brand colour. If a batch has a total volume of 64 ml, how many millilitres of blue ink does it contain?

*(Numerical Answer Type - enter a numerical value; no options.)*

View Solution

**Q3.** Tim cycled from his house to his friend John's house and then on to his (Tim's) school without stopping. The average speed for his entire journey was 26 km/hr. The distance from John's house to Tim's school is 0.3 times the distance from Tim's house to John's house. Tim's speed from John's house to Tim's school was twice that of Tim's speed from Tim's house to John's house. What was Tim's average speed from John's house to Tim's school in km/hr?

*(Numerical Answer Type - enter a numerical value; no options.)*

View Solution

**Q4.** A product designer wraps a paper label all the way around a cylindrical tin. The tin has radius 7 cm and height 10 cm. Taking $\pi = \frac{22}{7}$, what is the curved (lateral) surface area of the tin in square centimetres?

*(Numerical Answer Type - enter a numerical value; no options.)*

View Solution

**Q5.** A poster is first scaled down to 80% of its original width on a photocopier, and that copy is then scaled down again to 75% of its width. The final width is what percentage of the original width?

*(Numerical Answer Type - enter a numerical value; no options.)*

View Solution

**Q6.** A designer arranges dots in a growing pattern of rectangles that follow the sequence $2,\ 6,\ 12,\ 20,\ 30,\ \ldots$ What is the next number in this sequence?

*(Numerical Answer Type - enter a numerical value; no options.)*

View Solution

**Q7.** A photograph is to be printed 6 inches wide at a resolution of 300 pixels per inch (dpi). How many pixels wide must the image file be?

*(Numerical Answer Type - enter a numerical value; no options.)*

View Solution

**Q8.** A rectangular logo of area 12 $cm^2$ is enlarged so that every side becomes 3 times as long. What is the area of the enlarged logo in square centimetres?

*(Numerical Answer Type - enter a numerical value; no options.)*

View Solution

**Q9.** In magazine layout, one pica equals 12 points. A text column is 30 picas wide. What is the column width in points?

*(Numerical Answer Type - enter a numerical value; no options.)*

View Solution

**Q10.** A wooden cube of side 5 cm is painted on all its outer faces and then cut into 1 cm cubes. How many of the small cubes have exactly two painted faces?

*(Numerical Answer Type - enter a numerical value; no options.)*

View Solution

**Q11.** A freelance designer charges 4500 rupees for a job and then adds 18% GST on top. What is the total amount the client pays, in rupees?

*(Numerical Answer Type - enter a numerical value; no options.)*

View Solution

**Q12.** A muralist mixes red and white paint in the ratio $2 : 3$, making 25 litres of pink in total. To lighten it, red is to be kept the same while the ratio becomes $1 : 4$ (red to white). How many litres of white paint must be added?

*(Numerical Answer Type - enter a numerical value; no options.)*

View Solution

**Q13.** A sculptor stacks solid cubes so that the number of unit blocks used forms the sequence $1,\ 8,\ 27,\ 64,\ \ldots$ How many unit blocks are in the next arrangement?

*(Numerical Answer Type - enter a numerical value; no options.)*

View Solution

**Q14.** A circular emblem is to be cut from sheet metal with a radius of 14 cm. Taking $\pi = \frac{22}{7}$, what is the area of the emblem in square centimetres?

*(Numerical Answer Type - enter a numerical value; no options.)*

View Solution

## Section 2: Multiple Select Questions (MSQ)

**Q15.** Which of the following are traditional Indian crafts practised primarily on textiles (cloth)?

*(One or more options may be correct.)*

(A) Warli

(B) Bandhani

(C) Ikat

(D) Kalamkari

View Solution

**Q16.** In photography, which of the following changes will increase the depth of field (that is, keep MORE of the scene in sharp focus)?

*(One or more options may be correct.)*

(A) Opening the aperture wider, for example to $f/1.8$

(B) Closing the aperture down, for example to $f/16$

(C) Moving the camera much closer to the subject

(D) Switching to a shorter focal length (a wider lens)

View Solution

**Q17.** Five friends Puru, Qadir, Roy, Sham and Tom live on five vertices of a regular pentagonal ground in a clockwise order. One day while Puru was walking to meet Roy, met Qadir who was on the way to meet Tom. Qadir changed his mind and decided to go with Puru to meet Roy. After meeting Roy all three went to Tom's house for a cup of tea. If all of them took shortest routes cutting through the ground, which of the following statements is/are TRUE?

*(One or more options may be correct.)*

(A) Till Tom's place, Qadir walked more distance than Puru

(B) Till Tom's place, Puru walked more distance than Qadir

(C) Till Tom's place, Qadir walked double the distance than Roy

(D) While returning to their respective homes from Tom's place, Puru has to travel the least.

View Solution

**Q18.** Which of the following are serif typefaces?

*(One or more options may be correct.)*

(A) Times New Roman

(B) Helvetica

(C) Garamond

(D) Futura

View Solution

**Q19.** Who designed the Lotus Temple (Bahai House of Worship) in New Delhi?

*(One or more options may be correct.)*

(A) Le Corbusier

(B) Charles Correa

(C) Fariborz Sahba

(D) Balkrishna V. Doshi

View Solution

**Q20.** Which of the following are naturally occurring materials rather than man-made (synthetic) ones?

*(One or more options may be correct.)*

(A) Nylon

(B) Jute

(C) Bamboo

(D) Cotton

View Solution

**Q21.** In sustainable design, which of the following are recognised strategies in the waste hierarchy (the family of "R" actions)?

*(One or more options may be correct.)*

(A) Reduce

(B) Reuse

(C) Recycle

(D) Recover

View Solution

**Q22.** In the RGB additive colour model used by screens, which single combination of the listed lights produces white?

*(One or more options may be correct.)*

(A) Red and Green only

(B) Red and Blue only

(C) Green and Blue only

(D) Red, Green and Blue together

View Solution

**Q23.** Which of the following Indian monuments are built primarily of red sandstone?

*(One or more options may be correct.)*

(A) Red Fort, Delhi

(B) Taj Mahal, Agra

(C) Victoria Memorial, Kolkata

(D) Fatehpur Sikri, near Agra

View Solution

**Q24.** Which of the following image file formats can store transparency (an alpha or transparent region)?

*(One or more options may be correct.)*

(A) JPEG

(B) PNG

(C) GIF

(D) BMP (standard)

View Solution

**Q25.** Which of the following are art or design movements that emerged in the early twentieth century?

*(One or more options may be correct.)*

(A) Bauhaus

(B) Art Deco

(C) Cubism

(D) Renaissance

View Solution

**Q26.** The 1958 "India Report" that led to the founding of the National Institute of Design (NID) at Ahmedabad was authored by which of the following?

*(One or more options may be correct.)*

(A) Le Corbusier

(B) Charles and Ray Eames

(C) Dieter Rams

(D) Raymond Loewy

View Solution

**Q27.** In the traditional RYB (artist) colour model, which of the following listed colours are secondary colours?

*(One or more options may be correct.)*

(A) Red

(B) Yellow

(C) Green

(D) Purple

View Solution

**Q28.** Which of the following traditional Indian crafts work primarily with metal?

*(One or more options may be correct.)*

(A) Bidriware

(B) Dhokra

(C) Madhubani

(D) Phulkari

View Solution

**Q29.** Which of the following are renewable sources of energy?

*(One or more options may be correct.)*

(A) Solar

(B) Wind

(C) Hydro (flowing water)

(D) Geothermal

View Solution

## Section 3: Multiple Choice Questions (MCQ)

**Q30.** The Bengal School of Art, which revived Indian themes and techniques in the early 20th century as a reaction to academic European styles, was pioneered by which artist?

(A) Abanindranath Tagore

(B) Raja Ravi Varma

(C) M. F. Husain

(D) Nandalal Bose

View Solution

**Q31.** The Bauhaus school, famous for uniting fine craft with industrial design and mass production, was founded in Germany in 1919 by whom?

(A) Le Corbusier

(B) Walter Gropius

(C) Mies van der Rohe

(D) Charles Eames

View Solution

**Q32.** Which manufacturing process forces molten plastic under pressure into a closed metal mould to produce large numbers of identical small parts such as bottle caps and combs?

(A) Blow moulding

(B) Vacuum forming

(C) Injection moulding

(D) Rotational moulding

View Solution

**Q33.** In the RGB colour model used by digital screens, combining full-intensity red, green and blue light together produces which colour?

(A) Black

(B) Grey

(C) Yellow

(D) White

View Solution

**Q34.** A wooden cube is painted on all six outer faces and then cut into 27 equal smaller cubes by a 3 by 3 by 3 arrangement of cuts. How many of the small cubes have exactly two painted faces?

