केंद्रीय विद्यालय संगठन, बेंगलुरु संभाग

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प्रथम प्री-बोर्ड परीक्षा २०२४-२५

FIRST PRE-BOARD EXAMINATION-2024-25

MARKING SCHEME

Class: X **Max Marks: 80**

Subject: MATHEMATICS (BASIC) **Code: 241**

Time: 3 hrs

	SECTION A	
1	a)3	**1**
2	a) consistent with unique solution	**1**
3	c) $\frac{4}{3}$	**1**
4	b) 5	**1**
5	c) 32cm	**1**
6	d)ΔABC ~ ΔDFE	**1**
7	b)2:1	**1**
8	a)1	**1**
9	d) $3\sqrt{3}$cm	**1**
10	a)60^0	**1**
11	a) $3x^2-3\sqrt{2}x+1$	**1**
12	c) (2, -1)	**1**
13	b) tan 30^0	**1**
14	a)$\frac{3}{26}$	**1**
15	a)54	**1**
16	d)$\frac{20}{3}$	**1**
17	b)360 cm^2	**1**
18	d) 35	**1**
19	a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)	**1**
20	c) Assertion **(A)** is true but reason **(R)** is false.	**1**

SECTION B

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tan (A + B) = √3
tan(A+B)=tan60^0
(A+B)=60^0 ... (i) ½
tan (A - B) = 1/√3
tan(A−B)=tan30^0
(A−B)=30^0 ... (ii)
Adding (i) and (ii); we get, ½
A+B+A−B=60^0+30^0
2A=90^0 ½
A=45^0
Putting the value of A in equation (i),
45^0+B=60^0
⇒B=60^0−45^0
⇒B=15^0 ½
Thus, A = 45^0 and B = 15^0

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class interval	frequency	cumulative frequency
0 – 20	4	4
20 - 40	6	10 (c f)
(l)40 – 60	5 (f)	15
60 - 80	3	18
80 - 100	4	22
Total	n = 22	

½

n/2 = 22/2 = 11, then the median class is (40-60) ½
Median = 40 + $\left[\frac{11-10}{5}\right]20$ ½
= 40 + $\frac{1}{5}$ × 20
= 40 + 4 = 44 ½
median of the given data = 44 runs

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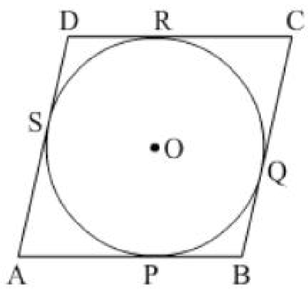
The midpoint of the line segment joining the points A(3, 4) and B(k, 6) is P(x, y)
[(3 + k)/2, (4 + 6)/2] = (x, y) ½
[(3 + k)/2, (10)/2] = (x, y)
[(3 + k)/2, 5] = (x, y)
So, x = 3 + k/2 and y = 5 ½
Put the value of x and y in the given equation of the line x + y -10 = 0
(3 + k)/2 + 5 - 10 = 0 ½
(3 + k)/2 - 5 = 0
(3 + k)/2 = 5
3 + k = 10
k = 10 - 3
k = 7 ½

(OR)

	Let the point lying on X axis which is equidistant from A(2,−2) and B(−4,2) be P(x,0) PA = PB $\sqrt{(x-2)^2+(0-(-2))^2} = \sqrt{(x-(-4))^2+(0-2)^2}$ $\left(\sqrt{(x-2)^2+(0-(-2))^2}\right)^2 = \left(\sqrt{(x-(-4))^2+(0-2)^2}\right)^2$ $(x-2)^2 + 2^2 = (x+4)^2 + (-2)^2$ $x^2 + 4 – 4x + 4 = x^2 + 16 + 8x + 4$ 8−4x=20+8x 8−20=8x+4x −12=12x 12x=−12 x=−1 Therefore the point is P(-1,0)	½ ½ ½ ½
24	$a_n = n^2 + 1$. Substituting the values, we get, $a_1 = 1^2 + 1 = 2$ $a_2 = 2^2 + 1 = 5$ $a_3 = 3^2 + 1 = 10$ The sequence becomes 2, 5, 10, ... $a_2 - a_1 \neq a_3 - a_2$ $5 - 2 \neq 10-5$, Therefore, the above statement does form an A.P. **(OR)** a=27 d=24−27=−3 a_n=a+(n−1)d 0=27+(n−1)(−3) 0=27−3(n−1) 3(n−1)=27 n−1=273 n−1=9 n=9+1 n=10 The 10th term of the given AP is 0	 ½ ½ ½ ½ ½ ½ ½ ½
25	Perimeter of ΔPCD = PC + CD + PD = PC + CE + ED + PD = PC + CA + DB + PD = PA + PB = 2PA = 2(10) = 20 cm [∵ CE = CA, DE = DB, PA = PB tangents from internal point to a circle are equal]	½ ½ ½ ½

