STANDARD SET-B SET B (14)

KENDRIYA VIDYALAYA SANGATHAN, JAIPUR REGION

First Pre-Board EXAM 2023-24

CLASS: X **SUBJECT: MATHEMATICS - STANDARD (041)**

Duration: 3 Hours **Max. Marks: 80**

General Instructions:

1. This Question Paper has 5 Sections A, B, C, D and E.
2. Section A has 20 MCQs carrying 1 mark each
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 case based integrated units of assessment (04 marks each) with subparts of the values of 1, 1 and 2 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2marks questions of Section E
8. Draw neat figures wherever required. Take π =22/7 wherever required if not stated.

SECTION A

Section A consists of 20 questions of 1 mark each.

1.	If two positive integers a and b are written as $a = x^3y^2$ and $b = xy^3$; x, y are prime numbers, then HCF (a, b) is (a) xy (b) xy^2 (c) x^3y^3 (d) x^2y^2	1
2.	Nature of roots of quadratic equation $2x^2 - 4x + 3 = 0$ is (a) real (b) equal (c) not real (d) none of them	1
3.	If $\Delta ABC \sim \Delta EDF$, then which of the following is not true? (a) BC. EF = AC. FD (b) AB. EF = AC. DE (c) BC. DE = AB. EF (d) BC. DE = AB. FD	1
4.	If the distance between the points (2, –2) and (–1, x) is 5, one of the values of x is (a) –2 (b) 2 (c) –1 (d) 1	1
5.	The zeroes of the polynomial $x^2 - 3x - m(m + 3)$ are (a) m, m + 3 (b) –m, m + 3 (c) m, – (m + 3) (d) –m, – (m + 3	1
6.	The value of k for which the pair of equation $kx - y = 2$ and $6x - 2y = 3$ has unique solution (a) k = 3 (b) $k \neq 3$ (c) $k \neq 0$ (d) k = 0	1
7.	In figure, $\angle BAC = 90°$ and $AD \perp BC$. Then, (a) $BD . CD = BC^2$ (b) $AB . AC = BC^2$ (c) $BD . CD = AD^2$ (d) $AB . AC = AD^2$	1
8.	Find the greatest number of 5 digits, that will give us remainder of 5, when divided by 8 and 9 respectively. (a) 99921 (b) 99931 (c) 99941 (d) 99951	1
9.	Two circles touch each other externally at C and AB is common tangent of circles, then $\angle ACB$ is (a) 70° (b) 60° (c) 100° (d) 90°	1
10.	If $x = a \cos \theta$ and $y = b \sin \theta$, then the value of $b^2x^2 + a^2y^2$ is (a) $a^2 + b^2$ (b) a^2/b^2 (c) a^2b^2 (d) None of these	1
11.	Given that $\sin \alpha = 1/2$ and $\cos \beta = 1/2$, then the value of $(\beta - \alpha)$ is (a) 0° (b) 30° (c) 60° (d) 90°	1
12	If the difference of Mode and Median of a data is 24, then the difference of median and mean is (a) 8 (b) 12 (c) 24 (d) 36	1
13.	The ratio of outer and inner perimeters of circular path is 23:22. If the path is 5 m wide, the diameter of the inner circle is (a) 55 m (b) 110 m (c) 220 m (d) 230 m	1

14. If the circumference of a circle and the perimeter of a square are equal, then
(a) Area of the circle = Area of the square
(b) Area of the circle > Area of the square
(c) Area of the circle < Area of the square
(d) Nothing definite can be said about the relation between the areas of the circle and square.

15. A card is selected from a deck of 52 cards. The probability of being a red face card is — 1
(a) 3/26 (b) 3/13 (c) 2/13 (d) 1/2

16. The value of (sin 45° + cos 45°) is — 1
(a) $1\sqrt{2}$ (b) $\sqrt{2}$ (c) $\sqrt{3}/2$ (d) 1

17. Consider the following distribution: — 1

Marks obtained	Number of students
More than or equal to 0	63
More than or equal to 10	58
More than or equal to 20	55
More than or equal to 30	51
More than or equal to 40	48
More than or equal to 50	42

the frequency of the class 30-40 is
(a) 4 (b) 48 (c) 51 (d) 3

18. Volume and surface area of a solid hemisphere are numerically equal. What is the diameter of hemisphere? — 1
(a) 9 units (b) 6 units (c) 4.5 units (d) 18 units

ASSERTION REASON BASED QUESTIONS:
In the question number 19 and 20, a statement of Assertion(A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices
(a)Both (A) and (R) are true and (R) is the correct explanation of (A).
(b)Both A and (R) are true and (R) is not the correct explanation of (A).
(c)(A) is true but (R) is false.
(d)(A) is false but (R) is true.