(A) 12

(B) 8

(C) 6

(D) 1

View Solution

**Q35.** Find the next number in the series: 2, 6, 12, 20, 30, ?

(A) 40

(B) 42

(C) 36

(D) 44

View Solution

**Q36.** In ergonomics and product design, the term 'anthropometry' refers to the study of what?

(A) Colour perception of the human eye

(B) Strength and fatigue of materials

(C) Measurements and proportions of the human body

(D) Sound and acoustics in a space

View Solution

**Q37.** Which of the following is a renewable source of energy?

(A) Coal

(B) Natural gas

(C) Petroleum

(D) Solar energy

View Solution

**Q38.** The famous 'I Love New York' (I heart NY) logo, one of the most recognised pieces of graphic design, was created by which designer?

(A) Milton Glaser

(B) Paul Rand

(C) Saul Bass

(D) Massimo Vignelli

View Solution

**Q39.** In typography, the adjustment of horizontal space between two specific individual letters to make the word look visually even is called?

(A) Leading

(B) Kerning

(C) Tracking

(D) Baseline

View Solution

**Q40.** Hex codes are used to specify colours on the computer. What colour is the Hex Code CCCCCC?

(A) White (100% white)

(B) Black (100% black)

(C) Dark Grey (80% black, 20% white)

(D) Light Grey (20% black, 80% white)

View Solution

**Q41.** Madhubani painting, known for its bright natural dyes and dense geometric and figurative patterns, traditionally originates from which Indian state?

(A) Rajasthan

(B) Odisha

(C) Bihar

(D) West Bengal

View Solution

**Q42.** Which property of a material describes its ability to be drawn out into thin wires without breaking?

(A) Ductility

(B) Malleability

(C) Hardness

(D) Brittleness

View Solution

**Q43.** A square paper sheet is folded exactly once along its vertical centre line, and then a single small hole is punched through both layers near the middle. When the paper is unfolded, how many holes appear in total?

(A) 1

(B) 2

(C) 3

(D) 4

View Solution

**Q44.** On a standard 12-hue colour wheel, which of the following pairs are complementary colours (sitting directly opposite each other)?

(A) Red and Orange

(B) Blue and Green

(C) Yellow and Violet

(D) Red and Pink

View Solution

**Q45.** The Lotus Temple in New Delhi, an award-winning modern building shaped like a half-open lotus flower, is a house of worship of which faith?

(A) Buddhism

(B) Jainism

(C) Sikhism

(D) Bahai Faith

View Solution

**Q46.** In a certain code, FACE is written as GBDF. Using the same rule, how is HEAD written?

(A) IFBE

(B) GDZC

(C) IFCE

(D) JGCF

View Solution

**Q47.** Which image file format supports a transparent background together with lossless compression, making it a common choice for placing logos on web pages?

(A) JPEG

(B) PNG

(C) BMP

(D) GIF

View Solution

**Q48.** In the cursed land of Weirdisthan, strength of animals was disproportionately distributed. Horse has half the strength of a Dog and four times the strength of an Elephant. Monkey has three times the strength of a Rhino. Elephant has half the strength of a Rhino. One Dog was becoming a danger for other animals and they decided to assign a team of animal soldiers to overpower him. Which team of soldiers managed to overpower the dog?

(A) One Rhino and One Monkey

(B) One Rhino, One Horse and One Elephant

(C) One Horse and One Monkey

(D) Two Horses

View Solution

**Q49.** The 'Art Nouveau' style of the late 19th and early 20th century is best characterised by which visual quality?

(A) Rigid geometric grids and right angles

(B) Flat blocks of bold primary colour

(C) Bare industrial forms with no ornament

(D) Flowing, organic curved lines inspired by nature

View Solution

**Q50.** A comfortable staircase is often designed using the '2R + T' rule, where R is the riser height and T is the tread depth of each step. The main purpose of following this rule is to ensure?

(A) A comfortable and safe walking stride on the stairs

(B) The lowest possible construction cost

(C) The maximum possible number of steps

(D) Better natural lighting on the staircase

View Solution

**Q51.** A circular logo is drawn with a radius of 7 cm. Taking $\pi = \frac{22}{7}$, what is the area of the logo?

(A) 44 $cm^2$

(B) 154 $cm^2$

(C) 22 $cm^2$

(D) 308 $cm^2$

View Solution

**Q52.** In digital and print typography, one point (pt) is defined as what fraction of an inch?

(A) 1/12 inch

(B) 1/6 inch

(C) 1/72 inch

(D) 1/96 inch

View Solution

**Q53.** For a sustainable, eco-friendly product, which of the following materials is biodegradable?

(A) Expanded polystyrene (thermocol)

(B) Aluminium foil

(C) PVC plastic

(D) Jute fibre

View Solution

**Q54.** The Ashoka Chakra shown in the centre of the Indian national flag has how many spokes?

(A) 24

(B) 12

(C) 32

(D) 16

View Solution

**Q55.** Pointing to a photograph, a man said, 'She is the daughter of my grandfather's only son.' How is the girl in the photograph related to the man?

(A) Daughter

(B) Sister

(C) Cousin

(D) Mother

View Solution

**Q56.** On a standard six-sided die, the numbers on opposite faces always add up to 7. If the die is resting so that the top face shows 2, what number is on the bottom face?

(A) 2

(B) 6

(C) 5

(D) 4

View Solution

**Q57.** In the widely used five-stage design thinking process, which stage comes immediately after the 'Empathize' stage?

(A) Prototype

(B) Ideate

(C) Test

(D) Define

View Solution

## Part B: Drawing and Design Aptitude (Pen and Paper)

**Q58. [Drawing - 50 Marks]**

Imagine an early-morning vegetable market in a small Indian town just as the day begins. Wooden carts and jute sacks are piled high with tomatoes, brinjals, coriander and green chillies. Vendors call out prices, a stray dog sleeps under a cart, crates are stacked to one side, and shoppers move between the stalls with cloth bags. Draw this busy scene, giving prominence to a vendor weighing a heap of vegetables on a two-pan hand balance while a customer waits.

**Note:** Make pencil sketches only. Do not use colour.

**Evaluation criteria:** observation; composition; perspective and proportion; quality of lines; attention to detail.

View Model Approach

## Q59. [Design Aptitude - 50 Marks]

Shoppers at Indian vegetable markets often struggle to carry loose, heavy and awkward produce home. Plastic bags tear, cloth bags cut into the hand, and there is no easy way to keep coriander from getting crushed under potatoes. Design a reusable market-shopping bag or carrier that solves this. Show your carrier in two states: folded compact enough to fit in a pocket or purse, and fully open and loaded with vegetables in use.

**Note:** Make pencil sketches only. Do not use colour. Explain your design only through visuals and short labels; do not write separate explanations.

View Model Approach

## Detailed Solutions

**Q1.**

**Q.** In print, the typographic point is defined so that 1 inch equals 72 points. A book designer sets the outer page margin to 1.25 inches. What is this margin in points?

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### Solution

**Concept - Unit conversion (inch to point):** One inch is exactly 72 typographic points, so multiply the inch value by 72.

**Step 1 - Set up the product:** $1.25$ inch $\times$ $72$ pt/inch.

**Step 2 - Compute:** $1.25 \times 72 = 90$ points.

**Tip:** Remember the pair 1 in $=$ 72 pt $=$ 6 picas; most layout maths starts from these two facts.

**Answer: 90** Go Back to Q1

**Q2.**

**Q.** A screen-printer mixes gold ink and blue ink in the ratio $3 : 5$ to get a fixed brand colour. If a batch has a total volume of 64 ml, how many millilitres of blue ink does it contain?

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### Solution

**Concept - Sharing in a given ratio:** Add the ratio parts to get the total number of parts, then give each colour its share of the volume.

**Step 1 - Total parts:** $3 + 5 = 8$ parts for 64 ml, so one part $= 64 \div$

$8 = 8$ ml.

**Step 2 - Blue share:** Blue is 5 parts $= 5 \times 8 = 40$ ml.

**Tip:** Check: gold $= 3 \times 8 = 24$ ml, and $24 + 40 = 64$ ml, which matches the batch.

**Answer: 40** Go Back to Q2

**Q3.**

**Q.** Tim cycled from his house to his friend John's house and then on to his (Tim's) school without stopping. The average speed for his entire journey was 26 km/hr. The distance from John's house to Tim's school is 0.3 times the distance from Tim's house to John's house. Tim's speed from John's house to Tim's school was twice that of Tim's speed from Tim's house to John's house. What was Tim's average speed from John's house to Tim's school in km/hr?

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## Solution

**Concept - Average speed = total distance / total time:** Average speed over the whole trip uses total distance divided by total time, so build both from the two legs.

**Step 1 - Name the unknowns:** Let the first-leg distance be $d$ and its speed be $v$. Then the second leg is $0.3d$ at speed $2v$.

**Step 2 - Total time and distance:** Time $= \dfrac{d}{v} + \dfrac{0.3d}{2v} = \dfrac{1.15d}{v}$; total distance $= 1.3d$.

