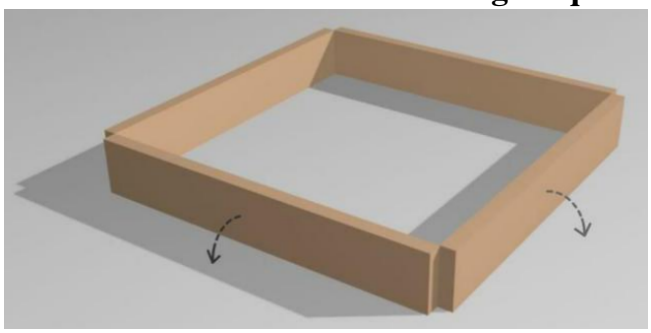
UCEED 2021 Question Paper

Time Allowed :3 Hours	**Maximum Marks :**300	**Total questions :**68

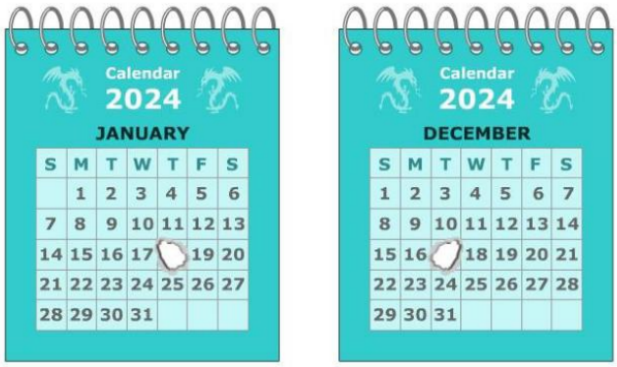
Section 1: Numerical Answer Type (NAT) questions

Q.01 Four identical pieces of wood of length 50 **cm** $\times$ 8 **cm** $\times$ 2 **cm are arranged as shown in the figure. Another larger square is generated by rotating all the wooden panels along the *outer* edges and extending the outermost edges till they touch each other. What is the area of this larger square thus constructed?**

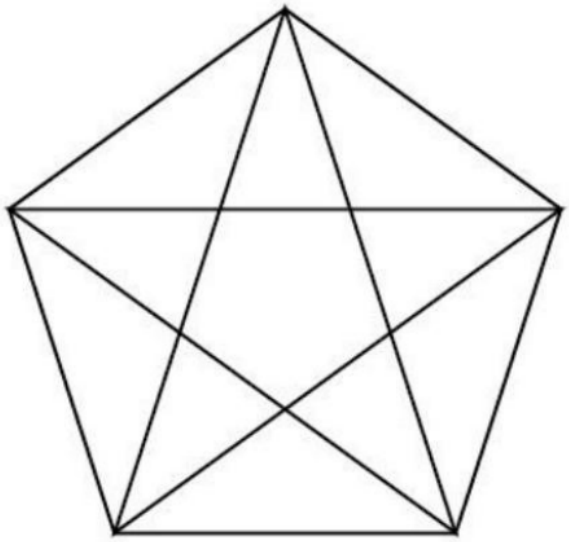


Q.02 A cricket team has 10 blue pairs of gloves and 10 white pairs of gloves in a cricket kit. If a batter reaches into the kit and pulls out one glove at a time without looking at it, what is the least number of gloves she must pull out to make sure that she has a pair of gloves of the same colour?

