केंद्रीय विद्यालय संगठन, बेंगलुरु संभाग

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प्रथम प्री-बोर्ड परीक्षा २०२५-२६

FIRST PRE-BOARD EXAMINATION-2025-26

Class: X **Max Marks: 80**

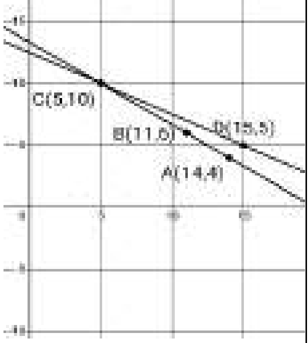
Subject: MATHEMATICS (BASIC) **Time: 3 hrs**

CODE : 241 **MARKING SCHEME**

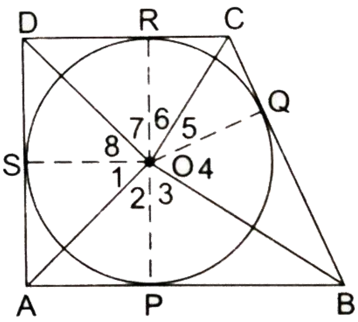
	SECTION - A	
	(Multiple Choice Questions)	
1.	(b) 315	1
2.	(d) 2	1
3.	(b) (x-3)(x+2)=x(4x+5)	1
4.	(d) $\sqrt{2}$	1
5.	(a) a= -1, b=15	1
6.	(c) equilateral	1
7.	(b) 18 m	1
8.	(a) 4	1
9.	(c) 1	1
10.	(d) 115^0	1
11.	(c) 24 cm	1
12.	(d) 12 cm	1
13.	(a) 0^0	1
14.	(a) $\frac{11}{26}$	1
15.	(d) $\frac{\theta}{720}$ x $2\pi R^2$	1
16.	(c) 30	1
17.	(a)20	1
18.	(b) 0.38	1
19.	(c) Assertion is true, Reason is false.	1
20.	(d) Assertion is false, Reason is true.	1
	SECTION B	
21.	**(a)** 5x7x11x13 + 7x11 = 7x11(5x13+1) =7x11x11x2x3	1 1

	Factorisation of number contains more than one prime. So by fundamental theorem of arithmetic, this is a composite number. **OR** **(b)** $(12)^n = (2\text{x}2\text{x}3)^n = 2^{2n}\text{ x}3^n$ Primes in factorisation of **(**12)^n are 2 and 3. To end in digit 0 prime factorization of (12)^n should also contain the prime 5. Therefore, there is no natural number n for which **(**12)^n ends with digit zero.	 1 1
22.	To find the **zeros**, $p(x) = 0$: $x^2 + 7x + 12 = 0$ $(x+3)(x+4) = 0$ $x = -3, x = -4$ **To verify the relationship between zeros and coefficients** $a = 1, b = 7, c = 12$ **Sum of zeros** : $(-3) + (-4) = -7$ $-\frac{b}{a} = -\frac{7}{1} = -7$ **Product of zeros :** $(-3) \times (-4) = 12$ $\frac{c}{a} = \frac{12}{1} = 12$	1 ½ ½
23.	k.x.(x-3) +9 = 0 or $kx^2 - 3kx + 9 = 0$ For equal roots, $b^2 - 4ac = 0$ $9k^2 - 36k = 0$ or k=0(rejected) , k=4	½ ½ 1
24.	Given:Vertices $A(3,2)$, $B(1,0)$, and midpoint of diagonals $O(2,-5)$. Let the other two vertices be $C(x_1, y_1)$and $D(x_2, y_2)$. Mid point of AC is O $\frac{3+x_1}{2} = 2, \frac{2+y_1}{2} = -5$ $x_1 = 1, y_1 = -12$ Mid point of BD is O $\frac{1+x_2}{2} = 2, \frac{0+y_2}{2} = -5$ $x_2 = 3, y_2 = -10$ *So C is (1, -12), D is (3, -10)*	 1 1
25.	**(a)** $\sin(A + B) = 1$ or $\sin(A + B) = \sin 90^0$ $A+B = 90^0$ -------(1) $\cos(A - B) = \frac{\sqrt{3}}{2}$ or $\cos(A - B) = \cos 30^0$ A – B=30 --------(2) On solving equation 1 and 2 we get $A = 60^0$, $B = 30^0$ **OR** **(b)** $\frac{2\cos^2 90^0 + 4\cos^2 45^0 + \tan^2 60^0 + 3\text{cosec}^2 60^0 + 1}{3\sec 60^0 - 7/2 \sec^2 45^0 + 2\text{cosec} 30^0 - 1}$ $= \frac{2 \text{ x } 0 + 4 \text{ x } ½ + 3 + 3 \text{ x } 4/3 + 1}{3 \text{ x } 2 - 7/2 \text{ x } 2 + 2\text{x } 2 - 1}$ =10/2 =5	½ ½ 1 1 1