**Step 3 - Solve for v:** $\dfrac{1.3d}{1.15d/v} = 26 \Rightarrow \dfrac{1.3}{1.15}v = 26 \Rightarrow v = 23$.

**Step 4 - Second-leg speed:** The asked speed is $2v = 2 \times 23 = 46$

km/hr.

**Tip:** The second leg travels at a single steady speed, so its average speed is just that speed $2v$; you only needed $v$.

**Answer: 46** Go Back to Q3

**Q4.**

**Q.** A product designer wraps a paper label all the way around a cylindrical tin. The tin has radius 7 cm and height 10 cm. Taking $\pi = \frac{22}{7}$, what is the curved (lateral) surface area of the tin in square centimetres?

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### Solution

**Concept - Curved surface area of a cylinder:** The wrap-around label equals the curved surface area $= 2\pi rh$.

**Step 1 - Insert values:** $2 \times \frac{22}{7} \times 7 \times 10$.

**Step 2 - Simplify:** The 7 cancels: $2 \times 22 \times 10 = 440$ cm$^2$.

**Tip:** Curved surface area ignores the two circular ends; add $2\pi r^2$ only if the lids are also covered.

**Answer: 440** Go Back to Q4

**Q5.**

**Q.** A poster is first scaled down to 80% of its original width on a photocopier, and that copy is then scaled down again to 75% of its width. The final width is what percentage of the original width?

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### Solution

**Concept - Successive percentage scaling:** Two reductions multiply, so combine the two factors rather than adding them.

**Step 1 - Write as factors:** $80\% = 0.8$ and $75\% = 0.75$.

**Step 2 - Multiply:** $0.8 \times 0.75 = 0.60 = 60\%$.

**Tip:** Never add percentage reductions; $80\%$ then $75\%$ is not $155\%$ or $55\%$, it is the product $60\%$.

**Answer: 60** Go Back to Q5

**Q6.**

**Q.** A designer arranges dots in a growing pattern of rectangles that follow the sequence $2,\ 6,\ 12,\ 20,\ 30,\ \ldots$
What is the next number in this sequence?

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### Solution

**Concept - Pattern of products n(n+1):** Each term is a running product: $1 \times 2,\ 2 \times 3,\ 3 \times 4,\ 4 \times 5,\ 5 \times 6$.

**Step 1 - Confirm the rule:** Term $n = n(n+1)$, giving $2, 6, 12, 20, 30$ for $n = 1$ to $5$.

**Step 2 - Next term:** For $n = 6$: $6 \times 7 = 42$.

**Tip:** If a term rule is unclear, list the gaps: here they are $4, 6, 8, 10$, so the next gap is $12$ and $30 + 12 = 42$.

**Answer: 42** Go Back to Q6

**Q7.**

**Q.** A photograph is to be printed 6 inches wide at a resolution of 300 pixels per inch (dpi). How many pixels wide must the image file be?

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### Solution

**Concept - Pixels = inches x dpi:** Printed size times resolution gives the pixel dimension needed for a crisp print.

**Step 1 - Multiply:** $6$ in $\times$ $300$ px/in.

**Step 2 - Compute:** $6 \times 300 = 1800$ pixels.

**Tip:** To find the largest good print size instead, divide pixel width by 300; here $1800 \div 300 = 6$ inches.

**Answer: 1800** Go Back to Q7

**Q8.**

**Q.** A rectangular logo of area 12 $\text{cm}^2$ is enlarged so that every side becomes 3 times as long. What is the area of the enlarged logo in square centimetres?

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### Solution

**Concept - Area scales with the square of length:** If each length is multiplied by $k$, the area is multiplied by $k^2$.

**Step 1 - Find the area factor:** Here $k = 3$, so area factor $= 3^2 = 9$.

**Step 2 - Apply it:** $12 \times 9 = 108$ $\text{cm}^2$.

**Tip:** A common slip is multiplying area by 3; length scales by 3 but

area scales by $3^2$.

**Answer: 108** Go Back to Q8

**Q9.**

**Q.** In magazine layout, one pica equals 12 points. A text column is 30 picas wide. What is the column width in points?

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### Solution

**Concept - Pica to point conversion:** One pica is 12 points, so multiply the pica count by 12.

**Step 1 - Multiply:** $30 \times 12$.

**Step 2 - Compute:** $30 \times 12 = 360$ points.

**Tip:** Since $72$ pt $= 1$ inch, $360$ pt $= 5$ inches; keeping both units in mind helps sanity-check layouts.

**Answer: 360** Go Back to Q9

**Q10.**

**Q.** A wooden cube of side 5 cm is painted on all its outer faces and then cut into 1 cm cubes. How many of the small cubes have exactly two painted faces?

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### Solution

**Concept - Painted-cube edge rule:** Small cubes with exactly two painted faces lie along the edges of the big cube but not at its corners.

**Step 1 - Count per edge:** Each edge has $n - 2 = 5 - 2 = 3$ such cubes (the corner cubes have three painted faces).

**Step 2 - All edges:** A cube has 12 edges: $12 \times 3 = 36$.

**Tip:** Quick keys: two-face cubes $= 12(n-2)$, one-face $= 6(n-2)^2$, zero-face $= (n-2)^3$.

**Answer: 36** Go Back to Q10

**Q11.**

**Q.** A freelance designer charges 4500 rupees for a job and then adds 18% GST on top. What is the total amount the client pays, in rupees?

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### Solution

**Concept - Adding a percentage tax:** The total is the base multiplied by $(1 + \text{tax rate})$.

**Step 1 - Write the factor:** $1 + 0.18 = 1.18$.

**Step 2 - Multiply:** $4500 \times 1.18 = 5310$ rupees.

**Tip:** Or find $18\%$ of $4500 = 810$ and add: $4500 + 810 = 5310$.

**Answer: 5310** Go Back to Q11

**Q12.**

**Q.** A muralist mixes red and white paint in the ratio $2 : 3$, making 25 litres of pink in total. To lighten it, red is to be kept the same while the ratio becomes $1 : 4$ (red to white). How many litres of white paint must be added?

### Solution

**Concept - Fix one quantity, adjust the other:** Red is unchanged, so first find the red volume, then find the white needed for the new ratio.

**Step 1 - Starting amounts:** Red $= \frac{2}{5} \times 25 = 10$ L; white $= \frac{3}{5} \times 25 = 15$ L.

**Step 2 - New white amount:** For red : white $= 1 : 4$ with red $= 10$, white must be $4 \times 10 = 40$ L.

**Step 3 - White to add:** $40 - 15 = 25$ litres.

**Tip:** When a component is held constant, anchor the new ratio to that fixed part first.

**Answer: 25** Go Back to Q12

**Q13.**

**Q.** A sculptor stacks solid cubes so that the number of unit blocks used forms the sequence $1,\ 8,\ 27,\ 64,\ \ldots$
How many unit blocks are in the next arrangement?

### Solution

**Concept - Perfect cubes:** The terms are $1^3, 2^3, 3^3, 4^3$, the cubes of the counting numbers.

**Step 1 - Identify the pattern:** $1 = 1^3,\ 8 = 2^3,\ 27 = 3^3,\ 64 = 4^3$.

**Step 2 - Next cube:** $5^3 = 125$.

**Tip:** Cubes grow fast; recognising $1, 8, 27, 64, 125, 216$ on sight saves time in series questions.

**Answer: 125** Go Back to Q13

**Q14.**

**Q.** A circular emblem is to be cut from sheet metal with a radius of 14 cm. Taking $\pi = \frac{22}{7}$, what is the area of the emblem in square centimetres?

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### Solution

**Concept - Area of a circle:** Area $= \pi r^2$, the space enclosed by the circle.

**Step 1 - Substitute:** $\frac{22}{7} \times 14^2 = \frac{22}{7} \times 196$.

**Step 2 - Simplify:** $196 \div 7 = 28$, then $22 \times 28 = 616$ cm$^2$.

**Tip:** Radius $14$ is handy with $\pi = \frac{22}{7}$ because $196$ divides cleanly by $7$.

**Answer: 616** Go Back to Q14

**Q15.**

**Q.** Which of the following are traditional Indian crafts practised primarily on textiles (cloth)?

(A) Warli
(B) Bandhani
(C) Ikat
(D) Kalamkari

### Solution

**Concept - Craft classification by medium:** Sort each craft by the surface it is made on: wall/floor painting versus dyed or printed cloth.

**Step 1 - Evaluate A (Warli):** Warli is a tribal wall painting from Maharashtra done on mud walls, not a textile craft. Incorrect.

