INDIAN SCHOOL AL WADI AL KABIR

FIRST REHEARSAL EXAMINATION (2023-24) ISWKP1/241/1

Class: X Sub: MATHEMATICS BASIC (241) Max Marks: 80

Date:05/12/2023 Time: 3 hours

General Instructions:

1. This Question Paper has 38 questions divided into 5 Sections A,B,C,D and E.
2. Section A has 20 Multiple Choice Questions (MCQs) carrying 01 mark each.
3. Section B has 5 Short Answer-I (SA-I) type questions carrying 02 marks each.
4. Section C has 6 Short Answer-II (SA-II) type questions carrying 03 marks each.
5. Section D has 4 Long Answer (LA) type questions carrying 05 marks each.
6. Section E has 3 case based integrated units of assessment (04 marks each) with sub-parts of the values of 1, 1 and 2 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 2 Questions of 5 marks, 2 Questions of 3 marks and 2 Questions of 2 marks has been provided.
   An internal choice has been provided in the 2 marks questions of Section E.
8. Draw neat figures wherever required. Take π =22/7 wherever required if not stated.
9. Use of calculators is not allowed.

SECTION A

Section A consists of 20 questions of 1 mark each.

Q.1. The HCF and LCM of 12, 21,15 respectively are

(A) 3, 140 **(B)** 12, 420 **(C)** 420, 3 **(D)** 3, 420

Q.2. The value of k for which the system of linear equations $3x + 6y = 9,\ 5x + ky + 7 = 0$ is inconsistent is

(A) $\frac{-14}{3}$ **(B)** $\frac{2}{5}$ **(C)** 10 **(D)** 5

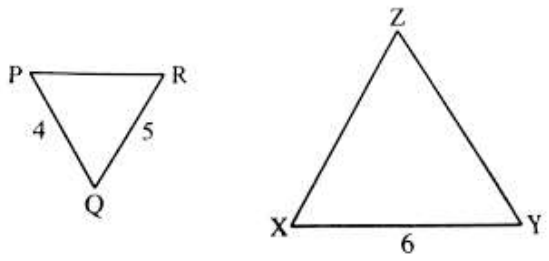
Q.3. A quadratic polynomial, whose zeroes are -3 and 4 is

(A) $x^2 - x + 12$ **(B)** $x^2 - x - 12$ **(C)** $x^2 + x + 12$ **(D)** $2x^2 + 2x - 24$

Q.4. The quadratic equation $2x^2 - \sqrt{5}\,x + 1 = 0$ has

(A) two distinct real roots **(B)** two equal real roots **(C)** no real roots **(D)** more than two real roots

Q.5. In the given figure, $\Delta PQR \sim \Delta XYZ$. If PQ = 4 cm, QR = 5 cm and XY = 6 cm, then the measure of YZ is



(A) 4.5 cm **(B)** 8.3 cm **(C)** 6.4 cm **(D)** 7.5 cm

Q.6. The perimeter of a triangle with vertices $(0, 4)$, $(0, 0)$ and $(3,0)$ is

(A) 12 units **(B)** 5 units **(C)** 11 units **(D)** $\left(7 + \sqrt{5}\right)$ units

Q.7. The value of a, for which $P\left(\frac{a}{3}, 2\right)$ is the midpoint of the line segment joining the points $Q(-5, 4)$ and $R(-1, 0)$ is

(A) 9 **(B)** 4 **(C)** -6 **(D)** -9

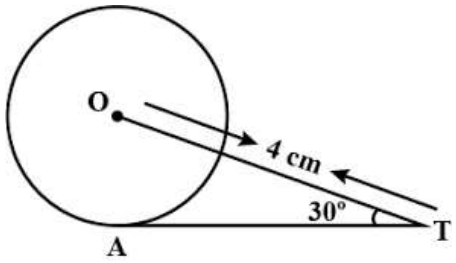
Q.8. For the following distribution, the lower limit of the modal class is