	SECTION C	
26	Let us assume, to the contrary, that $\sqrt{3}$ is rational. $\sqrt{3}= a/ b$ · (a and b are coprime.) So, $\sqrt{3}b = a$· Squaring on both sides $(\sqrt{3}b)^2 = (a)^2$. $3b^2 = a^2$ a^2 is divisible by 3, a is also divisible by 3. Let a = 3c for some integer c. Substituting for a, we get $3b^2 = 9c^2$ $b^2 = 3c^2$ b^2 is divisible by 3 b is also divisible by 3 Therefore, a and b have at least 3 as a common factor. But this contradicts the fact that a and b are coprime. This contradiction has arisen because of our incorrect assumption that $\sqrt{3}$ is rational. So, we conclude that $\sqrt{3}$ is irrational.	½ ½ ½ ½ ½ ½
27	Let the ones place digit be'y' and tens place digit be 'x' Original number = 10x + y Reversing the digits, one's place and ten's place interchanged. Reversed number = 10y + x Given 7(10x + y) = 4(10y + x) 70x + 7y = 40y + 4x 66x = 33y y = 2x …. (1) Also y – x = 3 Substituting 'y' value from equation (1) 2x – x = 3 x = 3 So y = 2x = 2(3) = 6 ∴The original two digit number is 10x + y = 10(3) + 6 = 36 .	½ ½ ½ ½ ½ ½
28	Let ABCD be the rhombus circumscribing the circle with centre O, such that AB, BC, CD and DA touch the circle at points P, Q, R and S respectively. ∴ AP = AS ...(i) [tangents from A] BP = BQ ...(ii) [tangents from B] CR = CQ ...(iii) [tangents from C] DR = DS ...(iv) [tangents from D]  ∴ AB + CD = AP + BP + CR + DR = AS + BQ + CQ + DS [From (i), (ii), (iii), (iv)] = (AS + DS) + (BQ + CQ) = AD + BC Hence, (AB + CD) = (AD + BC) ⇒ 2AB = 2AD [∵ opposite sides of a parallelogram are equal] ⇒ AB = AD	½ ½ ½ ½ ½

$\therefore$ CD = AB = AD = BC

Hence, ABCD is a rhombus ½

(OR)

Given , To prove, Diagram, Construction **1 ½**

Correct proof **1 ½**

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Given that, the line segment joining the points A(3, 2) and B(5, 1) is divided at the point P in the ratio 1 : 2.

$\therefore$ Coordinate of point P = $\left(\frac{1x5+2x3}{1+2}, \frac{1x1+2x2}{1+2}\right)$ **1**

$= \left(\frac{5+6}{3}, \frac{1+4}{3}\right) = \left(\frac{11}{3}, \frac{5}{3}\right)$ ½

P$\left(\frac{11}{3}, \frac{5}{3}\right)$lies on the line 3x – 18y + k = 0 ...[Given]

$\therefore 3\left(\frac{11}{3}\right)-18\left(\frac{5}{3}\right)+k = 0$ ½

$\Rightarrow$ 11 – 30 + k = 0

$\Rightarrow$ k – 19 = 0 ½

$\Rightarrow$ k = 19

Hence, the required value of k is 19. ½

(OR)

Let P and Q be the points of trisection of the line segment joining A(4, -1) and B(- 2, -3).