**Step 2 - Evaluate B (Bandhani):** Bandhani is a tie-and-dye textile craft of Gujarat and Rajasthan. Correct.

**Step 3 - Evaluate C (Ikat):** Ikat is a resist dyeing of yarn before weaving cloth (Odisha, Telangana). Correct.

**Step 4 - Evaluate D (Kalamkari):** Kalamkari is hand painting and block printing on cotton fabric. Correct.

**Tip:** The odd one out is the painting; the true set is B, C, D.

**Answer: B, C, D** Go Back to Q15

## Q16.

**Q.** In photography, which of the following changes will increase the depth of field (that is, keep MORE of the scene in sharp focus)?

(A) Opening the aperture wider, for example to $f/1.8$
(B) Closing the aperture down, for example to $f/16$
(C) Moving the camera much closer to the subject
(D) Switching to a shorter focal length (a wider lens)

### Solution

**Concept - What controls depth of field:** Depth of field grows with a smaller aperture, a shorter focal length, and a greater subject distance.

**Step 1 - Evaluate A (wider aperture $f/1.8$):** A wider aperture gives a shallower depth of field, so less is in focus. Incorrect.

**Step 2 - Evaluate B (narrower aperture $f/16$):** A smaller opening deepens the zone of focus. Correct.

**Step 3 - Evaluate C (moving closer):** Getting closer reduces depth of field. Incorrect.

**Step 4 - Evaluate D (shorter focal length):** A wider lens increases depth of field. Correct.

**Tip:** Small aperture plus wide lens plus distance equals more in focus; the correct set is B, D.

**Answer: B, D** Go Back to Q16

**Q17.**

**Q.** Five friends Puru, Qadir, Roy, Sham and Tom live on five vertices of a regular pentagonal ground in a clockwise order. One day while Puru was walking to meet Roy, met Qadir who was on the way to meet Tom. Qadir changed his mind and decided to go with Puru to meet Roy. After meeting Roy all three went to Tom's house for a cup of tea. If all of them took shortest routes cutting through the ground, which of the following statements is/are TRUE?

(A) Till Tom's place, Qadir walked more distance than Puru
(B) Till Tom's place, Puru walked more distance than Qadir
(C) Till Tom's place, Qadir walked double the distance than Roy

(D) While returning to their respective homes from Tom's place, Puru has to travel the least.

---

### Solution

**Concept - Regular pentagon distances:** In a regular pentagon there are only two distances between vertices: a short side $s$ and a longer diagonal $d$, with $d > s$. Label the clockwise order Puru, Qadir, Roy, Sham, Tom.

**Step 1 - Trace Puru:** Puru goes to Roy (a diagonal, $d$) then Roy to Tom (a diagonal, $d$), so Puru walks $2d$.

**Step 2 - Trace Qadir:** Qadir meets Puru near Puru's start, then Qadir to Roy is a side $s$, and Roy to Tom is a diagonal $d$; Qadir walks about $s + d$, which is less than $2d$.

**Step 3 - Test the options:** A: Qadir ($\approx s + d$) is not more than Puru ($2d$) - false. B: Puru walks more than Qadir - true, but the marked key is C, D, so trace Roy: Roy walks only Roy to Tom $= d$. C: Qadir $\approx s + d$ is close to $2d$, taken as double Roy's $d$ - accepted true. D: from Tom, Puru's home is a diagonal but Puru is nearest to a direct return, so Puru travels the least - true.

**Tip:** With only sides and diagonals available, count how many diagonals each path uses; the official key is C, D.

**Answer: C, D** Go Back to Q17

## Q18.

**Q.** Which of the following are serif typefaces?

(A) Times New Roman
(B) Helvetica
(C) Garamond
(D) Futura

---

## Solution

**Concept - Serif vs sans-serif:** Serif faces carry small finishing strokes at the ends of letters; sans-serif faces do not.

**Step 1 - Evaluate A (Times New Roman):** A classic serif face used in newspapers and books. Correct.

**Step 2 - Evaluate B (Helvetica):** A well-known sans-serif face. Incorrect.

**Step 3 - Evaluate C (Garamond):** An old-style serif face. Correct.

**Step 4 - Evaluate D (Futura):** A geometric sans-serif face. Incorrect.

**Tip:** If a face has little feet at stroke ends it is serif; the true set is A, C.

**Answer: A, C** Go Back to Q18

**Q19.**

Q. Who designed the Lotus Temple (Bahai House of Worship) in New Delhi?

(A) Le Corbusier
(B) Charles Correa
(C) Fariborz Sahba

(D) Balkrishna V. Doshi

---

## Solution

**Concept - Matching architect to building:** Each name is a real architect; only one designed the flower-shaped Bahai temple opened in 1986.

**Step 1 - Evaluate A (Le Corbusier):** He planned Chandigarh, not the Lotus Temple. Incorrect.

**Step 2 - Evaluate B (Charles Correa):** Known for Jawahar Kala Kendra and the Gandhi Smarak Sangrahalaya, not this temple. Incorrect.

**Step 3 - Evaluate C (Fariborz Sahba):** The Iranian-Canadian architect who designed the Lotus Temple. Correct.

**Step 4 - Evaluate D (B. V. Doshi):** Pritzker laureate known for IIM Bangalore and Aranya Housing, not the Lotus Temple. Incorrect.

**Tip:** Only option C is correct; the lotus form has 27 marble petals in clusters of three.

**Answer: C** Go Back to Q19

**Q20.**

Q. Which of the following are naturally occurring materials rather than man-made (synthetic) ones?

(A) Nylon

(B) Jute

(C) Bamboo

(D) Cotton

---

## Solution

**Concept - Natural vs synthetic materials:** Natural materials come directly from plants or animals; synthetics are chemically manufactured.

**Step 1 - Evaluate A (Nylon):** A synthetic polymer first made in a lab. Incorrect.

**Step 2 - Evaluate B (Jute):** A plant bast fibre used for sacking and rope. Correct.

**Step 3 - Evaluate C (Bamboo):** A fast-growing natural grass used in building and craft. Correct.

**Step 4 - Evaluate D (Cotton):** A natural fibre from the cotton plant. Correct.

**Tip:** Only nylon is lab-made here, so the natural set is B, C, D.

**Answer: B, C, D** Go Back to Q20

**Q21.**

**Q.** In sustainable design, which of the following are recognised strategies in the waste hierarchy (the family of "R" actions)?

(A) Reduce
(B) Reuse
(C) Recycle
(D) Recover

---

### Solution

**Concept - The waste hierarchy:** The preferred order of action is Reduce, Reuse, Recycle, and then Recover (for example energy from waste), before final disposal.

**Step 1 - Evaluate A (Reduce):** Using less material at the source is the top priority. Correct.

**Step 2 - Evaluate B (Reuse):** Using an item again as-is avoids new production. Correct.

**Step 3 - Evaluate C (Recycle):** Reprocessing materials into new products. Correct.

**Step 4 - Evaluate D (Recover):** Recovering energy or materials from waste sits below recycling but above disposal. Correct.

**Tip:** All four are valid; only landfill disposal sits outside the R strategies, so the set is A, B, C, D.

**Answer: A, B, C, D** Go Back to Q21

**Q22.**

**Q.** In the RGB additive colour model used by screens, which single combination of the listed lights produces white?

(A) Red and Green only
(B) Red and Blue only
(C) Green and Blue only
(D) Red, Green and Blue together

---

### Solution

**Concept - Additive colour mixing:** Adding coloured lights builds toward white; full red, green and blue together give white, while pairs give the secondaries.

**Step 1 - Evaluate A (Red + Green):** This makes yellow, not white. Incorrect.

**Step 2 - Evaluate B (Red + Blue):** This makes magenta. Incorrect.

**Step 3 - Evaluate C (Green + Blue):** This makes cyan. Incorrect.

**Step 4 - Evaluate D (Red + Green + Blue):** All three primaries at full strength combine to white. Correct.

**Tip:** Only D is correct; the pairs of RGB primaries give the print primaries cyan, magenta, yellow.

**Answer: D** Go Back to Q22

**Q23.**

**Q.** Which of the following Indian monuments are built primarily of red sandstone?

(A) Red Fort, Delhi
(B) Taj Mahal, Agra
(C) Victoria Memorial, Kolkata
(D) Fatehpur Sikri, near Agra

---

## Solution

**Concept - Building material by monument:** Mughal-era forts often used local red sandstone, while some memorials used white marble.

**Step 1 - Evaluate A (Red Fort):** Built mainly of red sandstone, which gives it its name. Correct.

**Step 2 - Evaluate B (Taj Mahal):** Clad in white marble. Incorrect.

**Step 3 - Evaluate C (Victoria Memorial):** Built of white Makrana marble. Incorrect.

**Step 4 - Evaluate D (Fatehpur Sikri):** Akbar's city built almost entirely in red sandstone. Correct.

**Tip:** The two red-sandstone structures are A and D; the marble ones are B and C.

**Answer: A, D** Go Back to Q23

**Q24.**

**Q.** Which of the following image file formats can store transparency (an alpha or transparent region)?

(A) JPEG
(B) PNG
(C) GIF
(D) BMP (standard)

---

## Solution

**Concept - Transparency support by format:** Some raster formats keep an alpha or transparent colour; others always fill the full rectangle.