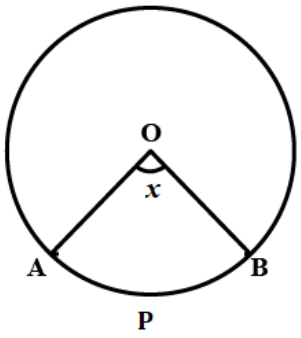
Class	0 – 5	5 – 10	10 – 15	15 – 20	20 – 25
Frequency	10	15	12	20	9

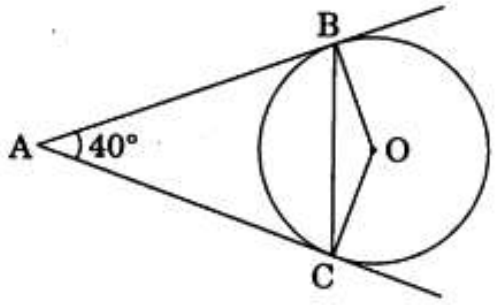
(A) 25 **(B)** 15 **(C)** 30 **(D)** 35

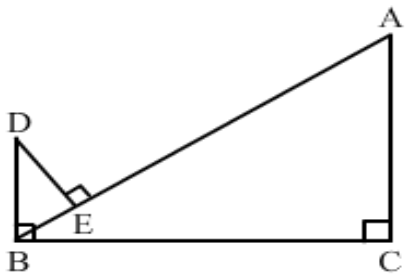
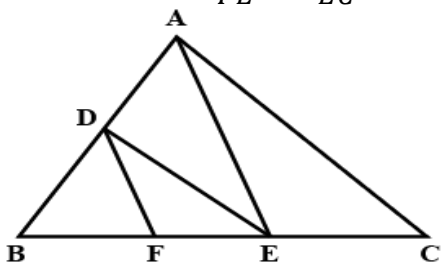
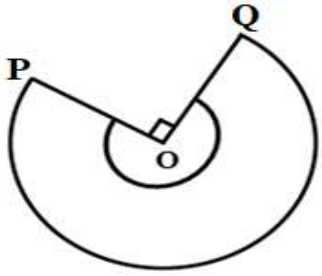
Q.9. If $2\ cos\left(\frac{A}{2}\right) = \sqrt{3}\,, then\ A\ is$:

(A) 60° **(B)** 90° **(C)** 30° **(D)** 45°

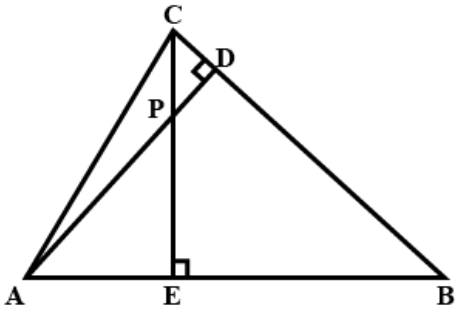
Q.10.	If a pole 6 m high casts a shadow $2\sqrt{3}$ m long on the ground, then the Sun's elevation is **(A)** 30° **(B)** 90° **(C)** 60° **(D)** 15°
Q.11.	In the given figure, AT is a tangent to the circle with centre O such that OT = 4 cm and ∠OTA = 30°. Then AT is equal to  **(A)** 4 cm **(B)** 2 cm **(C)** $4\sqrt{3}cm$ **(D)** $2\sqrt{3}cm$
Q.12.	Shown below is a solved trigonometric problem. $\frac{1+\sec A}{\sec A}$ $= \frac{\frac{1}{1}+\frac{1}{\operatorname{cosec} A}}{\frac{1}{\operatorname{cosec} A}}$ (***Step* 1**) $= \frac{\frac{\operatorname{cosec} A + 1}{\operatorname{cosec} A}}{\frac{1}{\operatorname{cosec} A}}$ (***Step* 2**) $= \frac{(\operatorname{cosec} A + 1)}{\operatorname{cosec} A} \times \operatorname{cosec} A$ (***Step* 3**) $= \operatorname{cosec} A + 1$ (***Step* 4**) In which step is there an error in solving? **(A)** Step 2 **(B)** Step 1 **(C)** Step 3 **(D)** There is no error