19. **Assertion (A):** The point (0, 4) lies on y-axis. — 1
Reason (R): The y co-ordinate of the point on x-axis is zero

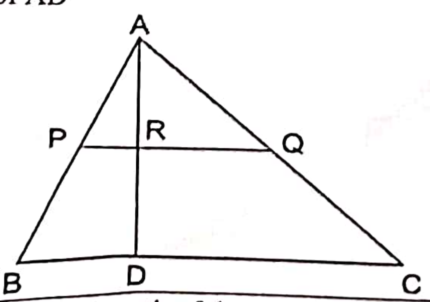
20. **Assertion (A):** 6^n never ends with the digit zero, where n is natural number. — 1
Reason (R): Any number ends with digit zero, if its prime factor is of the form $2^m \times 5^n$, where m, n are natural numbers

SECTION B

Section B consists of 5 questions of 2 marks each.

21. If the system of equations 2x + 3y = 7 and (a + b)x + (2a – b)y = 21 has infinitely many solutions, then find a and b. — 2

22. In the given figure, AP = 3 cm, AR = 4.5 cm, AQ = 6 cm, AB = 5 cm, AC = 10 cm. Find the length of AD — 2



23. Find the length of the tangent from an external point P at a distance of 20 cm from the centre of a circle of radius 12 cm. — 2

24. Simplify: $\frac{\tan^2\theta}{1+\tan^2\theta}+\frac{\cot^2\theta}{1+\cot^2\theta}$ — 2

OR

$7\sin^2 A + 3\cos^2 A = 4$,then find tanA

25. Find the area of the sector of a circle with radius 4 cm and of angle 30°. Also, find the area of the corresponding major sector. (Use $\pi = 3.14$) — 2

OR

What is the angle subtended at the centre of a circle of radius 10 cm by an arc of length 5π cm?

SECTION C

Section C consists of 6 questions of 3 marks each

26. Four bells toll at an interval of 8, 12, 15 and 18 seconds respectively. All the four begin to toll together. Find the number of times they toll together in one hour excluding the one at the start. — 3

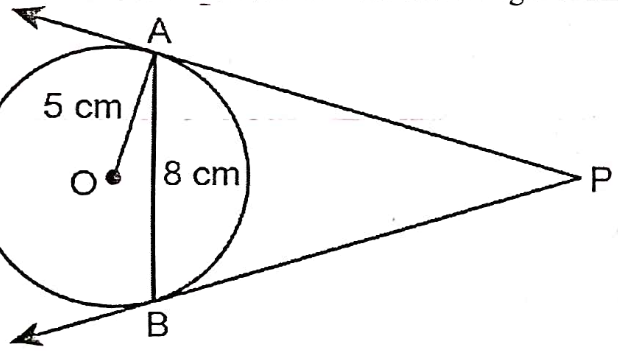
27. If the zeroes of the polynomial $x^2 + px + q$ are double in value to the zeroes of $2x^2 - 5x - 3$, then find the values of p and q — 3

OR

Find the quadratic polynomial sum and product of whose zeros are –1 and –20 respectively. Also find the zeroes of the polynomial so obtained.

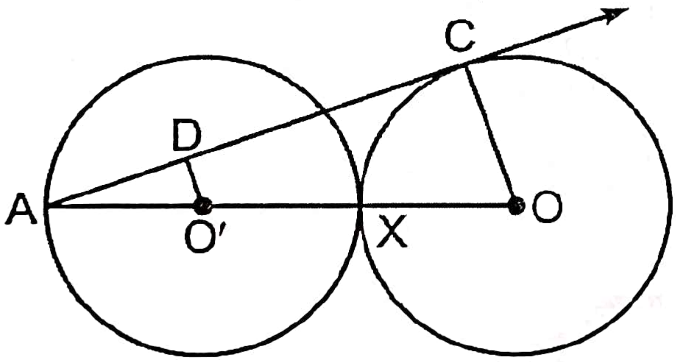
28. Two numbers are in the ratio of 1 : 3. If 5 is added to both the numbers, the ratio becomes 1 : 2. Find the numbers. — 3

29. In the given figure, AB is a chord of length 8 cm of a circle of radius 5 cm. The tangents to the circle at A and B intersect at P. Find the length of AP. — 3



OR

In the below figure, two equal circles, with centres O and O', touch each other at X. OO' produced meets the circle with centre O' at A. AC is tangent to the circle with centre O, at the point C. O'D is perpendicular to AC. Find the value of $\frac{DO'}{CO}$.