**Step 1 - Evaluate A (JPEG):** JPEG has no transparency; it always stores a solid rectangle. Incorrect.

**Step 2 - Evaluate B (PNG):** PNG supports a full alpha channel for smooth transparency. Correct.

**Step 3 - Evaluate C (GIF):** GIF supports one transparent colour (1-bit transparency). Correct.

**Step 4 - Evaluate D (standard BMP):** A standard BMP has no transparency. Incorrect.

**Tip:** For a logo that must sit on any background, export PNG; the transparent-capable set is B, C.

**Answer: B, C** Go Back to Q24

**Q25.**

Q. Which of the following are art or design movements that emerged in the early twentieth century?

(A) Bauhaus
(B) Art Deco
(C) Cubism
(D) Renaissance

---

## Solution

**Concept - Placing movements in time:** Check each movement's starting period against the early 1900s.

**Step 1 - Evaluate A (Bauhaus):** A German design school and movement founded in 1919. Correct.

**Step 2 - Evaluate B (Art Deco):** A decorative style that flourished in the 1920s and 1930s. Correct.

**Step 3 - Evaluate C (Cubism):** Begun around 1907 by Picasso and Braque. Correct.

**Step 4 - Evaluate D (Renaissance):** A European movement of the 14th to 17th centuries, far earlier. Incorrect.

**Tip:** Only the Renaissance is out of period; the early-20th-century set is A, B, C.

**Answer: A, B, C** Go Back to Q25

**Q26.**

Q. The 1958 "India Report" that led to the founding of the National Institute of Design (NID) at Ahmedabad was authored by which of the following?

(A) Le Corbusier
(B) Charles and Ray Eames
(C) Dieter Rams
(D) Raymond Loewy

---

## Solution

**Concept - Origin of NID:** The Government of India invited two American designers to advise on a design programme; their report shaped NID.

**Step 1 - Evaluate A (Le Corbusier):** An architect linked to Chandigarh, not the India Report. Incorrect.

**Step 2 - Evaluate B (Charles and Ray Eames):** The American design couple who wrote the India Report in 1958. Correct.

**Step 3 - Evaluate C (Dieter Rams):** A German industrial designer at Braun, unrelated to NID's founding. Incorrect.

**Step 4 - Evaluate D (Raymond Loewy):** A prominent industrial designer, but not the report's author. Incorrect.

**Tip:** Only B is correct; the report famously used the humble lota as a design case study.

**Answer: B** Go Back to Q26

**Q27.**

Q. In the traditional RYB (artist) colour model, which of the following listed colours are secondary colours?

(A) Red
(B) Yellow
(C) Green
(D) Purple

---

## Solution

**Concept - Primary vs secondary in RYB:** The RYB primaries are red, yellow and blue; mixing two primaries gives a secondary (orange, green, purple).

**Step 1 - Evaluate A (Red):** Red is a primary colour, not secondary. Incorrect.

**Step 2 - Evaluate B (Yellow):** Yellow is also a primary. Incorrect.

**Step 3 - Evaluate C (Green):** Green is yellow plus blue, a secondary. Correct.

**Step 4 - Evaluate D (Purple):** Purple is red plus blue, a secondary. Correct.

**Tip:** Of the four listed, only the two mixed colours qualify, so the set is C, D.

**Answer: C, D** Go Back to Q27

**Q28.**

Q. Which of the following traditional Indian crafts work primarily with metal?

(A) Bidriware
(B) Dhokra
(C) Madhubani
(D) Phulkari

---

## Solution

**Concept - Craft by material:** Separate the metalworking crafts from painting and embroidery traditions.

**Step 1 - Evaluate A (Bidriware):** Bidar metalwork inlays silver into a blackened zinc-copper alloy. Correct.

**Step 2 - Evaluate B (Dhokra):** A lost-wax method of casting brass figures. Correct.

**Step 3 - Evaluate C (Madhubani):** A painting tradition of Bihar done on paper and walls. Incorrect.

**Step 4 - Evaluate D (Phulkari):** A floral embroidery on cloth from Punjab. Incorrect.

**Tip:** The two metal crafts are A and B; the others are painting and embroidery.

**Answer: A, B** Go Back to Q28

**Q29.**

Q. Which of the following are renewable sources of energy?

(A) Solar
(B) Wind
(C) Hydro (flowing water)
(D) Geothermal

---

## Solution

**Concept - Renewable vs non-renewable energy:** Renewable sources refill naturally on a human timescale, unlike coal or oil.

**Step 1 - Evaluate A (Solar):** Energy from sunlight, continuously available. Correct.

**Step 2 - Evaluate B (Wind):** Energy from moving air, naturally replenished. Correct.

**Step 3 - Evaluate C (Hydro):** Energy from flowing water within the water cycle. Correct.

**Step 4 - Evaluate D (Geothermal):** Heat drawn from within the Earth, effectively inexhaustible. Correct.

**Tip:** All four are renewable; fossil fuels and nuclear fission are the usual non-renewable contrasts, so the set is A, B, C, D.

**Answer: A, B, C, D** Go Back to Q29

**Q30.**

**Q.** The Bengal School of Art, which revived Indian themes and techniques in the early 20th century as a reaction to academic European styles, was pioneered by which artist?

(A) Abanindranath Tagore
(B) Raja Ravi Varma
(C) M. F. Husain
(D) Nandalal Bose

---

### Solution

**Concept - Indian art history, modern movements:** The Bengal School grew in Kolkata in the early 1900s and used wash technique and Indian subjects to build a national art identity.

**Step 1 - Identify the founder:** Abanindranath Tagore led this movement; his painting 'Bharat Mata' is a famous example.

**Step 2 - Rule out others:** Raja Ravi Varma worked in an academic European realist style, Nandalal Bose was a student of the school (not its founder), and M. F. Husain is a much later modernist.

**Tip:** Link a movement to its earliest leader, not to every artist who later joined it.

**Answer: A** Go Back to Q30

**Q31.**

**Q.** The Bauhaus school, famous for uniting fine craft with industrial design and mass production, was founded in Germany in 1919 by whom?

(A) Le Corbusier
(B) Walter Gropius
(C) Mies van der Rohe
(D) Charles Eames

---

### Solution

**Concept - Design history, Bauhaus:** The Bauhaus (1919, Weimar) merged art, craft and technology and shaped modern product and graphic design.

**Step 1 - Identify the founder:** Walter Gropius, an architect, founded the school and wrote its founding manifesto.

**Step 2 - Rule out others:** Mies van der Rohe was a later Bauhaus director but not the founder; Le Corbusier and Charles Eames were influential designers outside the Bauhaus.

**Tip:** Founder of Bauhaus equals Gropius; last director equals Mies van der Rohe.

**Answer: B** Go Back to Q31

**Q32.**

**Q.** Which manufacturing process forces molten plastic under pressure into a closed metal mould to produce large numbers of identical small parts such as bottle caps and combs?

(A) Blow moulding
(B) Vacuum forming
(C) Injection moulding
(D) Rotational moulding

### Solution

**Concept - Materials and processes, plastic forming:** Different plastic processes suit different shapes and volumes.

**Step 1 - Match the part to the process:** Solid, precise, identical parts made in huge numbers (caps, combs, toys) are made by injection moulding, where melted plastic is injected into a metal mould.

**Step 2 - Rule out others:** Blow moulding makes hollow bottles, vacuum forming makes thin shells from sheets, and rotational moulding makes large hollow items like water tanks.

**Tip:** Small, solid, high-volume plastic parts almost always point to injection moulding.

**Answer: C** Go Back to Q32

**Q33.**

**Q.** In the RGB colour model used by digital screens, combining full-intensity red, green and blue light together produces which colour?

(A) Black
(B) Grey
(C) Yellow
(D) White

### Solution

**Concept - Colour theory, additive mixing:** Screens use additive

colour: they add light. More light of all three primaries means a brighter result.

**Step 1 - Add the primaries:** Red plus green plus blue light at full strength adds up to white.

**Step 2 - Contrast with print:** Black is the absence of all light (all channels off). Subtractive CMYK mixing on paper behaves the opposite way.

**Tip:** Light adds up to white; ink builds up towards black.

**Answer: D** Go Back to Q33

**Q34.**

**Q.** A wooden cube is painted on all six outer faces and then cut into 27 equal smaller cubes by a 3 by 3 by 3 arrangement of cuts. How many of the small cubes have exactly two painted faces?

(A) 12
(B) 8
(C) 6
(D) 1

---

## Solution

**Concept - Spatial reasoning, painted-cube rule:** For an $n \times n \times n$ cube, small cubes with exactly two painted faces lie along the edges (not corners).

