



COMMON PRE-BOARD EXAMINATION 2022-23

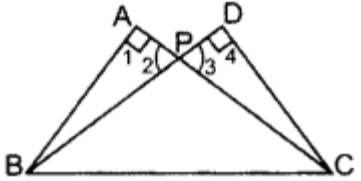
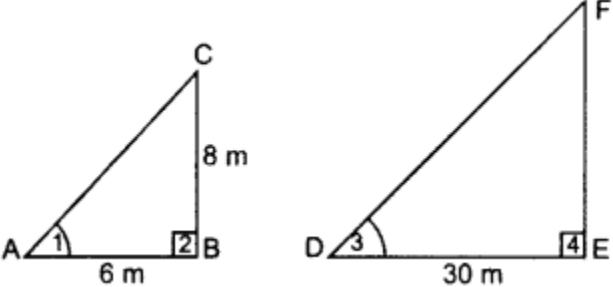
CLASS: X

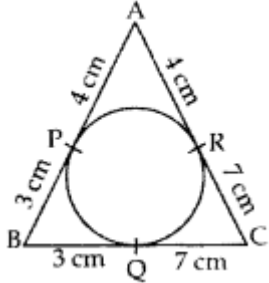
SUBJECT: MATHEMATICS (241)

ANSWER KEY



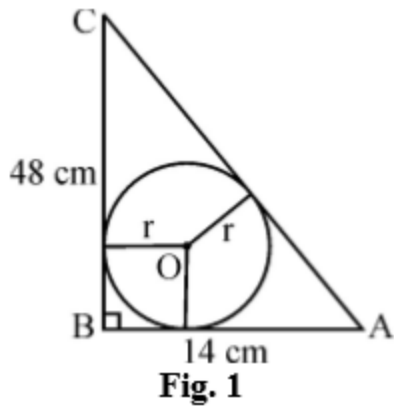
Q.No	SECTION A	Marks
1	C	1
2	A	1
3	B	1
4	B	1
5	C	1
6	A	1
7	B	1
8	D	1
9	A	1
10	A	1
11	D	1
12	C	1
13	D	1
14	C	1
15	A	1
16	D	1
17	C	1
18	C	1
19	D	1
20	D	1
	SECTION B	

21	<p>We have, $3x = y + 5$, and $5x - y = 11$</p> $\begin{array}{rcl} 3x - y & = & 5 \quad \dots(i) \\ 5x - y & = & 11 \quad \dots(ii) \\ \hline -2x & = & -6 \end{array}$ <p style="text-align: right;">...[By subtracting]</p> <p>Putting the value of x in (i), we get</p> $3x - y = 5 \Rightarrow 3(3) - y = 5$ $9 - 5 = y \Rightarrow y = 4$ $\therefore x = 3, y = 4$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$
22	 <p>In $\triangle APB$ and $\triangle DPC$,</p> <p>$\angle 1 = \angle 4 \dots$ [Each = 90°]</p> <p>$\angle 2 = \angle 3 \dots$ [Vertically opp. \angles]</p> <p>$\therefore \triangle APB \sim \triangle DPC \dots$ [AA similarity]</p> <p>$\Rightarrow BP/PC = AP/PD \dots$ [Sides are proportional]</p> <p>$\therefore AP \times PC = BP \times PD$</p>	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$
or	 <p>Let BC be the pole and EF be the tower Shadow AB = 6 m and DE = 30 m.</p>	Fig $\frac{1}{2}$

	<p>In $\triangle ABC$ and $\triangle DEF$,</p> <p>$\angle 2 = \angle 4 \dots$ [Each 90°]</p> <p>$\angle 1 = \angle 3 \dots$ [Sun's angle of elevation at the same time]</p> <p>$\triangle ABC \sim \triangle DEF \dots$ [AA similarity]</p> <p>$AB/DE = BC/EF \dots$ [In -As corresponding sides are proportional]</p> <p>$\Rightarrow 6/30 = 8/EF$</p> <p>$\therefore EF = 40 \text{ m}$</p>	<p>1/2</p> <p>1/2</p> <p>1/2</p>
23	 <p>: $AP = AR = 4 \text{ cm}$ $RC = 11 - 4 = 7 \text{ cm}$ $RC = QC = 7 \text{ cm}$ $BQ = BP = 3 \text{ cm}$ $BC = BQ + QC$ $= 3 + 7 = 10 \text{ cm}$</p>	<p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p>
24	<p>Here $\theta = \frac{360^\circ}{60 \text{ m}} \times 5 \text{ m} = 30^\circ \dots [\because 1 \text{ hour} = 60 \text{ minutes}]$</p> <p>$r(\text{radius}) = 14 \text{ cm}$</p> <p>$\therefore \text{Required area} = \frac{\theta}{360} \pi r^2$</p> <p>$= \frac{30}{360} \times \frac{22}{7} \times 14 \times 14$</p> <p>$= \frac{154}{3} \text{ cm}^2 \text{ or } 51.\bar{3} \text{ cm}^2$</p>	<p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p>