30. If $\tan\theta = \frac{a}{b}$, prove that $\frac{a\sin\theta - b\cos\theta}{a\sin\theta + b\cos\theta} = \frac{a^2-b^2}{a^2+b^2}$ — 3

31. Two dice are thrown at the same time. What is the probability that the sum of the two numbers appearing on the top of the dice is — 3

(i) 5? (ii) 10? (iii) at least 9?

SECTION D

Section D consists of 4 questions of 5 marks each

32. A motorboat whose speed in still water is 9 km/h, goes 15km downstream and comes back to the same spot, in a total time of 3 hours 45 minutes. Find the speed of the stream. 5

OR

A takes 6 days less than the time taken by B to finish a piece of work. If both A and B together can finish it in 4 days, find the time taken by B to finish the work alone.

33. State and prove Basic Proportional Theorem. 5

34. A toy is in the form of a hemisphere surmounted by a right circular cone of the same base radius as that of the hemisphere. If the radius of the base of the cone is 21 cm and its volume is 2/3 of the volume of the hemisphere, calculate the height of the cone and the surface area of the toy. 5

OR

A vessel full of water is in the form of an inverted cone of height 8 cm and the radius of its top, which is open, is 5 cm. 100 spherical lead balls are dropped into the vessel. One fourth of the water flows out of the vessel. Find the radius of a spherical ball.

35. If the median of the following distribution is 58 and sum of all the frequencies is 140. What is the value of x and y? 5

Class	15 – 25	25 – 35	35 – 45	45 – 55	55 – 65	65 – 75	75 – 85	85 – 95
Frequency	8	10	x	25	40	y	15	7

SECTION E

Section E consists of 3 Case Studies of 4 marks each

36. Manpreet Kaur is the national record holder for women in the shot-put discipline. Her throw of 18.86m at the Asian Grand Prix in 2017 is the maximum distance for an Indian female athlete. Keeping her as a role model, Sanjitha is determined to earn gold in Olympics one day. Initially her throw reached 7.56m only. Being anathlete in school, she regularly practiced both in the mornings and in the evenings and was able to improve the distance by 9cm every week. During the special camp for 15 days, she started with 40 throws and every day kept increasing the number of throws by 12 to achieve this remarkable progress

(i) How many throws Sanjitha practiced on 11th day of the camp? 1

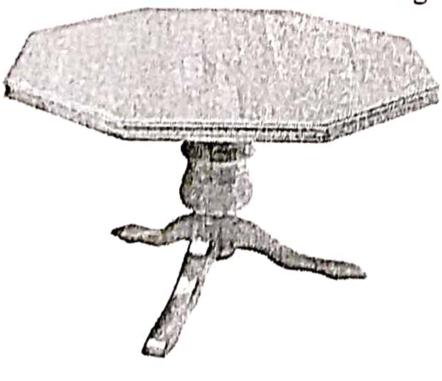
(ii) What would be Sanjitha's throw distance at the end of 6 weeks?

OR

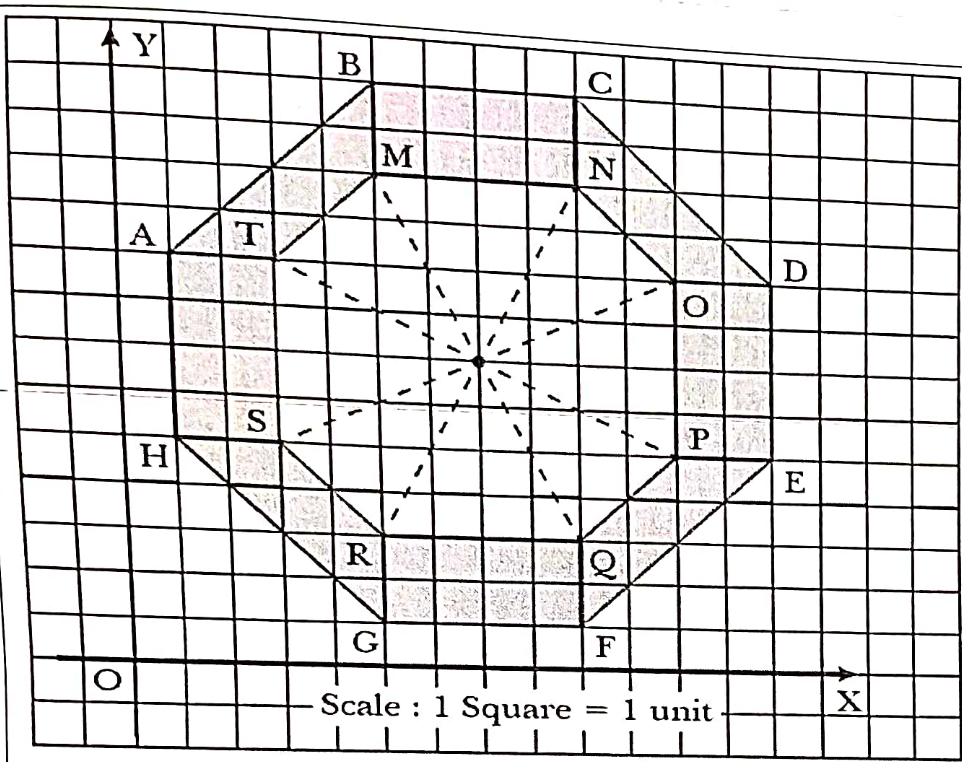
When will she be able to achieve a throw of 11.16 m? 2