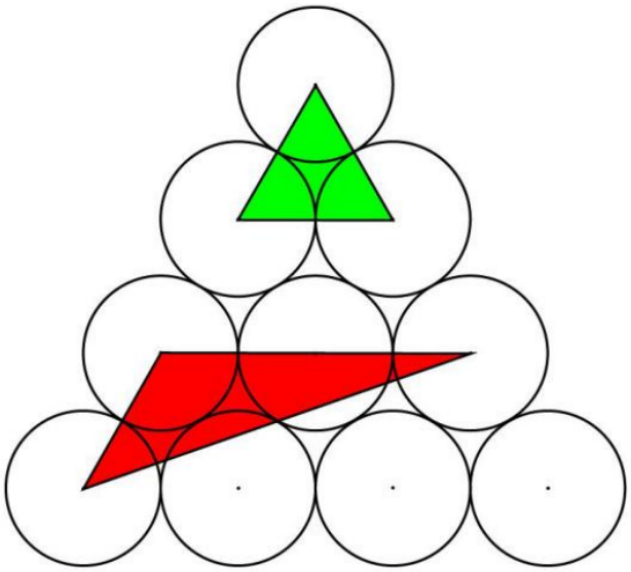
Q.03 Chinnu was excited about the New Year when she bought a new calendar to keep on her study table. While playing, her baby sister poked a hole through the entire calendar from January through December as seen in the image. If every page had the same 5 week table structure for each month, and if all the consecutive months were printed back to back, which date in the month of April has a hole in it?



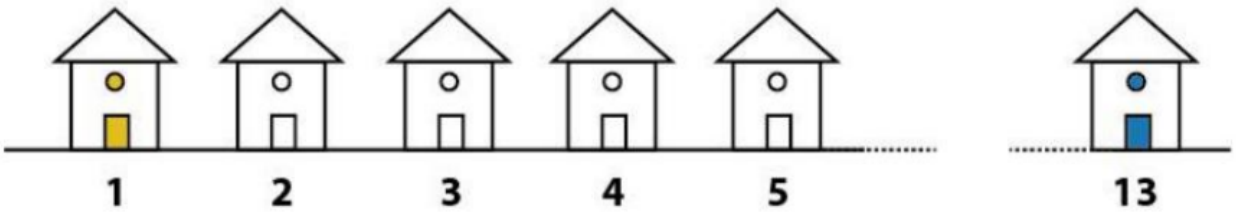
Q.04 How many triangles are there in the figure shown?



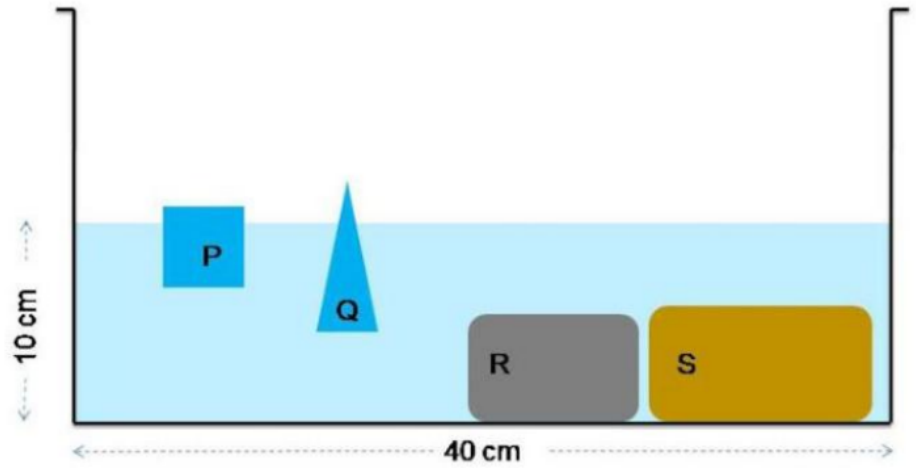
Q.05 The corners of the green and red triangles coincide with the centres of the circles. All the circles have equal diameters and adjacent circles touch each other. If the area of the green triangle is 3.14, what is the area of the red triangle?