	<p>Such that $3 + 2\sqrt{3} = a/b$, where a and b are coprime.</p> <p>Rearranging the equations, we get</p> $2\sqrt{3} = \frac{a}{b} - 3 = \frac{a - 3b}{b}$ $\sqrt{3} = \frac{a - 3b}{2b} = \frac{a}{2b} - \frac{3b}{2b}$ $\sqrt{3} = \frac{a}{2b} - \frac{3}{2}$ <p>Since a and b are integers, we get $a/2b - 3/2$ is rational and so $\sqrt{3}$ is rational.</p> <p>But this contradicts the fact that $\sqrt{3}$ is irrational.</p> <p>So we conclude that $3 + 2\sqrt{3}$ is irrational.</p>	<p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p>
27	<p>$f(x) = x^2 - 4x + 3$</p> <p>$\alpha + \beta = 4$;</p> <p>$\alpha \beta = 3$</p> <p>$\alpha^2 + \beta^2 = 10$</p> <p>$\alpha^4 \beta^2 + \alpha^2 \beta^4 = \alpha^2 \beta^2 (\alpha^2 + \beta^2)$</p> <p>$= 3^2 \times 10 = 90$</p>	<p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>1</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p>
28	<p>Let the digit in the ones place be x and tens place be y</p> <p>Hence the two digit number = $10y + x$</p> <p>Given that the two digit number = 4 times sum of its digits</p> <p>$10y + x = 4(x + y)$</p> <p>$10y + x = 4x + 4y$</p> <p>$3x - 6y = 0$</p> <p>$3x = 6y$</p> <p>$x = 2y \rightarrow (1)$</p> <p>It is also given that the two digit number = 2 times product of its digits</p> <p>$10y + x = 2xy \rightarrow (2)$</p> <p>Solving 1 and 2 we get</p>	<p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p>

29.



using Pythagoras theorem

$$AC^2 = AB^2 + BC^2$$

$$AC^2 = (14)^2 + (48)^2$$

$$AC = 50cm$$

area of ABC = area of $\triangle AOB$ + area of $\triangle BOC$

+area of $\triangle AOC$

$$\frac{1}{2} \times b \times h = \frac{1}{2} \times b_1 \times h_1 + \frac{1}{2} \times b_2 \times h_2 + \frac{1}{2} \times b_3 \times h_3$$

$$14 \times 48 = 14 \times r + 48 \times r + 50 \times r$$

$$56r = 336$$

$$r = 336/56$$

$$= r = 6cm$$

Radius r of in circle is 6 cm

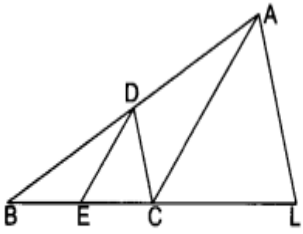
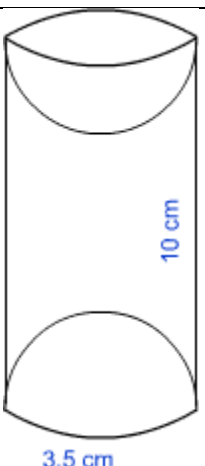
1

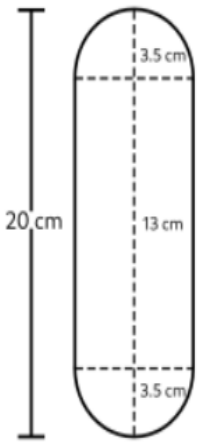
1

1

30

	$= (1 + \tan A + \sec A) (1 + \cot A - \operatorname{cosec} A)$ $= \left(1 + \frac{\sin A}{\cos A} + \frac{1}{\cos A}\right) \left(1 + \frac{\cos A}{\sin A} - \frac{1}{\sin A}\right)$ $= \left(\frac{\cos A + \sin A + 1}{\cos A}\right) \left(\frac{\sin A + \cos A - 1}{\sin A}\right)$ $= \frac{(\cos A + \sin A)^2 - 1}{\sin A \cos A} = \frac{\cos^2 A + \sin^2 A + 2 \cos A \sin A - 1}{\sin A \cos A}$ $= \frac{2 \sin A \cos A}{\sin A \cos A} = 2 = \text{RHS}$	1 1/2 1 1/2
OR	<p>We have,</p> $\frac{\cos \theta - \sin \theta}{\cos \theta + \sin \theta} = \frac{1 - \sqrt{3}}{1 + \sqrt{3}} \Rightarrow \frac{\frac{\cos \theta - \sin \theta}{\cos \theta}}{\frac{\cos \theta + \sin \theta}{\cos \theta}} = \frac{1 - \sqrt{3}}{1 + \sqrt{3}}$ <p>[Dividing numerator & denominator of the LHS by $\cos \theta$]</p> $1 - \tan \theta / 1 + \tan \theta = 1 - \sqrt{3} / 1 + \sqrt{3}$ $\tan \theta = \tan 60^\circ$ $\theta = 60^\circ$	1 1 1/2 1/2
31.	i) 15/36 Or 5/12 ii) 25/36 iii) 3/36 or 1/12	Each 1 mark
32	Let the marks obtained in mathematics be x then marks in science be 28-x from given condition, $(x+3)(28-x-4)=180$ $\Rightarrow (x+3)(24-x)=180$	1/2