(iii) How many throws did she do during the entire camp of 15 days ? 1

37. The top of a table is shown in the figure given below:



4|5



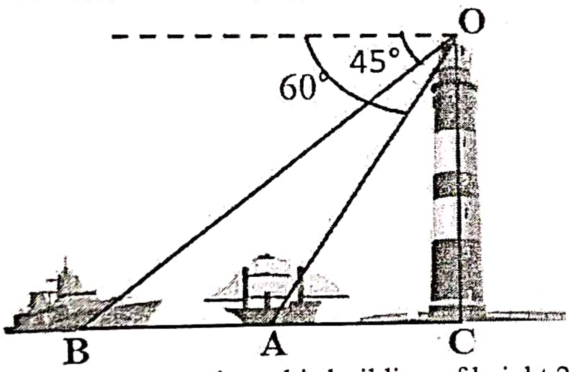
On the basis of information given, answer the following questions.

(i) Find the distance between points A and B.
(ii) Write the co-ordinates of the mid point of line segment joining points M and Q.
(iii) If G is taken as the origin, and x, y axis put along GF and GB, then find the point denoted by coordinate (4, 2). 1 1

OR

Find the coordinates of H, G and also find the distance between them. 2

38. A person/observer on the sea coast observes two ships in the sea, both the ships are in same straight path one behind the other.



If the observer is on his building of height 20 meters (including observer) and he observes the angle of depression of two ships as 45° and 60° respectively.

On the basis of above information answer the following questions.

(i) If a person observes a ship whose angle of depression is 60° then how much distance is the ship away from him? 1
(ii) If a person observes another ship whose angle of depression is 45° then how much distance that ship is away from him? 1
(iii) If a person observes the ship whose angle of depression changes from 60° to 30° then how far be ship from the observer if the observer is at 20 m of height (including him)? 2

OR

Find the distance between the ships A and B when the angle of depressions are 60° and 45° respectively.

STANDARD Set-B

SET II

KENDRIYA VIDYALAYA SANGATHAN, JAIPUR REGION

MARKING SCHEME

I Pre-Board EXAMINATION: 2023-24

CLASS X

Max.Marks: 80

SUBJECT: MATHEMATICS - STANDARD (041)

Duration: 3 hrs

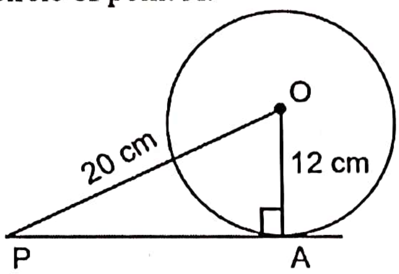
SECTION A

Section A consists of 20 questions of 1 mark each.

1.	B	1
2.	C	1
3.	C	1
4.	B	1
5.	B	1
6.	B	1
7.	C	1
8.	C	1
9.	D	1
10.	C	1
11.	B	1
12.	B	1
13.	C	1
14.	B	1
15.	A	1
16.	B	1
17.	D	1
18.	A	1
19.	B	1
20.	A	1

SECTION B

Section B consists of 5 questions of 2 marks each.