Q.13.	If the radii of two circles are in the ratio of 4 : 3, then their areas are in the ratio of : **(A)** 4 : 3 **(B)** 16 : 9 **(C)** 8 : 3 **(D)** 9 : 16
Q.14.	Two cubes each with 6 cm edge are joined end to end. The surface area of the resulting cuboid is **(A)** $360\ cm^2$ **(B)** $512\ cm^2$ **(C)** $216\ cm^2$ **(D)** $36\ cm^2$
Q.15.	A bag contains 50 cards numbered from 1 to 50. A card is drawn at random from the bag. What is the probability that the number on the card is an even number? **(A)** $\frac{12}{25}$ **(B)** $\frac{1}{2}$ **(C)** $\frac{2}{5}$ **(D)** $\frac{1}{5}$
Q.16.	In the figure, O is the centre of the circle. If the area of the sector OAPB is $\frac{5}{18}$ of the area of the circle, then the value of x is  **(A)** 100° **(B)** 120° **(C)** 40° **(D)** 20°
Q.17.	2 cards of hearts and 4 cards of spades are missing from a pack of 52 cards. A card is drawn at random from the remaining pack. What is the probability of getting a black card? **(A)** $\frac{22}{52}$ **(B)** $\frac{22}{46}$ **(C)** $\frac{24}{52}$ **(D)** $\frac{24}{46}$
Q.18.	If 'p' and 'q' are natural numbers and 'p' is the multiple of 'q', then what is the HCF of 'p' and 'q'? **(A)** pq **(B)** p **(C)** q **(D)** $p+q$

	DIRECTION: In question numbers 19 and 20, a statement of **Assertion (A)** is followed by a statement of **Reason (R).** Choose the correct option. (a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A). (b) Both Assertion (A) and Reason (R) are true and Reason (R) is not the correct explanation of Assertion (A). (c) Assertion (A) is true but Reason (R) is false. (d) Assertion (A) is false but Reason (R) is true.
Q.19.	***Statement A (Assertion):*** 12^n does not end with the digit zero, where n is natural number. ***Statement R (Reason):*** If any natural number ends with digit zero its prime factorisation will always include both 2 and 5 as its prime factors.
Q.20.	***Statement A (Assertion):*** C is the mid-point of PQ, if P is $(4, x)$, C is $(y, -1)$ and Q is $(-2, 4)$, then x and y respectively are -6 and 1. ***Statement R (Reason):*** The mid-point of the line segment joining the points is $P(x_1, y_1)$ and $Q(x_2, y_2)$ is $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$.
SECTION B	
Section B consists of 5 questions of 2 marks each	
Q.21.	In the given figure, if AB and AC are tangents to the circle with centre O such that $\angle BAC = 40°$ then what will be the value of $\angle BOC$ and $\angle OBC$? 

Q.22.	Solve for x and y: 2x – y – 3 = 0, 4 x – y – 5 = 0.
Q.23.	In the given figure, DB ⊥ BC, DE ⊥ AB and AC ⊥ BC. Prove that $\frac{BE}{DE} = \frac{AC}{BC}$.  **(OR)** In the figure, DE || AC and DF || AE. Prove that $\frac{BF}{FE} = \frac{BE}{EC}$. 
Q.24.	If $4 \tan\theta = 3$, evaluate $\frac{4\sin\theta - \cos\theta + 1}{4\sin\theta + \cos\theta - 1}$.
Q.25.	A pendulum swings through an angle of 30° and describes an arc 8.8 cm in length. Find the length of the pendulum. **(OR)** The shape of the top of a table in restaurant is that of a sector of a circle O and $\angle POQ = 90°$, if PO = OQ = 60 cm. Find the area of the top of the table. (Use π = 3.14). 