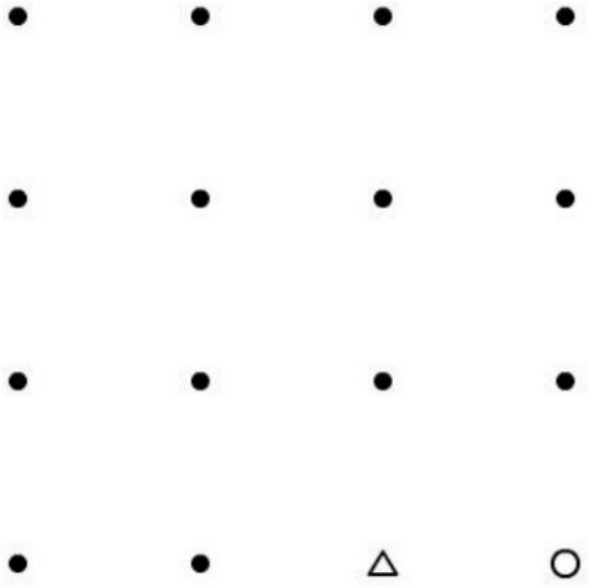
Q.06 A Street has 13 houses in a row as shown in the figure. Some residents in the first house tested positive for COVID-19. The virus spreads in two ways: it can spread to the next house, or jump directly to the third house. Residents of house number 2 can get infection in only one way, the house number 3 in two ways, the house number 4 in 3 ways, the house number 5 in 5 ways and so on. If the virus only progresses from Left to Right direction, in how many ways can the residents of the house number 13 get infected?



Q.07 In the container of dimensions 40 **cm** $\times$ 20 **cm** $\times$ 20 **cm, four objects are dipped in water. Objects P and Q are made of light material, while objects R and S are made of iron and copper, respectively. The object P is a cube of edge 4 cm with 1/10th floating above water; object Q displaces 50 cc of water while floating; objects R and S displace 295.4 cc and 397 cc of water, respectively. If all objects are removed from the container, what would be the new water level measured from the bottom?**



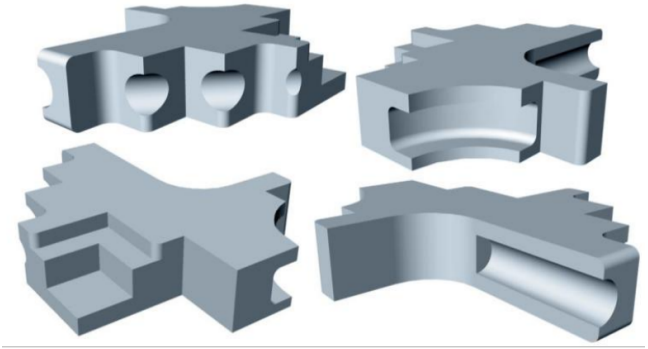
Q.08 If you start from the circle and end at the triangle, what is the minimum number of straight lines required to pass through all the dots without retracing any route? You are allowed to pass through a dot more than once.



Q.09 If each word is written in a single font and normal and bold versions of the same font are not to be counted separately, how many fonts are used in the given set of words?

पाठव पाठव पाठव पाठव
पाठव पाठव पाठव पाठव
पाठव पाठव पाठव पाठव

Q.10 The figure shows views of the same solid. Count the number of surfaces.



Q.11 There are apples and oranges in a basket that can carry a maximum of 50 fruits. Some fruits are rotten and some are good. The number of rotten apples is twice the number of good apples. The number of good oranges is twice the number of rotten oranges. The number of oranges is thrice the number of apples. If there are more than 40 fruits in the basket, what is the total number of apples and oranges?

Q.12 Four views of a convex solid are shown. How many surfaces does the solid have?

Q.13 When young Moosa started selling dosas on a street corner to support his daughter Lisa's education, his age was six times that of Lisa's. He started selling dosas for ₹2 each and he increased its price by ₹1 every year. Lisa grew up to be a successful lawyer and on Moosa's 60^{th} birthday she gifted him a small shop near their house, the board of which is seen in the image. In which year will Lisa celebrate her 60^{th} birthday?

Q.14 Three circles of radius 10 cm are drawn inside an equilateral triangle as shown. The area of the red region (in sq. cm, up to two decimal places) is __.