21.	Ans: Given system of equations $2x + 3y = 7$ ...(i) $(a + b)x + (2a - b)y = 21$ ...(ii) Equations have infinitely many solutions, if $\frac{2}{a+b} = \frac{3}{2a-b} = \frac{7}{21} = \frac{1}{3} \Rightarrow \frac{2}{a+b} = \frac{1}{3}$ $\Rightarrow 6 = a + b \Rightarrow a + b = 6$ ...(i) and $\frac{3}{2a-b} = \frac{1}{3} \Rightarrow 2a - b = 9$ ...(ii) On solving equation (i) and (ii), we get $a = 5, b = 1$	1 1
22.	Ans: In ΔABC, $\frac{AP}{AB} = \frac{3}{5}$ .... (i) $\frac{AQ}{AC} = \frac{6}{10} = \frac{3}{5}$ .... (ii) From (i) and (ii), we get $\frac{AP}{AB} = \frac{AQ}{AC} \Rightarrow PQ \parallel BC$ In ΔABD, $PR \parallel BD \Rightarrow \frac{AP}{AB} = \frac{AR}{AD} \Rightarrow \frac{3}{5} = \frac{4.5}{AD} \Rightarrow AD = 7.5cm$	1 1
23.	Ans: Let PA be the tangent to the circle of point A.  Here, OP = 20 cm and OA = 12 cm Since PA is tangent of A, therefore OA = PA. In right angled triangle ΔOAB, $OP^2 = PA^2 + OA^2$ (Using Pythagoras Theorem) $\Rightarrow (20)^2 = PA^2 + (12)^2 \Rightarrow PA^2 = 400 - 144 = 256$ $\Rightarrow PA = 16$ cm Hence, Length of tangent be 16 cm.	½ ½ 1
24.	. Simplify: $\frac{\tan^2\theta}{1+\tan^2\theta} + \frac{\cot^2\theta}{1+\cot^2\theta}$ Ans: $\frac{\tan^2\theta}{1+\tan^2\theta} + \frac{\cot^2\theta}{1+\cot^2\theta} = \frac{\tan^2\theta}{\sec^2\theta} + \frac{\cot^2\theta}{\operatorname{cosec}^2\theta}$ $= \frac{\sin^2\theta}{\cos^2\theta} \times \frac{\cos^2\theta}{1} + \frac{\cos^2\theta}{\sin^2\theta} \times \frac{\sin^2\theta}{1} = \sin^2\theta + \cos^2\theta = 1$ **OR** If $7\sin^2A + 3\cos^2A = 4$, then find tan A Ans: Given, $7\sin^2A + 3\cos^2A = 4$ Dividing both sides by $\cos^2A$, we get $7\tan2A + 3 = 4\sec^2A$ [$\because \sec^2\theta = 1 + \tan^2\theta$] $\Rightarrow 7\tan^2A + 3 = 4(1 + \tan^2A)$ $\Rightarrow 7\tan^2A + 3 = 4 + 4\tan^2A$ $\Rightarrow 3\tan^2A = 1 \Rightarrow \tan^2A = 1/3 \Rightarrow \tan A = 1/\sqrt{3}$	1 1 ½ 1 ½

25	Ans: $Area\ of\ sector\ AOB = \frac{\pi r^2\theta}{360^0} = \frac{3.14\times4^2\times30^0}{360^0} = 4.19cm^2$ Area of major sector = Area of circle – Area of sector AOB $= \pi r^2 - 4.19 = 3.14 \times 16 - 4.19 = 46.1\ cm^2$ **OR** Ans: $Arc\ length\ of\ a\ circle\ of\ radius\ r = \frac{\theta}{360^0}\times 2\pi r$ $\Rightarrow 5\pi = \frac{\theta}{360^0}\times2\pi\times10 \Rightarrow \frac{\theta}{360^0} = \frac{5\pi}{20\pi} = \frac{1}{4}$ $\Rightarrow \theta = 90^0$	1 1 1 1
	SECTION C	
	Section C consists of 6 questions of 3 marks each	
26.	Ans: Prime factorisation of the given numbers are: $8 = 2 \times 2 \times 2 = 2^3$ $12 = 2 \times 2 \times 3 = 2^2 \times 3^1$ $15 = 3 \times 5 = 3^1 \times 5^1$ $18 = 2 \times 3 \times 3 = 2^1 \times 3^2$ LCM (8, 12, 15 and 18) $= 2^3 \times 3^2 \times 5^1 = 8 \times 9 \times 5 = 360$ sec = 6 min ∴ Four bells toll together in one hour $= 60 \div 6 = 10$ times.	1 1 1
27.	Let α and β be the zeroes of $2x^2 - 5x - 3$. $\therefore\ \alpha + \beta = \frac{5}{2},\quad \alpha\beta = \frac{-3}{2}$ As per the question, It is given that 2α, 2β are the zeroes of $x^2 + px + q$ $\therefore\ 2\alpha + 2\beta = -p$ $\Rightarrow\ 2(\alpha + \beta) = -p\ \Rightarrow\ 2\times\frac{5}{2} = -p \Rightarrow p = -5$ Also, $(2\alpha)(2\beta) = q\ \Rightarrow\ 4\alpha\beta = q$ $\Rightarrow\ \alpha\beta = \frac{q}{4} \Rightarrow \frac{-3}{2} = \frac{q}{4}\ \Rightarrow q = -6$ **OR** Ans: Let α and β be the zeros of the quadratic polynomial. ∴ Sum of zeros, $\alpha + \beta = -1$ and product of zeros, $\alpha.\ \beta = -20$ Now, quadratic polynomial be $x^2 - (\alpha + \beta).x + \alpha\beta = x^2 - (-1)x - 20 = x^2 + x - 20$ Now, for zeroes of this polynomial $x^2 + x - 20 = 0 \Rightarrow x^2 + 5x - 4x - 20 = 0$ $\Rightarrow x(x + 5) - 4(x + 5) = 0 \Rightarrow (x + 5)(x - 4) = 0$ $\Rightarrow x = -5, 4$ ∴ zeroes are – 5 and 4	1 1 1 1 1 1

