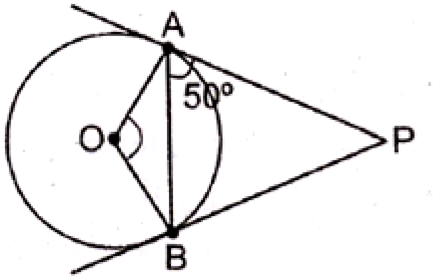
COMMON PRE-BOARD EXAMINATION 2022-23

Subject: MATHEMATICS (STANDARD) -041

CLASS X

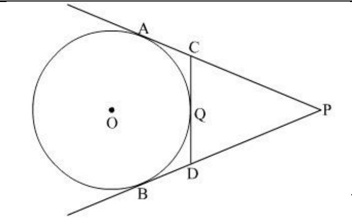
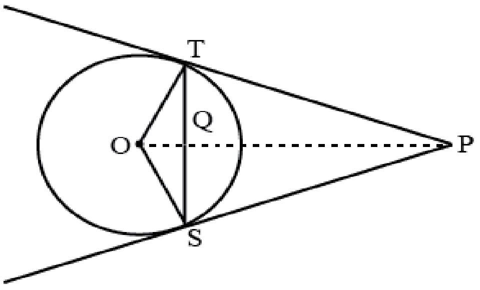
MARKING SCHEME

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

21	SUBTRACTING THE EQN	
	86X – 86 Y = 86	
	X – Y = 1	(1/2)
	ADDING THE EQN	
	348 X + 348 Y = 1740	
	X + Y = 5	(1/2)
	SOLVING X = 3	(1/2)
	Y = 2	(1/2)
22	SINCE DE ∥ BC,	
	BD/AD = BE /EC (BPT)	(1/2)
	SINCE DC ∥ AP,	
	BD/AD = BC/CP (BPT)	(1/2)
		REASON(1/2)
	FROM THE ABOVE TWO EQN	
	BE/EC = BC/CP	(1/2)
23.		(1/2)
	ANGLE OAP = 90(RADIUS IS PERPENDICULAR TO THE TANGENT)	
	ANGLE OAB = 90 – 50 = 40 DEGREES	(1/2)
	TRIANGLE OAB IS ISOSCELES , ANGLE OBA = 40 DEGREES,	(1/2)
	HENCE ANGLE AOB = 180 - -80 = 100 DEGREES	(1/2)
24.	ANGLE COVERED = 210 DEGREES	(1/2)
	AREA = 210/360 × 22/7 × 10 × 10	(1/2)
	= 550/3	(1/2)
	= 183.33 SQ CM	(1/2)
	OR	

	GIVEN, 5/18 $\times \pi R^2 = \frac{\theta}{360} \times\ \pi R^2$ θ = 100 DEGREES	(1) (1)
25.	(i) tan θ $= \frac{1.5}{3} = \frac{1}{2}$ Hence θ = 30^0 (ii)secθ+ cosec θ = sec 30 + cosec 30 = 2/$\sqrt{3}$ + 2 = $\frac{2+2\sqrt{3}}{\sqrt{3}}$ OR Cos θ + sin θ = $\sqrt{2}$ cos θ Squaring both sides Sin$^2\theta$ + $cos^2\theta$ + 2 sin θ cos θ = $2cos^2\theta$ $sin^2\,\theta - \,cos^2\theta + 2\sin\theta cos = 0$ (sin$\theta + cos\theta$)(sin $\theta - cos\theta$) $= \,-2\,sincos\theta$ cos$\theta - sin\theta = \frac{-2sin\theta cos}{-\sqrt{2}cos\vartheta}$ = $\sqrt{2}$ sinθ	(1) (1/2+1/2) (1/2) (1/2) (1/2+1/2)
26.	Assume 2 + 3 $\sqrt{5}$ is rational, hence 2+ 3$\sqrt{5}$ = a/b, where a and b are coprime and a and b are integers 3$\sqrt{5}$ = a/b – 2 $\sqrt{5}$ = ($\frac{a}{b} - 2$) $\frac{1}{3}$, wehre LHS is irrational and RHS is rational , which is a contradiction . Hence our asumptionis incorrect Hence 2+ 3 $\sqrt{5}$ is irrational	1 1 1
27.	$\alpha +\ \beta = 24$ $\alpha -\ \beta = 8$ Solving the above , we get $\alpha = 16\ and\ \beta = 8$ Hence the required quadratic equation is X^2 – (16+ 8) x + 16 x 8 = 0 X^2 – 24 x + 128 = 0	1,1 1
28.	Let speed = x km/h and time taken =y Hence distance = xy	(1/2)