Q.15 A smaller square of 5 cm is placed inside a bigger square such that all 4 corners of the smaller square are touching the sides of the bigger square. If the smallest distance between the corners of the two squares is 3 cm, what is the area of the bigger square in sq. cm that falls *outside* the smaller one?

Q.16 A digital clock reads hours and minutes. The sum of the digits it displays at 12:00 is 3 ($1+2+0+0$). At 12:01 it is 4 ($1+2+0+1$) and so on. What is the sum of all the digits it displays from 12:00 to 12:59?

Q.17 A rhombus is inscribed in a rectangle which in turn is inscribed in a circle as shown in the figure below. P is the centre of all three shapes, $PQ = QR = 5$ units. What is the perimeter of the rhombus?

Q.18 If colour and size differences are not to be counted as unique, how many types of leaves occur only once?

Section 2: Multiple Select Questions (MSQ)

Q.19 Which of the options is/are rotation(s) of the given figure?

Q.20 Consider the following quote from J. C. Kumarappa's *Economy of Permanence*:
"Man comes nearest to his God, the creator, when he utilizes his brain power to marshal mechanical forces to serve his purposes. To do so in a way that will bring blessings and not destruction, he has to follow closely nature's way to get the best out of it. We cannot get the co-operation of nature purely on our own terms. Any attempt to do so will bring violent destruction in its wake."
Which of the options is/are implied by the quote?

(A) Utilizing brain power to marshal mechanical forces to serve our purposes, if not done properly, can lead to destruction.

(B) Utilizing brain power to marshal mechanical forces to serve our purposes can bring man nearest to his God.
(C) While utilizing brain power to marshal mechanical forces to serve our purposes, the best way to proceed is to follow nature's way.
(D) Dealing with nature purely on our own terms will bring violent destruction.

Q.21 Which four pieces of a jigsaw puzzle can be combined to form a square?

(A) 1, 2, 3, 4
(B) 3, 2, 4, 4
(C) 2, 2, 2, 2
(D) 2, 2, 3, 4

Q.22 Eight friends (Balram, Bhandari, Das, Munshi, Nadkarni, Parmar, Patel, Sethuraman) purchased a square plot of land divided into 8 plots and a back garden, as shown. Parmar was allotted plot 1. Balram preferred the west. Patel chose to stay the farthest from Nadkarni. Munshi and Bhandari became Nadkarni's neighbours. Sethuraman became a neighbour of Patel. Nadkarni hails from the North-East, so he chose the North-East plot. Which of the options *must* be true?

(A) Das stays in plot number 5.
(B) Munshi could be a neighbour of Parmar.
(C) Balram and Nadkarni could be neighbours.
(D) Balram shares a wall with Bhandari.

Q.23 Letters of the alphabet of a font are shown. The cyan letters H, A and B illustrate how some of them can be folded once to form new shapes (followed possibly by a rotation). Which of the black shapes (A, B, C, D) have been obtained by a *single* fold and rotation?

Q.24 Three friends P, Q and R go for morning walks around a ground. They start together from the gate in the same direction, but walk at different speeds. R walks half as fast as P. Q walks 1.5 times faster than R. P takes 1 minute to take one round. If they all stop when R has finished 4 rounds, which of the options must be true?

Q.25 Image shows part of a poster made by CDC in the context of COVID-19. Which of the statements is/are true?

(A) It effectively communicates physical distancing.

(B) It is gender neutral. It promotes mask usage.

(C) It is faith neutral and age inclusive.

(D) It effectively communicates all Covid-19 related safety measures.

Q.26 A toy was created using a piece of paper, the two sides of which are shown in the image. When dropped from a height it spins like a fan. Which of the options depict(s) the correct pattern formed while it spins?

(A)

(B)

(C)

(D)

Q.27 Which option(s) can be folded to form the cube shown?