SECTION C

26.	Let's assume √3 is a rational number ⇒ √3 = p/ q where p and q are coprime integers and q ≠ 0. ⇒ √3 q = p………….. (1). Take squares on both sides of equation (1). ⇒ $3q^2 = p^2$ ∵ 3 is a prime number that divides p^2, so 3 divides p. ⇒ 3 is a factor of p. Therefore, p is a number that divides q. Let p = 3a where a is a whole number. Substitute the value of p in equation (1) ⇒ $3q^2 = (3a)^2$ ⇒ $3q^2 = 9a^2$ ⇒ $q^2 = 3a^2$ ⇒ $q^2 / 3 = a^2$ ……… (2) 3 is a prime number that divides q^2, so 3 divides q ⇒ Since 3 is a factor of q. From equation 1 and 2, we can conclude that 3 is a factor of p , 3 is a factor of q. So 3 is a factor of both p and q. This leads to the contradiction to our assumption that p and q are co-primes .	 ½ ½ ½ ½ ½ ½
27.	The first 16 multiples of 7 are: 7, 14, 21, 28, 35, 42, 49, 56, 63, 70, 77, 84, 91, 98, 105, 112 This forms an **Arithmetic Progression (AP)** where: First term (a) = 7 Common difference (d) = 7 Number of terms (n) = 16 Sn = n/2 × [2a + (n - 1)d] = 16/2 × [2(7) + (16 - 1)(7)] = 8 × [14 + 15(7)] = 8 × [14 + 105] = 8 × 119 = **952**	½ 1 ½ 1
28.	**(a)** Let x be the price of one pencil and y be the price of one pen. Alok's purchase: $2x + 3y = 40$ Rahul's purchase: $x + 2y = 25$ Solution is (5, 10) The price of one pencil is Rs.5 and of one pen is Rs. 10  **OR** **(b** Let us assume that Rohan's present age = X years and Grandfather's present age = Y years ATQ, X + Y = 88 ... (equation 1) Y - 12 = 7(X - 12) 7X – Y= 72 ... (equation 2) Solving the equations**:** X = 20 years Y = 68 years **Answer: Rohan is 20 years old and his grandfather is 68 years old.**	 ½ ½ 1 1 1 1 1

29. In the given figure, P, Q, R, S are points of contact



AS = AP (The tangents drawn from an external point to a circle are equal.)

∠SOA = ∠POA = ∠1 = ∠2 (Tangents drawn from a point outside of the circle, subtend equal angles at the centre) — 1

Similarly,

∠3 = ∠4, ∠5 = ∠6, ∠7 = ∠8

Since complete angle is 360° at the centre,

We have,

∠1 + ∠2 + ∠3 + ∠4 + ∠5 + ∠6 + ∠7 + ∠8 = 360° — 1

2 (∠1 + ∠8 + ∠4 + ∠5) = 360° (or) 2 (∠2 + ∠3 + ∠6 + ∠7) = 360°

∠1 + ∠8 + ∠4 + ∠5 = 180° (or) ∠2 + ∠3 + ∠6 + ∠7 = 180°

From above figure,

∠1 + ∠8 = ∠AOD, ∠4 + ∠5 = ∠BOC and ∠2 + ∠3 = ∠AOB, ∠6 + ∠7 = ∠COD — 1

Thus we have,

∠AOD + ∠BOC = 180° (or) ∠AOB + ∠COD = 180°

∠AOD and ∠BOC are angles subtended by opposite sides of quadrilateral circumscribing a circle and the sum of the two is 180°.

Hence proved.