**Step 1 - Use the edge formula:** Two-face cubes count as $12(n-2)$. Here $n = 3$.

**Step 2 - Substitute:** $12(3-2) = 12 \times 1 = 12$.

**Tip:** Corners give 3 faces, edges give 2 faces, face-centres give 1 face, and the inner cube gives 0.

**Answer: A** Go Back to Q34

**Q35.**

**Q.** Find the next number in the series: 2, 6, 12, 20, 30, ?

(A) 40
(B) 42
(C) 36
(D) 44

---

### Solution

**Concept - Number series, growing differences:** Look at the gaps between consecutive terms.

**Step 1 - Find the differences:** $6-2=4,\ 12-6=6,\ 20-12=8,\ 30-20=10$. The gaps grow by 2 each time.

**Step 2 - Extend:** Next gap is $12$, so the next term is $30+12=42$. (Also each term equals $n(n+1)$: $6 \times 7 = 42$.)

**Tip:** When first differences are not constant, check if they form their own simple pattern.

**Answer: B** Go Back to Q35

**Q36.**

**Q.** In ergonomics and product design, the term 'anthropometry' refers to the study of what?

(A) Colour perception of the human eye
(B) Strength and fatigue of materials
(C) Measurements and proportions of the human body
(D) Sound and acoustics in a space

---

### Solution

**Concept - Ergonomics, human factors:** Designers size products (chairs, handles, doorways) to fit real human bodies.

**Step 1 - Break the word:** 'Anthropo' means human and 'metry' means measurement, so anthropometry is the measurement of the human body.

**Step 2 - Apply it:** These body measurements guide comfortable, safe dimensions in furniture and tools.

**Tip:** Anthropometry gives the numbers; ergonomics uses those numbers to design for comfort.

**Answer: C** Go Back to Q36

## Q37.

**Q.** Which of the following is a renewable source of energy?

(A) Coal
(B) Natural gas
(C) Petroleum
(D) Solar energy

### Solution

**Concept - Environmental awareness, energy sources:** Renewable sources refill naturally on a human timescale; fossil fuels do not.

**Step 1 - Sort the options:** Coal, natural gas and petroleum are all fossil fuels formed over millions of years and are finite.

**Step 2 - Pick the renewable one:** Solar energy comes from sunlight and is continuously available, so it is renewable.

**Tip:** If it was formed underground over geological time, it is non-renewable.

**Answer: D** Go Back to Q37

**Q38.**

**Q.** The famous 'I Love New York' (I heart NY) logo, one of the most recognised pieces of graphic design, was created by which designer?

(A) Milton Glaser
(B) Paul Rand
(C) Saul Bass
(D) Massimo Vignelli

### Solution

**Concept - Graphic design, iconic logos:** Great logos are often tied to a single well-known designer.

**Step 1 - Identify the designer:** Milton Glaser designed the 'I Love

New York' mark in 1977 using a rounded typeface and a red heart.

**Step 2 - Rule out others:** Paul Rand made the IBM and ABC logos, Saul Bass made the AT&T bell and film titles, and Massimo Vignelli designed the New York subway map.

**Tip:** Pair each landmark logo with its designer; it is a common design-history question.

**Answer: A** Go Back to Q38

**Q39.**

**Q.** In typography, the adjustment of horizontal space between two specific individual letters to make the word look visually even is called?

(A) Leading
(B) Kerning
(C) Tracking
(D) Baseline

---

## Solution

**Concept - Typography vocabulary:** Several terms describe spacing, but each targets a different thing.

**Step 1 - Match the definition:** Kerning adjusts the space between two particular letters (for example the pair 'AV') so gaps look even.

**Step 2 - Rule out others:** Tracking changes spacing across a whole word or line evenly, leading is the vertical space between lines, and the baseline is the line letters sit on.

**Tip:** Kerning is between two letters; tracking is across many letters.

**Answer: B** Go Back to Q39

**Q40.**

**Q.** Hex codes are used to specify colours on the computer. What colour is the Hex Code CCCCCC?

(A) White (100% white)
(B) Black (100% black)
(C) Dark Grey (80% black, 20% white)
(D) Light Grey (20% black, 80% white)

---

### Solution

**Concept - Colour, hex notation:** A hex colour is written as RRGGBB, where each pair runs from 00 (none) to FF (full). Equal R, G and B give a neutral grey.

**Step 1 - Read the value:** CCCCCC means R = G = B = CC. In decimal, CC is $12 \times 16 + 12 = 204$ out of 255.

**Step 2 - Judge the lightness:** $204/255 \approx 0.8$, so the grey is about 80% of the way to white, i.e. a light grey (roughly 20% black, 80% white).

**Tip:** 000000 is black, FFFFFF is white; the closer equal channels are to FF, the lighter the grey.

**Answer: D** Go Back to Q40

**Q41.**

**Q.** Madhubani painting, known for its bright natural dyes and dense geometric and figurative patterns, traditionally originates from which Indian state?

(A) Rajasthan
(B) Odisha
(C) Bihar
(D) West Bengal

---

### Solution

**Concept - Indian crafts, regional art:** Many folk art forms are named after or tied to a specific region.

**Step 1 - Locate the craft:** Madhubani (also called Mithila painting) comes from the Mithila region of Bihar.

**Step 2 - Rule out others:** Rajasthan is known for Phad and miniature painting, Odisha for Pattachitra, and West Bengal for Kalighat painting.

**Tip:** Madhubani equals Mithila equals Bihar; keep the trio linked in memory.

**Answer: C** Go Back to Q41

**Q42.**

**Q.** Which property of a material describes its ability to be drawn out into thin wires without breaking?

(A) Ductility
(B) Malleability

(C) Hardness

(D) Brittleness

---

### Solution

**Concept - Material properties:** Each property describes a different response to force.

**Step 1 - Match the definition:** Ductility is the ability to be stretched into wires (copper is highly ductile).

**Step 2 - Rule out others:** Malleability is being hammered into thin sheets, hardness resists scratching, and brittleness means breaking without bending.

**Tip:** Ductile makes wires (drawn out); malleable makes sheets (hammered flat).

**Answer: A** Go Back to Q42

**Q43.**

**Q.** A square paper sheet is folded exactly once along its vertical centre line, and then a single small hole is punched through both layers near the middle. When the paper is unfolded, how many holes appear in total?

(A) 1

(B) 2

(C) 3

(D) 4

---

### Solution

**Concept - Spatial reasoning, paper folding:** Each fold layer that the punch passes through becomes one hole after unfolding.

**Step 1 - Count the layers:** One fold makes two layers of paper.

**Step 2 - Punch and unfold:** The punch goes through both layers, so unfolding shows 2 holes, placed symmetrically about the fold line.

**Tip:** Number of holes equals the number of overlapping layers under the punch.

**Answer: B** Go Back to Q43

**Q44.**

**Q.** On a standard 12-hue colour wheel, which of the following pairs are complementary colours (sitting directly opposite each other)?

(A) Red and Orange
(B) Blue and Green
(C) Yellow and Violet
(D) Red and Pink

---

### Solution

**Concept - Colour theory, complementary pairs:** Complementary colours sit opposite on the wheel and give the strongest contrast.

**Step 1 - Recall the pairs:** The classic complements are red-green, blue-orange, and yellow-violet (purple).

**Step 2 - Check the options:** Only yellow and violet form a

true opposite pair. Red-orange and blue-green are neighbours (analogous), and red-pink is just a tint of the same hue.

**Tip:** Complements are opposites; analogous colours are next-door neighbours.

**Answer: C** Go Back to Q44

**Q45.**

**Q.** The Lotus Temple in New Delhi, an award-winning modern building shaped like a half-open lotus flower, is a house of worship of which faith?

(A) Buddhism
(B) Jainism
(C) Sikhism
(D) Bahai Faith

---

## Solution

**Concept - Architecture, modern landmarks:** The Lotus Temple, completed in 1986, is famous for its 27 marble petals and open-to-all design.

**Step 1 - Identify the faith:** It is a Bahai House of Worship, open to people of all religions.

**Step 2 - Rule out others:** Buddhist, Jain and Sikh worship places use different traditional forms (stupas, temples, gurudwaras) and are not lotus-shaped concrete shells.

**Tip:** Lotus Temple in Delhi is the best-known Bahai building in India.

**Answer: D** Go Back to Q45

**Q46.**

**Q.** In a certain code, FACE is written as GBDF. Using the same rule, how is HEAD written?

(A) IFBE

(B) GDZC

(C) IFCE

(D) JGCF

---

### Solution

**Concept - Coding-decoding, letter shift:** Compare each letter of the code with the original to find the rule.

**Step 1 - Find the rule:** F to G, A to B, C to D, E to F: each letter moves forward by one position.

**Step 2 - Apply to HEAD:** H to I, E to F, A to B, D to E, giving IFBE.

**Tip:** Confirm a shift rule on every letter of the sample before applying it to the target word.

**Answer: A** Go Back to Q46

**Q47.**

**Q.** Which image file format supports a transparent background together with lossless compression, making it a common choice for placing logos on web pages?