P divides A, B in the ratio 1 : 2. ½

Therefore, the coordinates of P is given by

P = $\left(\frac{1x(-2)+2x4}{1+2}, \frac{1x(-3)+2x(-1)}{1+2}\right)$ ½

$= \left(\frac{-2+8}{3}, \frac{-3-2}{3}\right) = \left(\frac{6}{3}, \frac{-5}{3}\right) = \left(2, \frac{-5}{3}\right)$ ½

Q is the midpoint of PB

therefore the coordinates of Q can be found out as

Q = $\left(\frac{2+(-2)}{2}, \frac{-\frac{5}{3}+(-3)}{2}\right) = \left(\frac{0}{2}, \frac{(-5-9)/3}{2}\right) = \left(0, \frac{-14}{6}\right) = \left(0, \frac{-7}{3}\right)$ 1

Therefore, the points of trisection are P$\left(2, \frac{-5}{3}\right)$ and Q$\left(0, \frac{-7}{3}\right)$ ½

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C I	Frequency(f_i)	x_i	f_i x_i
0-6	6	3	18
6-12	8	9	72
12-18	P	15	15p
18-24	9	21	189
24-30	7	27	189
Total	$\sum$ fi = 30 +p		$\sum$ fixi = 468 +15p

1

Given mean = 15.45

$\frac{468+15p}{30+p} = 15.45$ ½

$468 + 15p$ = 15.45(30 + p) ½

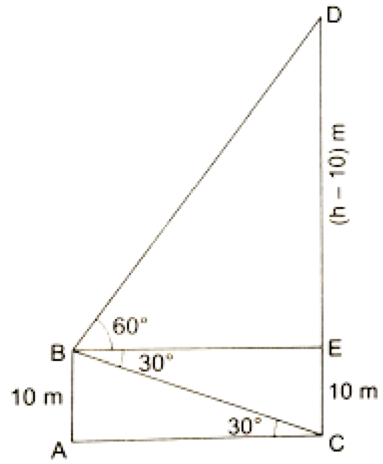
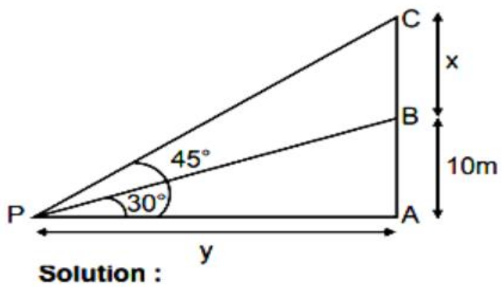
468 + 15p = 463.5 +15.45p

15.45p – 159 = 468 – 463.5

0.45p = 4.5 ½

P = 10 ½

31	LHS = $\frac{1}{1-\sin A}+\frac{1}{1+\sin A}$ $=\frac{1+\sin A+1-\sin A}{(1-\sin A)(1+\sin A)}$ $=\frac{2}{1-\sin^2 A}$ $=\frac{2}{\cos^2 A}$ $= 2\sec^2 A$ = RHS	**1 ½** **½** **½** **½**
	SECTION D	
32	Let her actual marks be x. Therefore, $9(x + 10) = x^2$ $x^2 – 9x – 90 = 0$ $x^2 – 15x + 6x – 90 = 0$ $x(x – 15) + 6(x – 15) = 0$ $(x + 6)(x – 15) = 0$ Therefore $x = –6$ or $x = 15$ Since x is the marks obtained, $x \neq –6$. Therefore, $x = 15$. She has obtained 15 marks **(OR)** Let the speeds of the cars be x km/hr and y km/hr Case 1: When the cars are going in the same direction Relative speed = x - y Distance = 100 km Time = 100 / (x - y) = 5 hours x - y = 100 / 5=20 x – y = 20 ------------- (1) Case 2:When the cars are going in the opposite direction Relative speed = x + y Time =100 / (x + y) = 1 hour x + y = 100 ------------- (2) Solving the equations (1) and (2), x = 60 y = 40 Hence the speeds of the cars are 60 km/hr and 40 km/hr.	**1** **1** **1** **1** **1** **½** **½** **½** **½** **½** **½** **½** **½** **½** **½**
33	(i)Figure, Given, To Prove, Construction Correct Proof (ii) CD/AD=CE/BE [by basic proportionally theorem] (x+3)/(3x+19)=(x)/(3x+4) (x+3)(3x+4)=x(3x+19) $3x^2+4x+9x+12=3x^2+19x$ 19x−13x=12 6x=12 ∴ x=2	**2** **2** **1**