30. $\frac{\tan\theta}{1-\cot\theta} + \frac{\cot\theta}{1-\tan\theta} = 1 + \sec\theta\,\mathrm{cosec}\,\theta$

$= \frac{\tan\theta}{1-1/\tan\theta} + \frac{1/\tan\theta}{1-\tan\theta}$ — ½

$= \tan^2\theta/(\tan\theta-1) + 1/\tan\theta\,(1-\tan\theta)$ — ½

$= (\tan^3\theta-1)/\tan\theta\,(\tan\theta-1)$

$= (\tan\theta-1)(\tan^2\theta+1+\tan\theta)/\tan\theta\,(\tan\theta-1)$ — 1

$= (\tan^2\theta+1+\tan\theta)/\tan\theta$ — ½

$= (\sec^2\theta/\tan\theta + 1$ — ½

$= 1 + \sec\theta\,\mathrm{cosec}\,\theta$ — ½

31. **(a)** — 1 ½

Class Interval	f	x	d=x-A	fd
65-68	2	66.5	-9	-18
68-71	4	69.5	-6	-24
71-74	3	72.5	-3	-9
74-77	8	75.5=A	0	0
77-80	7	78.5	3	21
80-83	4	81.5	6	24
83-86	2	84.5	9	18
Total	30			**12**

Mean= A + ∑f d / ∑f 1

= 75.5 + 12/30

= 75.5+ 0.4

=75.9 ½

The mean heartbeats per minute for these women is 75.9

OR

(b)

Class Interval	Frequency	Cumulative Frequency
0-5	12	12
5-10	P	P+12
10-15	12	P+24
15-20	15	P+39
20-25	q	P+q+39
25-30	6	P+q+45
30-35	6	P+q+51
35-40	4	P+q+55

1

Median class is – 15-20

Median= $l + \frac{\frac{N}{2} - cf}{f} \times h$ ½

l = 15, N= 70, cf = p+24, f = 15 , h= 5 ½

p + q + 55 = 70 1

or p + q = 15 ----(eq1)

16= 15 +[(35-p-24)/ 15]

Or p=8

From eq 1, q =7

SECTION D

32. **(a)** (i) Let the width of the kite be x. 1

Then length = x +7

ATQ, x (x + 7) = 120 1

$X^2 + 7x - 120 = 0$

D= $b^2 - 4ac = 7^2 - 4 \times 1 \times (-120) = 529 > 0$ 1

So, it is possible to design a kite.

(ii) $X^2 + 7x - 120 = 0$ 1

$X^2 + 15x - 8x - 120 = 0$

(x+15) (x-8) =0 ½

X=-15(rejected) , x= 8

Width=8cm, length= x+7=8+7=15cm

So the kite will be rectangle. ½

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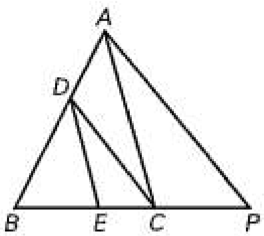
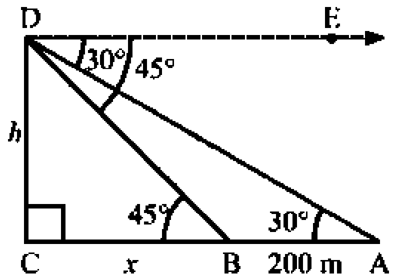
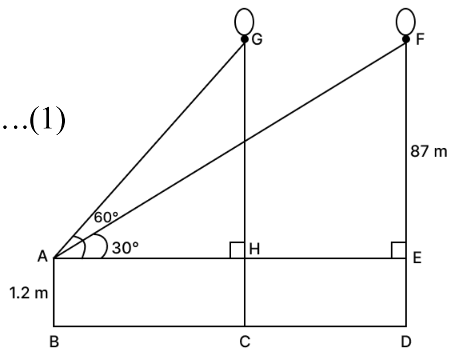
	OR **(b)** Let the original speed of the train be x km/h. ATQ, $T_2 - T_1 = 3$ $\frac{480}{x-8} - \frac{480}{x} = 3$ $X^2 - 8x - 1280 = 0$ $(x - 40)(x + 32) = 0$ X=40, x= - 32(rejected) The original speed of the train is 40 km/h.	 1 1 1 1 1
33.	Volume of the cuboid = 15 cm × 10 cm × 3.5 cm = 525 cm^3. For cone, r=0.5cm, h=1.4cm volume of one conical depression = (1/3) × π × r^2 × h. = 0.366 cm^3 approx. The total volume of the 4 conical depressions = 4 × 0.366 cm^3 ≈ 1.464 cm^3. The volume of wood in the pen stand = Volume of cuboid - Total volume of conical depressions = 525 cm^3 - 1.464 cm^3 ≈ 523.536 cm^3.	1 1 ½ 1 1
34.	(i) Fig, Given To Prove, Construction Correct Proof (ii) In the given fig., DE‖ AC BE/EC=BD/DA …….(1) Again DC‖ AP So BC/CP= BD/DA …….(2) From eq 1 and 2, BE/EC= BC/CP. 	1 2 ½ ½ 1
35.	**(a)** Let BC=x and DC= h Tan 45^0= h/x h =x ….(1) Tan 30^0= h/(x+200) 1/√3 = h/(x+200) X + 200= h√3 …..(2) On solving eq.1 and eq.2, h= 100(√3+1) = 100(1.732 +1) =273.2m  **OR** **(b)** EF= DF – DE= 88.2-1.2=87 In triangle AHG, tan60^0 = GH/AH √3=87/AH or AH =87/√3 ….(1) In triangle AEF, tan 30^0 = EF/AE 1/√3 = 87/AE or AE= 87√3 …..(2) From eq.1 and eq.2, HE= AE – AH = 87√3 - 87/√3 = 87√3 - 29√3 = 58√3 m Distance travelled by the balloon=58√3 m 	Fig-1 1 ½ 1 ½ 1 ½ Fig-1 1 ½ 1 1