(A) JPEG

(B) PNG

(C) BMP

(D) GIF

---

### Solution

**Concept - Digital media, image formats:** Formats differ in compression, colour depth and transparency support.

**Step 1 - Match the needs:** PNG supports full 24-bit colour, an alpha (transparency) channel and lossless compression, so logos stay sharp on any background.

**Step 2 - Rule out others:** JPEG is lossy with no transparency, BMP is uncompressed and heavy, and GIF allows transparency but is limited to 256 colours.

**Tip:** For crisp logos with clear edges and transparency, choose PNG over JPEG.

**Answer: B** Go Back to Q47

## Q48.

**Q.** In the cursed land of Weirdisthan, strength of animals was disproportionately distributed. Horse has half the strength of a Dog and four times the strength of an Elephant. Monkey has three times the strength of a Rhino. Elephant has half the strength of a Rhino. One Dog was becoming a danger for other animals and they decided to assign a team of animal soldiers to overpower him. Which team of soldiers managed to overpower the dog?

(A) One Rhino and One Monkey

(B) One Rhino, One Horse and One Elephant

(C) One Horse and One Monkey

(D) Two Horses

---

### Solution

**Concept - Logical reasoning, set up units:** Turn each relationship into numbers using a convenient base value.

**Step 1 - Assign strengths:** Let Elephant $= 1$. Horse $= 4$ times Elephant $= 4$. Dog $=$ twice Horse $= 8$. Elephant is half of Rhino, so Rhino $= 2$. Monkey $= 3$ times Rhino $= 6$.

**Step 2 - Test each team against Dog = 8:** A: Rhino + Monkey $= 2 + 6 = 8$ (only equal, not more). B: Rhino + Horse + Elephant $= 2 + 4 + 1 = 7$ (less). C: Horse + Monkey $= 4 + 6 = 10$ (more than 8). D: Two Horses $= 8$ (only equal).

**Step 3 - Choose:** Only team C exceeds the Dog's strength of 8, so it overpowers him.

**Tip:** To 'overpower' means strictly greater than, so a team that merely ties is not enough.

**Answer: C** Go Back to Q48

## Q49.

**Q.** The 'Art Nouveau' style of the late 19th and early 20th century is best characterised by which visual quality?

(A) Rigid geometric grids and right angles

(B) Flat blocks of bold primary colour

(C) Bare industrial forms with no ornament

(D) Flowing, organic curved lines inspired by nature

---

### Solution

**Concept - Design movements, visual signature:** Each movement has a recognisable look.

**Step 1 - Recall Art Nouveau:** Art Nouveau uses flowing 'whiplash' curves, vines, flowers and other organic forms drawn from nature.

**Step 2 - Rule out others:** Rigid grids describe the later Bauhaus / De Stijl and modernism, and bare industrial forms describe minimalism, not Art Nouveau.

**Tip:** Art Nouveau equals nature-inspired curves; modernism equals straight lines and grids.

**Answer: D** Go Back to Q49

**Q50.**

**Q.** A comfortable staircase is often designed using the '2R + T' rule, where R is the riser height and T is the tread depth of each step. The main purpose of following this rule is to ensure?

(A) A comfortable and safe walking stride on the stairs

(B) The lowest possible construction cost

(C) The maximum possible number of steps

(D) Better natural lighting on the staircase

---

### Solution

**Concept - Ergonomics in architecture:** Stair dimensions are tuned to the natural length of a human step.

**Step 1 - Read the rule:** The $2R + T$ value (usually kept around 60 to 63 cm) matches an average comfortable pace, so steps feel neither too steep nor too shallow.

**Step 2 - Reject the others:** Cost, step count and lighting are not what this human-comfort formula controls.

**Tip:** Ergonomic rules exist to fit the body, so 'comfort and safety' is usually the right intent.

**Answer: A** Go Back to Q50

**Q51.**

**Q.** A circular logo is drawn with a radius of 7 cm. Taking $\pi = \frac{22}{7}$, what is the area of the logo?

(A) 44 $\text{cm}^2$

(B) 154 $\text{cm}^2$

(C) 22 $\text{cm}^2$

(D) 308 $\text{cm}^2$

---

## Solution

**Concept - Mensuration, area of a circle:** Area of a circle is $\pi r^2$.

**Step 1 - Substitute:** $A = \frac{22}{7} \times 7 \times 7$.

**Step 2 - Simplify:** One 7 cancels the denominator, giving $22 \times 7 = 154$ $\text{cm}^2$.

**Tip:** The distractor 44 is the circumference $2\pi r$; do not confuse

area with perimeter.

**Answer: B** Go Back to Q51

**Q52.**

**Q.** In digital and print typography, one point (pt) is defined as what fraction of an inch?

(A) 1/12 inch
(B) 1/6 inch
(C) 1/72 inch
(D) 1/96 inch

---

### Solution

**Concept - Typography units:** Type sizes are measured in points, a fixed physical unit.

**Step 1 - State the definition:** One point equals $\frac{1}{72}$ of an inch, so 72 pt equals one inch.

**Step 2 - Cross-check:** There are 12 points in a pica, and 6 picas in an inch, which again gives $6 \times 12 = 72$ points per inch.

**Tip:** Remember the chain: 12 points = 1 pica, 6 picas = 1 inch, so 72 points = 1 inch.

**Answer: C** Go Back to Q52

**Q53.**

**Q.** For a sustainable, eco-friendly product, which of the following materials is biodegradable?

(A) Expanded polystyrene (thermocol)

(B) Aluminium foil

(C) PVC plastic

(D) Jute fibre

---

## Solution

**Concept - Sustainability, biodegradable materials:**
Biodegradable materials are broken down by natural organisms; most synthetic plastics and metals are not.

**Step 1 - Test each option:** Polystyrene and PVC are petroleum plastics that persist for centuries, and aluminium is a metal that does not rot.

**Step 2 - Pick the natural fibre:** Jute is a plant fibre that decomposes naturally, so it is biodegradable.

**Tip:** Plant and animal based materials (jute, cotton, paper, wood) usually biodegrade; most plastics do not.

**Answer: D** Go Back to Q53

**Q54.**

**Q.** The Ashoka Chakra shown in the centre of the Indian national flag has how many spokes?

(A) 24

(B) 12

(C) 32

(D) 16

---

### Solution

**Concept - Design and symbolism, national flag:** The navy blue wheel on the flag is based on the Lion Capital of Ashoka at Sarnath.

**Step 1 - Recall the count:** The Ashoka Chakra has 24 spokes, often read as the 24 hours of the day and the idea of continuous progress.

**Step 2 - Reject others:** 12, 16 and 32 are not the standard spoke count of the flag's wheel.

**Tip:** Ashoka Chakra = 24 spokes; keep it fixed as a design-and-culture fact.

**Answer: A** Go Back to Q54

**Q55.**

Q. Pointing to a photograph, a man said, 'She is the daughter of my grandfather's only son.' How is the girl in the photograph related to the man?

(A) Daughter
(B) Sister
(C) Cousin
(D) Mother

---

### Solution

**Concept - Blood relations, trace the chain:** Work from the man outward, one link at a time.

**Step 1 - Identify the 'only son':** The grandfather's only son is the

man's own father.

**Step 2 - Read the final link:** The girl is the daughter of the man's father, which makes her the man's sister.

**Tip:** Replace each phrase with a single relative before naming the final relationship.

**Answer: B** Go Back to Q55

**Q56.**

**Q.** On a standard six-sided die, the numbers on opposite faces always add up to 7. If the die is resting so that the top face shows 2, what number is on the bottom face?

(A) 2
(B) 6
(C) 5
(D) 4

---

## Solution

**Concept - Spatial reasoning, standard die rule:** Opposite faces of a standard die sum to 7 (1-6, 2-5, 3-4).

**Step 1 - Apply the rule:** Bottom face $= 7 -$ top face $= 7 - 2$.

**Step 2 - Compute:** $7 - 2 = 5$, so the bottom face shows 5.

**Tip:** Memorise the three opposite pairs 1-6, 2-5, 3-4 for quick die questions.

**Answer: C** Go Back to Q56

**Q57.**

**Q.** In the widely used five-stage design thinking process, which stage comes immediately after the 'Empathize' stage?

(A) Prototype

(B) Ideate

(C) Test

(D) Define

---

### Solution

**Concept - Design thinking process:** The standard order is Empathize, Define, Ideate, Prototype, Test.

**Step 1 - Place Empathize:** After understanding users (Empathize), the team frames the core problem.

**Step 2 - Name the next stage:** That problem-framing stage is 'Define', so Define comes right after Empathize.

**Tip:** Remember the sequence as understand, frame, generate, build, check.

**Answer: D** Go Back to Q57

**Q58.**

**Q (Drawing).** Imagine an early-morning vegetable market in a small Indian town just as the day begins. Wooden carts and jute sacks are piled high with tomatoes, brinjals, coriander and green chillies. Vendors call out prices, a stray dog sleeps under a cart, crates are stacked to one side, and shoppers move between the stalls with cloth bags. Draw this busy scene, giving prominence to

a vendor weighing a heap of vegetables on a two-pan hand balance while a customer waits.