(A) Net A

(B) Net B

(C) Net C

(D) Net D

Q.28 Pressure cookers are sometimes made using copper and stainless steel. In such a pressure cooker,

(A) The bottom is made up of stainless steel and the rest is made up of copper because it is aesthetically pleasing.
(B) The bottom is made up of stainless steel and the rest is made up of copper because copper is a germicide.
(C) The bottom is made up of copper because it is a better conductor of heat compared to steel and hence it is more energy efficient.
(D) The bottom is made up of copper because that is the only way such a cooker can be heated using an induction stove.

Q.29 Rep-tile is a shape that can be dissected into smaller copies of the same shape without leaving any remainder. For example, a square can be cut into various numbers of smaller copies of square shape. If no flip is allowed, which of the options is/are rep-tiles?

(A) Regular-looking hexagon (B) Trapezium with one short top and two equal slanted sides
(C) Right-angled trapezium (one side vertical) (D) L-shaped right triomino

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Q.30 Which of the object(s) given in the options can produce the top and front view as shown in the figure? (Arrow shows the direction of front view.) The orthographic views show a square outline with a smaller, concentric square (a square "window").

(A) Slanted-faced block with a square window through its front face
(B) Skewed/tilted block with the same square window
(C) Different tilt orientation but the same square window
(D) Curved outer surface but with a planar square window patch

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Q.31 A designer has created an infinitely looping animation as shown in the image. It has 24 frames playing at a speed of 12 frames per second. Which of the statements is/are true?

(A) The duration of one circular loop is 3 seconds.

(B) Each dot turns white for 4 frames in each loop.

(C) If this animation is played at 8 frames per second, the speed of animation will be faster.

(D) This animation with the same duration is possible with 6 frames played at 3 frames per second.

Q.32 Three squiggles were drawn on three transparent square sheets in semi-transparent ink and piled together. Some sheets may be rotated. Additionally, in some options, some squiggles are different from the ones shown. In which option(s) do the squiggles look different?

(A) As shown under option A (overlay).

(B) As shown under option B (overlay).

(C) As shown under option C (overlay).

(D) As shown under option D (overlay).

Q.33 A beat policewoman is starting her midnight walk. Starting from the signal P1, she heads west and takes the second right. Thereafter, she continues her journey, taking the second left, second left, third right, third right, and after that she goes and ends her beat walk at the next signal. In the given map, some of the intersections have traffic light signals and are marked with dots. Which of the options is/are true?

Q.34 Which of the following relationships can be represented using the Venn diagram shown?

Q.35 From one side of a solid cube of side 2 units, a square pyramid of height 1 unit was removed as shown, resulting in a solid with 9 surfaces. If one more pyramid of the same dimensions is removed from another side of the resultant solid, how many surfaces can the new resultant solid have?

(A) 10

(B) 11

(C) 12

(D) 13

Q.36 If a solid octahedron as shown in the figure is cut by a plane into two pieces, what is/are the possible shape(s) of the cross-section?

(A) Triangle

(B) Square

(C) Pentagon

(D) Hexagon

Section 3: Multiple Choice Questions (MCQ)

Q.37 Consider the configuration in the given figure. If rotating and flipping are *not* allowed and pieces in an option need not be placed in the given sequence, which combination would complete the *maximum* number of horizontal black rows?

(A) Set A of blocks as shown

(B) Set B of blocks as shown

(C) Set C of blocks as shown

(D) Set D of blocks as shown

Q.38 Which of the options is the correct Amul logo (wordmark)?

(A) Stylized “Amul” with altered terminal on *l* and wrong *m* bowl

(B) Variant with oversharp spur on *A* and thin join on *u*

(C) Plain serif set in regular Roman (not the brand wordmark)

(D) Correct blackletter-inspired wordmark with the characteristic spur on “A”, rounded bowls in “m”, and curled terminal on “l”

Q.39 Identify the correct matching of the monuments (P, Q, R, S) with their respective empires.