SECTION E

36.

(i) Point R that divides PQ internally in ratio $2:1$ (so $PR:RQ = 2:1$)
Using the internal division formula if $AP:PB = m:n$,
X = $(m_1x_2 + m_2x_1)/m_1+m_2$ Y = (m1y2 + m2y1)/m_1+m_2 — **1**

$$X = \frac{2\,X9 + 1X3}{3} = \frac{21}{3} = 7, Y = \frac{2X8 + 1X2}{3} = \frac{18}{3} = 6.$$

$\boxed{R(7,6)}$.

(ii) Midpoint M of PQ : $(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2})$. — **1**

$$= (\frac{3+9}{2}, \frac{2+8}{2}) = (6,5).$$

(iii) (A) Length of bridge PQ in metres — **2**
Distance $PQ = \sqrt{(9-3)^2 + (8-2)^2} = \sqrt{6^2 + 6^2} = \sqrt{36+36} = \sqrt{72} = 6\sqrt{2}$ units.
Convert to metres: $6\sqrt{2}$ units $\times$ 5m/unit $= 30\sqrt{2}$m.

OR

(B) $P(3,2)$ and $R(7,6)$.
Midpoint $S = (\frac{3+7}{2}, \frac{2+6}{2}) = (5,4)$.

Distance $SQ = \sqrt{(9-5)^2 + (8-4)^2} = \sqrt{4^2 + 4^2} = \sqrt{16+16} = \sqrt{32} = 4\sqrt{2}$ units.
In metres: $4\sqrt{2}$ units $\times$ 5m/unit $= 20\sqrt{2}$m

37.

(i) Area swept by the hour hand= Area of sector $= \frac{\theta}{360°} \times \pi r^2$ — **1**

= (90/360) x 3.14 x 15x15
= 176.625 m^2

(ii) Area of triangle $= \frac{1}{2} r^2 \sin\,\theta$ — **1**

$$= \frac{1}{2} \times 15^2 \times \sin\,90°$$

= 112.5 m^2

(iii) Area of minor segment = Area of sector − Area of triangle — **2**
$= 176.625 - 112.5 = 64.125$ m^2

Total cost of decoration

Cost = Area of minor segment × 200
= 64.125 × 200 = 12,825 ₹

OR

(B) Arc length of the sector is:

$$L = \frac{\theta}{360°} \times 2\pi r$$

$$= \frac{90}{360} \times 2 \times 3.14 \times 15 = 23.55\text{m}$$

38.	(i)	Favourable outcomes-(1, 6), (2, 5) , (3, 4) , (4, 3), (5, 2) , (6, 1) Total outcomes= 36 P (E) = Favourable Outcome/Total outcome=6/36=1/6	1
	(ii)	Favourable Outcomes=(1, 1), (2, 2), (3, 3) , (4, 4), (5, 5) (6, 6) P(E)= 6/36=1/6	1
	(iii)	(A) Favourable Outcomes=(6, 1), (6, 2), (6, 3) , (6, 4), (6, 5) (6, 6), (1, 6), (2, 6), (3, 6), (4, 6), (5,6) P(E)= 11/36 OR (B) Probability of getting sum as 7 P(E)=1/6 P(sum not 7) = 1-1/6=5/6	2

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