28. Ans: Let two numbers are x and y respectively such that its fraction = x/y.

According to the question, $\frac{x}{y}=\frac{1}{3}$

$\Rightarrow 3x = y \Rightarrow y = 3x$...(i) — 1

Also, $\frac{x+5}{y+5}=\frac{1}{2}$

$\Rightarrow 2x + 10 = y + 5 \Rightarrow 2x - y = -5$ ...(ii) — 1

Putting the value of y=3x in (ii), we get

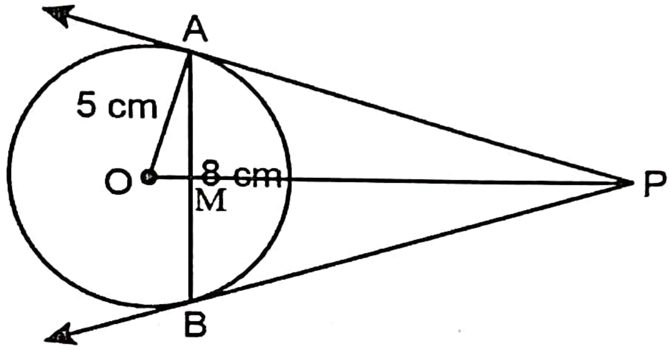
$2x - 3x = -5 \Rightarrow -x = -5 \Rightarrow x = 5$ — ½

Putting the value of x = 5 in (i), we get $y = 3\times5 = 15$

Hence, Numbers are 5 and 15. — ½

29. Ans: AB = 8 cm ⇒ AM = 4 cm

$\therefore OM = \sqrt{(5^2 - 4^2)} = 3$ cm — ½



Let AP = y cm, PM = x cm

$\therefore$ ΔOPA is a right angle triangle

$\therefore OP^2 = OA^2 + AP^2$

$(x + 3)^2 = y^2 + 25$ — ½

$\Rightarrow x^2 + 9 + 6x = y^2 + 25$ ...(i)

Also, $x^2 + 42 = y^2$ ...(ii)

$\Rightarrow x^2 + 6x + 9 = x^2 + 16 + 25$ — ½

$\Rightarrow 6x = 32$

$\Rightarrow x = 32/6 = 16/3$ cm — ½

$\therefore y^2 = x^2 + 16 = 256/9 + 16 = 400/9$ — ½

$\Rightarrow y = 20/3$ cm — ½

OR

Ans: AC is tangent to circle with centre O.

Thus ∠ACO = 90° — ½

In ΔAO'D and ΔAOC

∠ADO' = ∠ACO = 90°

∠A = ∠A (Common)

$\therefore$ ΔAO'D ~ ΔAOC (By AA similarity) — 1

$\Rightarrow \frac{AO'}{AO}=\frac{DO'}{CO}$ — ½

Now, AO = AO' + O' X + XO = 3r

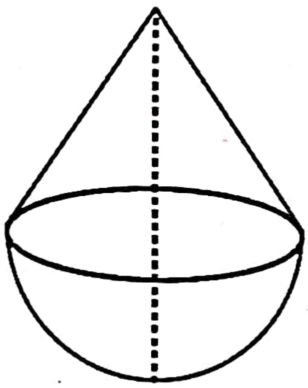
$\therefore \frac{DO'}{CO}=\frac{r}{3r}=\frac{1}{3}$ — 1