		1
33.	<p>BASIC PROPORTIONALITY THEOREM</p> <p>GIVEN</p> <p>TO PROVE</p> <p>FIGURE – 1 MARK</p> <p>PROOF 3 MARKS</p> <p>ANSWER FOR QUESTION:</p> $\Rightarrow \frac{BD}{DA} = \frac{BE}{EC} \quad (\text{By BPT}) \quad \dots(i)$ <p>In $\triangle ABL$ $DC \parallel AL$</p> $\Rightarrow \frac{BD}{DA} = \frac{BC}{CL} \quad (\text{By BPT}) \quad \dots(ii)$ <p>From (i) and (ii) we get</p> $\frac{BE}{EC} = \frac{BC}{CL} \Rightarrow \frac{4}{2} = \frac{6}{CL} \Rightarrow CL = 3 \text{ cm}$  <p style="text-align: center;">Fig. 7.32</p>	
34	 <p>Solution</p> <p>Given- Radius of cylinder = 3.5 cm and height = 10 cm</p> <p>Total surface area of Article = Curved surface area of cylinder + Curved surface area of two hemispheres</p> <p>Curved surface area of cylinder</p> $= 2\pi rh$ $= 2\pi \times 3.5 \times 10$	<p>1</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p>

	$=70\pi$ Surface area of a hemisphere $=2\pi r^2$ $=2\pi \times 3.5 \times 3.5$ $=24.5\pi$ Hence, Total surface area of article = $70\pi + 2 \times (24.5\pi)$ $=70\pi + 49\pi$ $=119\pi$ $=119 \times 227 = 374 \text{ cm}^2$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ 1
OR	 <p>Diameter of cylinder = 7 cm</p> <p>Height of cylinder = $20 - 7 = 13 \text{ cm} = H$</p> <p>Total Volume = $\pi R^2 H + \frac{4}{3} \pi R^3 \text{ cm}^3$</p> $= \pi \left(\frac{7}{2}\right)^2 \cdot 13 + \frac{4}{3} \pi \left(\frac{7}{2}\right)^3$ $= \frac{22}{7} \times \frac{49}{4} \left(13 + \frac{4}{3} \cdot \frac{7}{2}\right) \text{ cm}^3$ $= \frac{77 \times 53}{6}$ $= 680.17 \text{ cm}^3$	Fig $\frac{1}{2}$ 1 1 1 1 $\frac{1}{2}$

35	Rent (in Rupees)	Number of tenants	CF	1 for cf table
	1500-2500	8	8	
	2500-3500	10	18	
	3500-4500	15	33	
	4500-5500	25	58	
	5500-6500	40	98	
	6500-7500	20	108	
	7500-8500	15	123	
	8500-9500	7	130	
	n/2= 65			
5500-6500 is median class.				
l= 5500				
f=40				
cf=58				
h=1000				
$Median = l + \left[\frac{\frac{n}{2} - c}{f} \right] \times h$				
=5500+{ 65-58 }/40 x 1000 =5500+ 7 x 25 =5675				

1/2

1/2

1/2

1/2

1

1

36	i) 51, 49, 47....	1
	ii) 11	1
	iii) first term = 5	$\frac{1}{2}$
	second term = 7	$\frac{1}{2}$
	common difference = $7-5=2$	1
	or	$\frac{1}{2}$
	2x, x + 10, 3x + 2 are in AP.	$\frac{1}{2}$
37.	$2(x+10) = 2x + (3x+2)$	$\frac{1}{2}$
	$2x+20 = 5x+2$	$\frac{1}{2}$
	$3x = 18$	1
	$x = 6.$	
	i) (6,12)	1
	i) $4\sqrt{10}$	1
	iii) AR : BR = 3:2	$\frac{1}{2}$
	x coordinate = $\frac{3(22)+2(22)}{5}$	1
	=22	$\frac{1}{2}$
	Or	
	Let S divides MN in the ratio m:1	$\frac{1}{2}$
	$20 = \frac{24m+4}{m+1}$	$\frac{1}{2}$
	m = 4	$\frac{1}{2}$
	ratio is 4:1	$\frac{1}{2}$

38.	i) 400 m	1
	ii) 45°	1
	iii) $\tan 30^\circ = AB/BC$	$\frac{1}{2}$
	$\frac{1}{\sqrt{3}} = AB/15$	$\frac{1}{2}$
	$AB = 15/\sqrt{3}$	$\frac{1}{2}$
	$= 5\sqrt{3}$	$\frac{1}{2}$
	OR	
	$AB = 6$ m	1
	$AC = 6\sqrt{2}$ m	1