	Given ,	
	Xy = (x + 10) (y – 2)	(1/2)
	-2x + 10 y = 20…(1)	
	Xy = (x – 10) (y + 3)	
	3x – 10 y = 30…..(2)	(1/2)
	Solving 1 and 2	
	X = 50 km/hr	(1/2)
	And y = 12 hours	(1/2)
	Hence distance = 12 x 50 = 600 km	(1)
	OR	
	D = 1500 km	
	Given,$\frac{1500}{x} - \frac{1500}{(x+250)} = \frac{1}{2}$	(1)
	$\frac{x+250-x}{x^2+250\,x} = \frac{1}{2\times 1500}$	(1/2)
	$x^2+250\,x-750000=0$	(1/2)
	(x – 750) (x + 1000) = 0	(1/2)
	X = 750 km/hr	(1/2)
29.	A+B – C = 30^0	(1/2)
	A- B + C = 90^0	(1/2)
	B+ C – A = 60^0	(1/2)
	SOLVING 2 A = 120, A = 60	(1/2)
	B = 75, C = 45	(1/2+1/2)
	OR	
	LHS = $\frac{tan\theta}{1-tan\theta} - \frac{cot\theta}{1-cot\theta} = \frac{\frac{sin\theta}{cos\theta}}{1-\frac{sin\theta}{cos\theta}} - \frac{\frac{cos\theta}{sin\theta}}{1-\frac{cos\theta}{sin\theta}}$	
	$= \frac{\frac{sin\theta}{cos\theta}}{\frac{cos\theta-sin\theta}{cos\theta}} - \frac{\frac{cos\theta}{sin\theta}}{\frac{sin\theta-cos\theta}{sin\theta}} = \frac{sin\theta}{cos\theta-sin\theta} - \frac{cos\theta}{sin\theta-cos\theta} = \frac{sin\theta+cos\theta}{cos\theta-sin\theta}$ = RHS	

30.		
	DB = DQ AND AC = CQ (Tangents drawn from an external point to a circle are equal)	(1/2)
	AC = CQ	
	ADDING PC ON BOTH SIDES	(1/2)
	AC + PC = CQ + PC	(1/2)
	AP = CQ+ PC…..(1)	
	ALSO DB = DQ	(1/2)
	ADDING PD ON BOTH SIDES	
	DB + PD = DQ + PD	
	PB = DQ + PD…..(2)	(1/2)
	SINCE PA = PB(Tangents drawn from an external point to a circle are equal)from 1 and 2	
	PC+CQ = PD + DQ	(1/2)
	HENCE PROVED	
	OR	
		
	In triangle OPT, sin angle OPT = $\frac{r}{2r}$ = ½	(1)
	Hence angle OPT= 30 degrees	

	Similarly angle SPO = 30 degrees	
	Angle SOT = 180 – 60 = 120x	(1)
	In triangle SOT, OT = OS, hence isosceles triangle, hence angles are equal, those angles are 180 – 120/2 = 30 degrees each	(1)
	Hence angle OTS = angle OST = 30 degrees	
31.	P (exactly two heads) = 3/8	(1)
	P (atleast two tails) = 4/8 = 1/2	(1)
	P (at most two heads) = 7/8	(1)
32.	Let time taken by one pipe be x hours	
	And time taken by othr pipe is x+ 3 hours	(1/2)
	In 1 minute it covers 1/x	
	And other covers 1/x+3	(1/2)
	Hence in 40/13 mts work done is $\frac{1}{x} \times \frac{40}{13}$	(1/2)
	And work done by othr pipe is $\frac{1}{x+3} \times \frac{40}{13}$	
	Hence $\frac{40}{13x} + \frac{40}{13(x+3)} = 1$	(1)
	$13x^2$- 41 x -120 = 0	(1/2)
	$13x^2$ -65x + 24x -120 = 0	(1/2)
	X = 5 or x = -24/13	(1/2)
	Hence time taken by one pipe is 5 hours and othr is 5+ 3 = 8 hours	(1/2+1/2)
	OR	
	Let speed of train = x km/hr	(1/2)
	Time taken = 180/x hours	(1/2)
	New speed = (x + 9) km/hr	(1/2)
	Hence $\frac{180}{x} - 1 = \frac{180}{x+9}$	(1)
	X^2 + 9x – 1680 = 0	(1/2)
	X^2+ 45 x -36 x -1680 = 0	(1/2)
	X = 36/x = -45, Hence x = 36 km/hr	(1)+(1)