(A) P – Mauryan Empire, Q – Pallava Empire, R – Vijayanagar Empire, S – Mughal Empire

(B) P – Mughal Empire, Q – Vijayanagar Empire, R – Chola Empire, S – Mauryan Empire

(C) P – Mauryan Empire, Q – Chola Empire, R – Vijayanagar Empire, S – Mughal Empire

(D) P – Mauryan Empire, Q – Chola Empire, R – Bahmini Sultanate, S – Mughal Empire

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Q.40 A shadow puppetry setup is shown. Figure on the left shows ARRANGEMENT 1 and its resulting screen shadow. For ARRANGEMENT 2, which option (A–D) shows the correct shadow on the screen?

(A) Elephant in front of tree (similar to Arrangement 1 but shifted)

(B) Elephant fully in front, tree separately visible on the right

(C) Tree in front, elephant partially overlapped behind

(D) Elephant and tree overlapped closely on the left

Q.41 The handle was erased from the drawing of a mug. Which of the options represents the part that was erased?

(A) (as shown in the figure)

(B) (as shown in the figure)

(C) (as shown in the figure)

(D) (as shown in the figure)

Q.42 Which of the options will replace the question mark in the given sequence? F K ? U Z

(A) C

(B) O

(C) P

(D) R

Q.43 Two of the three lines shown below indicate the tracks made by a bicycle. Identify which is the front tyre track and which is the rear tyre track.

Q.44 An artwork on a paper creates an illusion of a ladder resting on a wall when the paper is folded and viewed from a specific angle. Which of the options correctly depicts this artwork on the paper when unfolded?

Q.45 On a race track shown below choose the correct starting configuration. The athletes are not allowed to change the tracks. Each grid is $2\,m \times 2\,m$.

(A)

(B)

(C)

(D)

Q.46 Two identical cubes P and Q are made of smaller cubes in $3 \times 3 \times 3$ and $5 \times 5 \times 5$ configurations, respectively, with alternate cubes painted green and white as shown. Identify the correct option.

(A) The surface area of green is more in P than in Q

(B) The surface area of white is more in P than in Q

(C) The surface areas of green and white are the same in P and Q

(D) The surface area of green is the same but the area of white is different in P and Q

Q.47 The image shows the top views of an L-shaped sculpture resting on a planar ground. When light falls on it at an angle of 45° from the ground in the directions marked by arrows, the corresponding shadows are formed on the ground. Which of the options is this sculpture?

(A) Sculpture with heart patterns arranged vertically on both faces

(B) Sculpture with staggered heart patterns on two faces

(C) Sculpture with dense hearts on both adjoining panels

(D) Sculpture with one face showing three hearts vertically and the other showing two rows

Q.48 Which option completes the sequence of circle–shadow arrangements in the given L-shaped figure?

(A) L-shape with misaligned circle placement

(B) L-shape with consistent continuation of circle–shadow sequence

(C) L-shape with shifted circles, breaking sequence

(D) L-shape with inverted placement of circles

Q.49 An animator was trying out options of various rough poses while planning a frame of a shot. Mirroring and silhouetting are two aspects that animators need to consider when deciding whether a pose is good or not. Based ONLY on these two aspects, which of the options can be considered the WEAKEST pose?

(A) Side-facing pose with arms spread

(B) Front-facing pose with arms crossing the body

(C) Tilted head, open body pose with visible arms

(D) Front-facing symmetrical pose with arms spread

Q.50 At 6:00 pm, the hour hand and the minute hand of an analog clock are at 180 degrees with each other. After approximately how much time will they be at 180 degrees with each other again?

(A) 48 minutes, 40 seconds

(B) 54 minutes, 33 seconds

(C) 60 minutes

(D) 65 minutes, 27 seconds

Q.51 Which of the kettles shown below can hold the most amount of water when placed on an even, horizontal surface?

(A) Kettle A

(B) Kettle B

(C) Kettle C

(D) Kettle D

Q.52 Two 6×6 coloured grids are overlaid (semi-transparent sheets). White behaves like transparent; black is opaque. What is the resulting grid?