34	Let height of the hill (CD) be h metres Then, CE = AB = 10 m and ED =(h−10)m 	**Fig 1 ½**
	In ΔCAB tan 30^0 = AB/ AC $\frac{1}{\sqrt{3}} = \frac{10}{AC}$	**1**
	AC=10√3m ∴BE=AC=10√3 m	**½**
	In ΔBED tan 60^0= DE/BE $\sqrt{3} = \frac{h-10}{BE}$	**1**
	$\sqrt{3} = \frac{h-10}{10\sqrt{3}}$ h−10=30	**½**
	h=40m Hence, the distance of the ship from the hill is 10√3 metres and the height of the hill is 40m.	**½**
	(OR)	
		**Fig 1 ½**
	Solution : In ΔAPB $\tan 30° = \frac{AB}{AP}$	**½**
	$\tan 30° = \frac{10}{y}$	**½**
	$y = \frac{10}{\tan 30°} = \frac{10}{\frac{1}{\sqrt{3}}}$ $= 10\sqrt{3} = 10 \times 1.732 = 17.32$ m	**½**
	In ΔAPC $\tan P = \frac{AC}{AP}$	**½**
	$\tan 45° = \frac{AC}{AP}$ $1 = \frac{AC}{AP}$	**½**
	AP = AC y = 10 + x	**½**
	17.32 = 10 + x x = 7.32 m	**½**

35	i)Area that can be grazed by horse = Area of sector OACB $= \frac{90°}{360°}\pi r^2$ $= \frac{1}{4} \times 3.14 \times (5)^2$ $= 19.625 \text{ m}^2$ ii) the area of the remaining field which the horse can't graze= (15x15) – 19.625 = 205.375m^2 iii)Area that can be grazed by the horse when length of rope is 10 m long $= \frac{90°}{360°} \times \pi \times (10)^2$ $= \frac{1}{4} \times 3.14 \times 100$ $= 78.5 \text{ m}^2$ Increase in grazing area = (78.5 − 19.625) m^2 = 58.875 m^2	**1 ½** **1** **1 ½** **1**
	SECTION E	
36	(i)Parabola (ii) $x^2 + 4 = 0$ $x^2 = -4$ No zeroes (iii)(A)$\alpha = \frac{1}{\beta}$ $\alpha\beta = 1$ $\frac{c}{a} = 1$ $\frac{8k}{2} = 1$ $k = \frac{1}{4}$ **(OR)** (iii)(B) $\alpha + \beta = -p$ $\alpha\beta = \frac{-1}{p}$ Quadratic polynomial $x^2 - (\alpha + \beta)x + \alpha\beta$ $x^2 - (-p)x + \frac{-1}{p}$ $px^2 + p^2x - 1$	**1** **½** **½** **½** **½** **½** **½** **½** **½** **½** **½**
37	i)P(Rohan landing on FREE PARKING)= $\frac{6}{36} = \frac{1}{6}$ ii)P (Minal to land on ROLL AGAIN) = 0 (Since sum of numbers on two dice cannot be 1) iii)(A) P(Minal landing on the Goan restaurant) = $\frac{5}{36}$ P (Shreya landing on the Goan restaurant) = $\frac{4}{36}$ Minal has greater chance than Shreya **(OR)**	**1** **1** **1** **1**

	iii)(B)P(Shreya reaching Ayush at the Jewish restaurant?) = $\frac{4}{36}$ P (Rohan reaching Ayush at the Jewish restaurant?) = $\frac{2}{36}$ Shreya has greater chance than Rohan	**1** **1**
38	i) Volume of a cuboid = l x b x h=8 x 6 x 4 =192 m^3 ii) Volume of the sphere = $\frac{4}{3}\pi r^3$ iii)(A) The cloth required = C.S.A of the hemisphere= $2\pi r^2$ $=2 \times \frac{22}{7} \times 14 \times 14 = 44 \times 28 = 1232$ sq.m **(OR)** iii)(B) Volume of the hemisphere = $\frac{2}{3}\pi r^3 = \frac{2}{3} \times \frac{22}{7} \times 7^3 = 44 \times 441 = 19404$ m^3	**1** **1** **1+1** **1+1**