30.	Ans: $LHS = \dfrac{a\sin\theta - b\cos\theta}{a\sin\theta + b\cos\theta} = \dfrac{a\dfrac{\sin\theta}{\cos\theta} - b}{a\dfrac{\sin\theta}{\cos\theta} + b} = \dfrac{a\tan\theta - b}{a\tan\theta + b}$	1
	$= \dfrac{a\tan\theta - b}{a\tan\theta + b} = \dfrac{a\times\dfrac{a}{b} - b}{a\times\dfrac{a}{b} + b} = \dfrac{\dfrac{a^2-b^2}{b}}{\dfrac{a^2+b^2}{b}} = \dfrac{a^2-b^2}{a^2+b^2} = RHS$	1+1
31.	Ans: Total number of outcomes = 36 (i) Number of outcomes in which the sum of the two numbers is 5 = 4 ∴ Required Probability = 4/36 = 1/9 (ii) Number of outcomes in which the sum of the two numbers is 10 = 3 ∴ Required Probability = 3/36 = 1/12 (i) Number of outcomes in which the sum of the two numbers is at least 9 = 10 ∴ Required Probability = 10/36 = 5/18	1 1 1

SECTION D

Section D consists of 4 questions of 5 marks each

32.	Ans: Let speed of stream be x km/h. Given, Speed of boat = 9 km/h Distance covered upstream = 15 km Distance covered downstream = 15 km Total time taken = 3 hours 45 minutes = 15/4 hours Now, Speed of boat upstream = 9 − x km/h Speed of boat downstream = 9 + x km/h	1
	According to the question, $\dfrac{15}{9+x} + \dfrac{15}{9-x} = \dfrac{15}{4}$	1
	$\Rightarrow \dfrac{1}{9+x} + \dfrac{1}{9-x} = \dfrac{1}{4} \Rightarrow \dfrac{9-x+9+x}{(9+x)(9-x)} = \dfrac{1}{4} \Rightarrow \dfrac{18}{(9+x)(9-x)} = \dfrac{1}{4}$	1
	$\Rightarrow \dfrac{18}{81-x^2} = \dfrac{1}{4}$ $\Rightarrow 81 - x^2 = 72$	1
	$\Rightarrow x^2 = 9$ $\Rightarrow x = 3$ (x is the speed of the stream and thus cannot have negative value) Thus, the speed of the stream is 3 km/hr.	1
	OR	

	Ans: Let B takes a total of x days to complete the work alone. So as know that A takes 6 days less than B we can write that A takes x - 6 days to complete the work alone. Work done by B in a day = $\frac{1}{x}$ Work done by A in a day = $\frac{1}{x-6}$ According to the question, $\frac{1}{x}+\frac{1}{x-6}=\frac{1}{4}\Rightarrow\frac{x-6+x}{x(x-6)}=\frac{1}{4}\Rightarrow\frac{2x-6}{x(x-6)}=\frac{1}{4}$ $\Rightarrow 8x - 24 = x^2 - 6x$ $\Rightarrow x^2 - 14x + 24 = 0$ $\Rightarrow x^2 - 12x - 2x + 24 = 0$ $\Rightarrow x(x - 12) - 2(x - 12) = 0$ $\Rightarrow x = 2, 12$ We will reject x = 2 as x − 6 will become negative. Hence, B takes 12 days to complete the work alone.	1 1½ 1 1 ½
33.	**Statement** **Construction, To Prove , Figure** **Correct Proof**	1 1½ 2½
34.	 According to question, Volume of cone = $\frac{2}{3}$ × volume of hemisphere $\Rightarrow\frac{1}{3}\pi r^2 h=\frac{2}{3}\times\frac{2}{3}\pi r^3\Rightarrow h=\frac{4}{3}r=\frac{4}{3}\times 21=28cm$ Slant height, $l=\sqrt{r^2+h^2}=\sqrt{21^2+28^2}=35cm$ Total surface area = $CSA_{cone}+CSA_{hemisphere}=\pi rl+2\pi r^2=\pi r(l+2r)$ $=\frac{22}{7}\times 21\times(42+35)=22\times 3\times 77=5082cm^2$ **OR**	1 1 1 2

Ans: Height (h) of the cone = 8 cm and radius (r) of the cone = 5 cm

$\therefore$ Volume of water flows out = $\frac{1}{4}$ × volume of cone

$= \frac{1}{4} \times \frac{1}{3} \pi r^2 h = \frac{1}{12} \times \pi \times 25 \times 8$

$\therefore$ Volume of water flows out = 100× volume of spherical ball 1

$\Rightarrow \frac{1}{12} \times \pi \times 25 \times 8 = 100 \times \frac{4}{3} \pi R^3$ 1