SECTION C	
Section C consists of 6 questions of 3 marks each	
Q.26.	Prove that $5 + 6\sqrt{7}$ is irrational given if $\sqrt{7}$ is an irrational number.
Q.27.	If α and β are zeroes of the quadratic polynomial $4x^2 + 4x + 1$, then form a quadratic polynomial whose zeroes are $2\alpha \; and \; 2\beta$.
Q.28.	If 99 x + 101 y = 499, 101 x + 99 y = 501, then solve the equations for the values of x and y. **(OR)** A shopkeeper gives books on rent for reading. She takes a fixed charge for the first two days, and an additional charge for each day thereafter. Latika paid Rs 22 for a book kept for six days, while Anand paid Rs 16 for the book kept for four days. Find the fixed charges and the charge for each extra day.
Q.29.	Evaluate: $\frac{2\,cos^2\,60° + 3\,sec^2\,30° - 2\,tan^2\,45°}{sin^2\,30° + \,cos^2\,45°}$. **(OR)** Prove that: $\frac{\tan\theta}{1-\cot\theta} + \frac{\cot\theta}{1-\tan\theta} - \sec\theta \; cosec\,\theta = 1.$
Q.30.	Prove that the lengths of tangents drawn from an external point to a circle are equal.

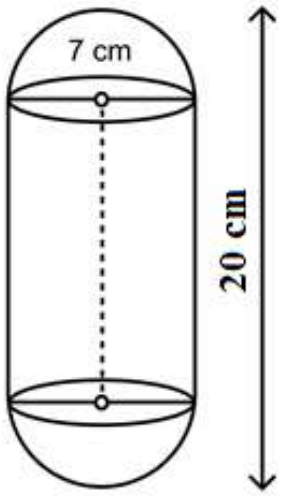
Q.31.	Naima is playing a game and has two identical 6-sided dice. The faces of the dice have 3 even numbers and 3 odd numbers. She has to roll the two dice simultaneously and has two options to choose from before rolling the dice. She wins a prize if: **Option 1**: the sum of the two numbers appearing on the top of the two dice is 8. **Option 2**: the product of the two numbers appearing on top of the two dice is 8. Find the probability of (i) getting the sum of the two numbers appearing on the top of two dice is 8. (ii) getting the product of the two numbers appearing on the top of two dice is 8. Which option should Naima choose so that her chances (probability) of winning a prize is higher?
SECTION D	
Section D consists of 4 questions of 5 marks each	
Q.32.	A motor boat whose speed is 18 km/h in still water takes 1 hour more to go 24 km upstream than to return downstream to the same spot. Find the speed of the stream. **(OR)** Solve for x: $\frac{1}{x-2}+\frac{2}{x-1}=\frac{6}{x}, x \neq 0,1,2.$
Q.33.	In the given figure, altitudes AD and CE of ΔABC intersect each other at the point P. Show that: (i) ΔAEP ~ ΔCDP (ii) ΔABD ~ ΔCBE (iii) ΔAEP ~ ΔADB 

Q.34.

A circus tent is in the shape of a cylinder surmounted by a conical top of same diameter. If their common diameter is 56 m, the height of the cylindrical part is 6 m and the total height of the tent above the ground is 27 m, find the area of the canvas used in making the tent.

(OR)

A toy is in the form cylinder with hemispherical ends. The total height of the toy is 20 cm and the diameter of the cylinder is 7 cm. Find the surface area and volume of air contained in the toy.



Q.35.

The following table gives the life time of 40 bulbs.

Life time (in hours)	Number of bulbs
40-50	4
50-60	6
60-70	13
70-80	10
80-90	2
90-100	5

Calculate the mean life time of a bulb.

SECTION E

Case study- based questions are compulsory

Q.36.

Case study-based question 1:

An interior designer, Sania, hired two painters, Manan and Bhima to make paintings for her buildings. Both painters were asked to make 50 different paintings each. The prices quoted by both the painters are given below:

Manan asked for ₹ 6000 for the first painting, and an increment of ₹ 200 for each following painting.

Bhima asked for ₹ 4000 for the first painting, and an increment of ₹ 400 for each following painting.