<table>
<tr>
<td>33.</td>
<td>Figure
Given
To prove
Constr.
Proof
$\frac{2}{6} = \frac{3}{EC}$, hence EC = 9 units</td>
<td>(1/2)
(1/2)
(2)
(1+1)</td>
</tr>
<tr>
<td>34.</td>
<td>Volume of liquid in bowl = $\frac{2}{3}\pi r^3$ = $\frac{2}{3}\pi \times 18^3 = 3888\pi cm^3$
Volume of liquid filled in bottles = 90% of 3888$\pi\ cm^3$
Volume of each cylindrical bottle -= $\pi r^2\ h = 9\ \pi h cm^3$
Volume of 72 cylindrical bottles = $72 \times 9\pi h = \frac{90}{100} \times 3888\pi$
H = $\frac{90\times3888}{100\times72\times9}$ = $\frac{27}{5} = 5.4\ cm$
OR
Number of turns = $\frac{12}{0.3} = 40$
Circumference of one turn = 2x3.14x 5 = 31.4 cm
Length of 40 turns = 31.4 x 40 = 1256 cm
Total length of wire wrapped = l = 1256 cm
Radius of wire = $\frac{0.3}{2} = 0.15\ cm$
Vol of wire = $\pi\ r^2\ l = 3.14\ x\ 0.15\ x\ 0.15\ x1256 = 88.7364\ cm^3$</td>
<td>(1)
(1)
(1)
(1)
(1)
(1)
(1)
(1)
(1+1)</td>
</tr>
<tr>
<td>35.</td>
<td>
<table>
<tr><th>Class interval</th><th>frequency</th><th>Cumulative frequency</th></tr>
<tr><td>0 – 10</td><td>X</td><td>X</td></tr>
<tr><td>10 – 20</td><td>5</td><td>5+x</td></tr>
<tr><td>20 – 30</td><td>9</td><td>14+x</td></tr>
<tr><td>30 – 40</td><td>12</td><td>26+x</td></tr>
<tr><td>40 – 50</td><td>Y</td><td>26+x+y</td></tr>
<tr><td>50 – 60</td><td>3</td><td>29+x+y</td></tr>
<tr><td>60 – 70</td><td>2</td><td>31+x+y</td></tr>
<tr><td>Total</td><td>N = 40</td><td></td></tr>
</table>
X+y = 9……(1)
Median = l+ $\frac{\frac{n}{2}-cf}{f} \times h$
Hence 32.5 = 30+ $\frac{20-(14+x)}{12} \times 10$</td>
<td>(2)
(1)
(1)</td>
</tr>
</table>

	X = 3, y = 6	(1/2+1/2)
10	(i) L = (5, 10), B = (0, 7)	
	Distance $\sqrt{25+49} = \sqrt{74}\, units$	1
	(ii) let K = (x,y) divides line joining L and B divides in the raio 3:2	
	X = $\frac{3x0+2x5}{5} = 2, y = \frac{3x7+2x\ 10}{5} = \frac{41}{5}$, hence K = (2, $\frac{41}{5}$)	1
	(iii) L = (5. 10), N = (2, 6) and P = (8, 6)	
	LN = 5 units, NP = 6 units, LP = 5 units	(1 1/2)
	Since LN = LP, it forms and isosceles triangle	(1/2)
	OR	
	Let the point equidistant from P and L be (0, y)	(1/2)
	Hence 25+ $(y – 10)^2$ = 64 + $(y – 6)^2$	(1)
	Y = $\frac{25}{8}$, hence the required point is (0. 25/8)	(1/2)
37.	(i) a+ 3d = 1800, a+ 7d = 2600	(1/2)
	d = 200, a = 1200	(1/2)
	(ii) 12th term = a+ 11 d= 1200 + 11x200 = 34030	((1/2+1/2)
	(iii) S_{10} = 10/2(2400 + 1800)= 5 x 4200 = 21000	(1+ 1)
	OR	
	n/2(2 x 1200+ (n-1) 200) = 31200	
	$n^2 + 11n – 312 = 0$	(1)
	$n^2 + 24n – 13n -312 = 0$	
	n= 13, n = -24	
	n = 13	(1)
38	(i) Difference between height of the lighthouse and building	(1/2)
	tan 60 = $\sqrt{3} = \frac{60}{AE}$, AE = $20\sqrt{3}\ m$	(1/2)
	tan 30 = $\frac{CE}{AE} = \frac{CE}{20\sqrt{3}}, hence\ CE = 20m$	
	(ii) Distance between light huse and building = $20\sqrt{3}$m	
	OR	(2)
	60:x = $\sqrt{3}$: 1, hence x = $20\sqrt{3}$,	

	(iii)	Angle of elevation = θ, tan θ = $\frac{60}{20\sqrt{3}} = \sqrt{3}, hence\ \theta = 60^0$ In triangle ABD, BD = AE = $20\sqrt{3}$ Distance from foot of light house to top of building = AD = $\sqrt{3600 + 1200}$ = $\sqrt{4800}$ =$40\sqrt{3}$m	(1/2) (1/2)