$\Rightarrow R^3 = \frac{1}{8} \Rightarrow R = \frac{1}{2} cm = 0.5 cm$ 1

2

35. For correct table.. 1

Variable	Frequency	c.f.
15-25	8	8
25-35	10	18
35-45	x	$18 + x$
45-55	25	$43 + x$
55-65	40	$83 + x$
65-75	y	$83 + x + y$
75-75	15	$98 + x + y$
85-95	7	$105 + x + y$
Total	$105 + x + y$	

And, $105 + x + y = 140$

$\Rightarrow x + y = 35$ (i) ½

Here, Median = 58

Then, median class is 55-65, $l = 55$, $\frac{N}{2} = \frac{140}{2} = 70$ ½ +½

Then, c.f. = $43 + x$ $f = 40$ ½

$$\text{Median} = l + \left(\frac{\frac{N}{2} - c.f.}{f}\right) \times h$$

$\Rightarrow 58 = 55 + \left(\frac{70 - 43 - x}{40}\right) \times 10$ 1

$\Rightarrow 3 = \frac{27 - x}{4} \Rightarrow 12 = 27 - x$

$\Rightarrow x = 27 - 12 = 15 \Rightarrow y = 35 - 15 = 20$

1

SECTION E

Section E consists of 3 Case Studies of 4 marks each

36. (i) Number of throws during camp. a = 40; d = 12

$t_{11} = a + 10d$

$= 40 + 10 \times 12$

$= 160$ *throws* 1

(ii) a = 7.56 m; d = 9cm = 0.09 m

n = 6 weeks

$t_n = a + (n-1) d$ 1

= 7.56 + 6(0.09)

= 7.56 + 0.54

Sanjitha's throw distance at the end of 6 weeks = 8.1 m 1

OR

a = 7.56 m; d = 9cm = 0.09 m

t_n = 11.16 m

$t_n = a + (n-1) d$ 1

11.16 = 7.56 + (n-1) (0.09)

3.6 = (n-1) (0.09)

$n-1 = \frac{3.6}{0.09} = 40$ 1

n = 41

Saniitha's will be able to throw 11.16 m in 41 weeks.

(iii) a = 40; d = 12; n = 15

$S_n = \frac{n}{2}[2a + (n-1) d]$

$S_n = \frac{15}{2}[2(40) + (15-1)(12)]$ ½

$= \frac{15}{2}[80 + 168]$

$= \frac{15}{2}[248]$ = 1860 throws

½

37. Ans: (i) Distance between A(1, 9) and B(5, 13) is

$= \sqrt{(5-1)^2 + (13-9)^2} = \sqrt{16+16} = \sqrt{32} = 4\sqrt{2} units$ 1

(ii) Midpoint of the line segment joining M(5, 11) and Q(9, 3) is given by

$\left(\frac{5+9}{2}, \frac{11+3}{2}\right) = \left(\frac{14}{2}, \frac{14}{2}\right) = (7,7)$ 1

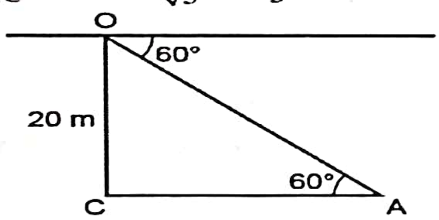
(iii) If G is (0, 0) then Q is (4, 2).

OR

As per graph the coordinate of H is (1, 5) and of G is (5, 1). 2

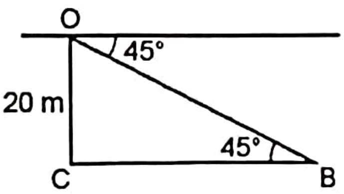
Distance HG $= \sqrt{(5-1)^2 + (1-5)^2} = \sqrt{16+16} = \sqrt{32} = 4\sqrt{2} units$

38. (i) $\tan 60^\circ = \frac{OC}{AC} \Rightarrow \sqrt{3} = \frac{20}{AC} \Rightarrow AC = \frac{20}{\sqrt{3}} = \frac{20\sqrt{3}}{3} m = 11.55m$



1

(ii) $\tan 45^\circ = \frac{OC}{BC} \Rightarrow 1 = \frac{20}{BC} \Rightarrow BC = 20m$

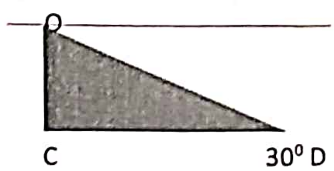


1

(iii) Sin30⁰ = OC/OD

½ = 20/OD

OD = 40 m



OR

Distance between two ships = BC – AC = 20-11.55 = 8.45 m 2