(A) Pattern shown under option A

(B) Pattern shown under option B

(C) Pattern shown under option C

(D) Pattern shown under option D

Q.53 A plane is landing smoothly on the airport runway. Select the correct picture.

Q.54 In the series, the first is an equilateral triangle, the second becomes a square by rearranging the pieces, and the third becomes a regular pentagon without any rotation. Similarly, the fourth becomes a regular hexagon. Which of the options replaces the question mark?

Q.55 Perspective view of an object is shown. The object is rotated with respect to the fixed coordinate system as indicated: 90° *clockwise* about the x-axis, 90° *anticlockwise* about the y-axis, and 90° *anticlockwise* about the z-axis. (All rotations are viewed from the positive axis toward the origin.) Which perspective option is the result?

(A)

(B)

(C)

(D)

Q.56 A car moves along a curving road at constant speed (path shown). Which graph(s) correctly show the car's x-coordinate versus time?

(A)

(B)

(C)

(D)

Q.57 Five small triangles of equal size are fitted in a large triangle as shown. Approximately what percentage (%) of the large triangle is *empty*?

(A) 33

(B) 44

(C) 55

(D) 66

Q.58 The image shows a cube net (developed surface) with different symbols on each face. Which option will *NOT* open up to this exact net?

(A) Opening that preserves all stated adjacencies

(B) Opening with one pair of faces that are opposite in the net but shown adjacent

(C) Valid opening consistent with the cross-shaped net

(D) Another valid opening consistent with the cross-shaped net

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Q.59 A frame of a bouncing ball is shown in the picture. This shows the animation principle of ___

(A) Stretching Principle

(B) Distortion Principle

(C) Squash and Stretch Principle

(D) Motion Principle

Q.60 Two paper loops are joined together as shown in the figure. If you cut the loops along the blue dotted line, what will be the resultant figure?

(A) Multiple small interlocked rings

(B) Two parallel strips with a small loop

(C) Single interlinked loop

(D) Large rectangular frame-like loop

Q.61 Reference image of a square pyramid, P, is provided on the left. Assume Q as an identical pyramid created by mirroring P upward. Q was rotated by 135° about the vertical axis and then brought down so that the two pyramids intersect. Which option is the resultant view from the given direction arrow?

(A) (as shown)

(B) (as shown)

(C) (as shown)

(D) (as shown)

Q.62 A cylinder with mirror finish is kept on paper on which the word WARD is written (top view shown). Which image best represents the word and its reflection?

(A) (as shown)

(B) (as shown)

(C) (as shown)

(D) (as shown)

Q.63 Which letter is NEVER used while printing the calendar mentioning names of all the days of the week and months in full form?

Q.64 Which option depicts the *reflection* of the figure shown (mirror is the horizontal line beneath the figures)?

Q.65 Three white squares overlap the cyan square such that one of their corners meets at the centre of the cyan square as shown. What is the ratio of the area of the shaded portion to the original cyan square?

(A) 1/6

(B) 1/4

(C) 1/3

(D) 3/8

Q.66 Letter analogy puzzle: QS : (two-symbol block) :: G? : ?X. Identify the correct option.

(A) GX

(B) X

(C) K G

(D) K

Q.67 P, Q, R, S are competing in a slow cycle race (the *slowest* cyclist wins). A few minutes after the race begins, P is physically ahead of Q. R and S are physically behind Q. S is physically ahead of R. P gets eliminated and R overtakes Q. Just before the end mark, S overtakes Q. Which option is true?

(A) R is winner

(B) S is winner

(C) Q is winner

(D) Q is runner up

Q.68 Select the correct Axis Bank logo (wordmark + symbol).

(A) Incorrect spacing and proportions between the symbol and the wordmark

(B) Correct wordmark with proper spacing/kerning; symbol at the right proportion and angle

(C) Incorrect symbol construction and weight

(D) Slanted/italicized wordmark and misaligned symbol