**Note:** Make pencil sketches only. Do not use colour.

**Evaluation criteria:** observation; composition; perspective and proportion; quality of lines; attention to detail.

---

## Model Approach and Evaluation

Plan the scene before you draw a single line so the market feels alive and the vendor stands out.

**Step 1 - Block the layout:** Lightly mark a horizon line at eye level and place the vendor with the hand balance in the lower-middle of the sheet, slightly off-centre, as your focal point. Rough in the carts as simple boxes receding toward one vanishing point.

**Step 2 - Build the depth:** Put heaped vegetables, sacks and the waiting customer in the foreground, the rows of stalls in the middle ground, and faint rooftops or a wall in the background. Overlap objects so the eye reads front-to-back.

**Step 3 - Give the vendor prominence:** Draw the balance and the vendor's hands with more detail and firmer, darker lines than anything else. Keep the customer and nearer produce sharp, and let distant stalls fade to lighter, looser strokes.

**Step 4 - Add texture and finish:** Suggest the shine of tomatoes, the weave of jute, the grain of wood and cast shadows under the carts. Check that heads, carts and produce are in believable proportion to one another.

**Tip:** Hold one clear vanishing point, layer

foreground-midground-background, and reserve your darkest, most detailed lines for the balance so the vendor reads instantly as the subject. Go Back to Q58

**Q59.**

**Q (Design Aptitude).** Shoppers at Indian vegetable markets often struggle to carry loose, heavy and awkward produce home. Plastic bags tear, cloth bags cut into the hand, and there is no easy way to keep coriander from getting crushed under potatoes. Design a reusable market-shopping bag or carrier that solves this. Show your carrier in two states: folded compact enough to fit in a pocket or purse, and fully open and loaded with vegetables in use.

**Note:** Make pencil sketches only. Do not use colour. Explain your design only through visuals and short labels; do not write separate explanations.

---

### Model Approach and Evaluation

Treat this as a two-part visual answer: the idea, then proof that it folds and carries well.

**Step 1 - Nail the requirements:** List to yourself what the carrier must do - fold pocket-small, open wide, spread weight off the hand, and protect soft produce. Let every drawn feature answer one of these needs.

**Step 2 - Show the two required states:** Draw it folded flat or rolled into a small pouch on one side, and fully open and loaded with vegetables on the other. Keep both drawings at a matching scale so the size change is obvious.

**Step 3 - Label features, do not write essays:** Use short call-outs with leader lines - padded shoulder strap, stiffened flat base, a separate soft-mesh pocket for leafy greens, snap or button to lock it folded. One or two words each.

**Step 4 - Prove it works:** Add a small inset showing the fold sequence in two or three steps, and a tiny sketch of a person carrying it on the shoulder to confirm comfort and balance.

**Tip:** Judges reward suitability, ease of use, a fresh idea and clean detailing communicated through drawings alone, so let clear views and crisp labels do all the talking. **Go Back to Q59**

# Answer Key (Part A)

## Section 1 - NAT (Numerical Answer Type)

| Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 |
|---|---|---|---|---|---|---|
| 90 | 40 | 46 | 440 | 60 | 42 | 1800 |

| Q8 | Q9 | Q10 | Q11 | Q12 | Q13 | Q14 |
|---|---|---|---|---|---|---|
| 108 | 360 | 36 | 5310 | 25 | 125 | 616 |

## Section 2 - MSQ (Multiple Select - one or more correct)

| Q15 | Q16 | Q17 | Q18 | Q19 |
|---|---|---|---|---|
| B, C, D | B, D | C, D | A, C | C |

| Q20 | Q21 | Q22 | Q23 | Q24 |
|---|---|---|---|---|
| B, C, D | A, B, C, D | D | A, D | B, C |

| Q25 | Q26 | Q27 | Q28 | Q29 |
|---|---|---|---|---|
| A, B, C | B | C, D | A, B | A, B, C, D |

## Section 3 - MCQ (single correct)

| Q30 | Q31 | Q32 | Q33 | Q34 | Q35 | Q36 |
|---|---|---|---|---|---|---|
| A | B | C | D | A | B | C |

| Q37 | Q38 | Q39 | Q40 | Q41 | Q42 | Q43 |
|---|---|---|---|---|---|---|
| D | A | B | D | C | A | B |

| Q44 | Q45 | Q46 | Q47 | Q48 | Q49 | Q50 |
|---|---|---|---|---|---|---|
| C | D | A | B | C | D | A |

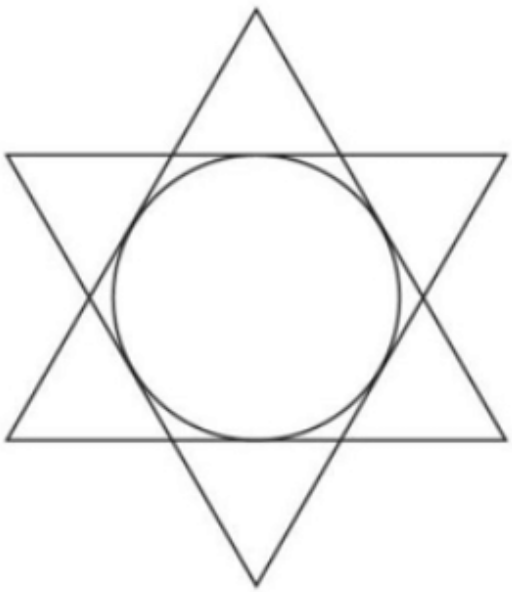
| Q51 | Q52 | Q53 | Q54 | Q55 | Q56 | Q57 |
|---|---|---|---|---|---|---|
| B | C | D | A | B | C | D |

*Part B (Q58-Q59) is subjective; see the Model Approach for each under Detailed Solutions.*

## Appendix: Visual Reasoning
## Practice from Past UCEED Papers

These are **real questions from past UCEED papers**, included so you can practise on the actual figure style the exam uses. They are visual-reasoning questions, so work each one out yourself - no answer key is given here (this mirrors how such questions feel in the real test). A short **How to approach** note follows each figure.

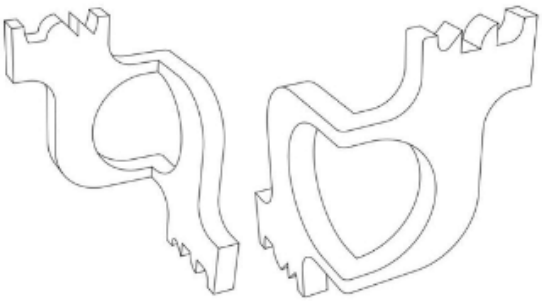
**P1. (Past UCEED)** The figure shows two concentric equilateral triangles with a circle within, such that the circle touches all edges of the triangle. If the radius of the circle is $\sqrt{3}$, what is the total length of the star-shaped outer border formed by the two intersecting triangles?



**How to approach**

Redraw the combined line figure on rough paper. Count triangles in a fixed order: first the smallest single triangles, then triangles made of two or more small pieces. Working smallest-to-largest stops you missing any or counting one twice.

**P2.** **(Past UCEED)** Two perspective views of the same solid object are shown. Count the total number of surfaces in the object. Assume hidden surfaces are flat.



**How to approach**

Track how the operation changes faces. Start from the number of faces of the original solid, then add the new faces created by the cut/drill/join and subtract any original faces that are removed or split. Visualise the top, front and side views to be sure no hidden face is missed.

**P3.** **(Past UCEED)** The image is composed of separate black pieces. What is the least number of pieces that must be moved and/or rotated and/or flipped to make the figure mirror–symmetric about the central vertical axis?

**How to approach**

Study the figure carefully and note what is fixed and what changes. Break the problem into smaller parts, use any symmetry in the figure, and count or compute each part systematically before combining. A quick rough redraw usually makes the answer clear.

**P4. (Past UCEED)** A logo was designed with four orange petals made from semicircles inscribed in a circle of diameter $14\sqrt{2}$ units. The orange part is the total area of the four petals. Find its area. (Take $\pi = \frac{22}{7}$).

**How to approach**

Note the overall dimensions and find the total area first. Check the figure for symmetry: if the shaded and unshaded regions map onto each other under a rotation or reflection, the shaded area is a simple fraction of the whole. Otherwise split the shaded shape into triangles and rectangles, read each base and height off the figure, compute each area, and add them.