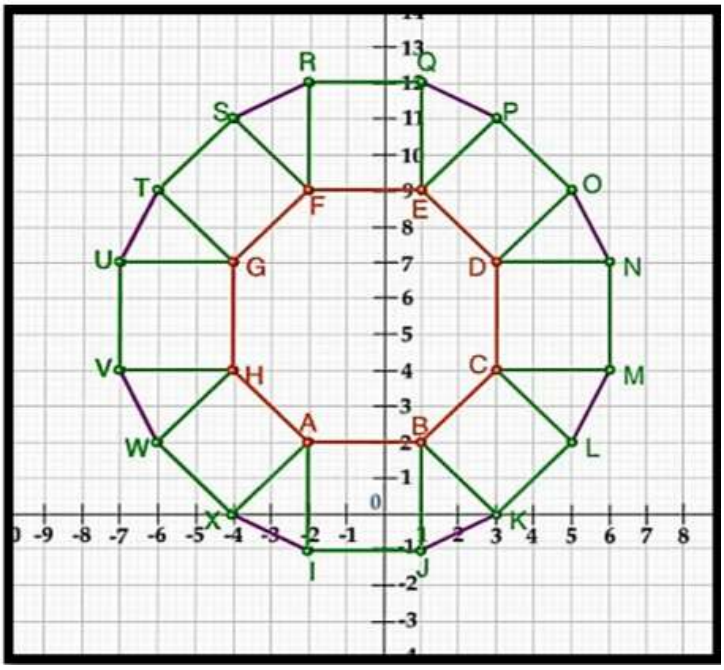
Now, answer the following questions based on the above given information.

I	According to the price quoted by Manan, what is the second term and common difference?	**(1 m)**
II	How much money did Manan get for his 25th painting?	**(1 m)**
III	(A) How much money did Bhima get in all?	**(2 m)**
	(OR)	
	(B) If both Manan and Bhima make paintings at the same pace, find the first painting for which Bhima will get more money than Manan.	**(2 m)**

Q.37.

Case study-based question 2:

A tiling or tessellation of a flat surface is the covering of a plane using one or more geometric shapes, called tiles, with no overlaps and no gaps. Historically, tessellations were used in ancient Rome and in Islamic art. You may find tessellation patterns on floors, walls, paintings etc. Shown below is a tiled floor in the archaeological Museum of Seville, made using squares, triangles and hexagons.



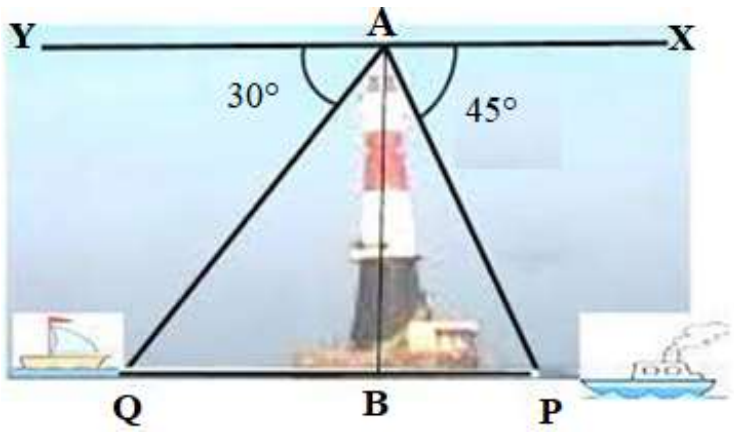
A craftsman thought of making a floor pattern after being inspired by the above design. To ensure accuracy in his work, he made the pattern on the Cartesian plane. He used regular octagons, squares and triangles for his floor tessellation pattern.

Now, answer the following questions based on the above given information.

I	What are the coordinates of A and B? **(1 m)**
II	(A) What is the length of the line segment joining points B and F? **(2 m)** **(OR)** (B) What is the area of Trapezium AFGH? **(2 m)**
III	In the figure, if the point of intersection of the diagonals of quadrilateral WXAH is centre Z, then what are the coordinates of Z? **(1 m)**

Q.38. **Case study-based question 3:**

A boy is standing on the top of light house. He observed that boat P and boat Q are approaching the light house from opposite directions. He finds that angle of depression of boat P is 45° and angle of depression of boat Q is 30°. He also knows that height of the light house is 100 m.



Now, answer the following questions.

I	What is the measure of ∠AQB?	**(1 m)**
II	If ∠XAP = 45°, then ∠APB is also 45°, why ?	**(1 m)**
III	(A) What is the length of PB?	**(2 m)**
	(OR)	
	(B) What is the length of QB?	**(2 m)**

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