

## **COMMON PRE-BOARD EXAMINATION 2022-23**

## **CLASS: X**





## ANSWER KEY

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

21	We have, $3x = y + 5$ , and $5x - y = 11$	1/2				
	3x - y = 5(i) 5x - y = 11(ii) -2x = -6[By subtracting	1/2				
	Putting the value of x in (i), we get	1/2				
	$3x - y = 5 \Rightarrow 3(3) - y = 5$					
	$9 - 5 = y \Rightarrow y = 4$	1/2				
	$\therefore x = 3, y = 4$					
22						
	B C					
	In $\triangle$ APB and $\triangle$ DPC,					
	$\angle 1 = \angle 4 \dots [Each = 90^{\circ}]$	1/2				
	$\angle 2 = \angle 3$ [Vertically opp. $\angle s$	1./				
	∴ ΔAPB ~ ΔDPC[AA similarity]	1/2				
	⇒ BP/PC=AP/PD [Sides are proportional]	1/2				
	$\therefore AP \times PC = BP \times PD$					
or		Fig ½				
	Let BC be the pole and EF be the tower Shadow AB = 6 m and DE = 30 m.					

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

OR						
OK	Circumference of a circle = 22 cm $2\pi r = 22$ cm	1/2				
	$2 \times \frac{22}{7} \times r = 22 \text{ cm}$					
	$r = \frac{22 \times 7}{22 \times 2} = \frac{7}{2}$ cm					
	$\therefore \text{ Area of quadrant} = \frac{1}{4}\pi r^2$					
		1/2				
	$= \frac{1}{4} \times \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} = \frac{77}{8} \text{ cm}^2$					
25	, $PQ^{2} + QR^{2} = PR^{2} \dots [By Pythogoras' theorem]$	1/2				
	P					
	W P P P P P P P P P P P P P P P P P P P					
	$Q \square R$					
	$(6)^2 + QR^2 = (12)^2$					
	$QR^2 = 144 - 36$ $QR^2 = 108$					
	$QR = \sqrt{36 \times 3} = 6\sqrt{3} \text{ cm}$					
	$\tan R = \frac{PQ}{OR} \qquad \qquad \tan P = \frac{QR}{PO}$					
	$\tan R = \frac{\cancel{6}}{\cancel{6}\sqrt{3}} = \frac{1}{\sqrt{3}}$ $\tan R = \tan 30^{\circ}$ $R = 30^{\circ}$ $\angle PRQ = 30^{\circ}$ $\tan P = \tan 60^{\circ}$ $P = 60^{\circ}$ $\angle QPR = 60^{\circ}$					
	$\tan R = \tan 30^{\circ} \qquad \tan P = \tan 60^{\circ}$					
	$R = 30^{\circ} \qquad P = 60^{\circ}$	Each				
	$\angle PRQ = 30^{\circ}$ $\angle QPR = 60^{\circ}$	angle				
		1/2				
26	Let us assume to the contrary, that $3 + 2\sqrt{3}$ is rational.					
	So that we can find integers a and b (b $\neq$ 0).					
		l				

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

	y = 2, x = 6	1				
	The two digit number is $(10y + x) = 10(3) + 6 = 36$	1/2				
	The two digit number is $(10y + x) = 10(3) + 0 = 30$					
OR	Let the speed of the first car starting from A be x km/hr and the speed of the second car starting from B be y km/hr.					
	Let the cars meet at point P when they are moving in the same direction and at point Q when they are moving in the opposite direction.  When they travel in the same direction, they meet in 7 hours.  Distance travelled by the first car in 7 hours AP=7×x km=7x km.					
	Distance travelled by the second car in 7 hours BP=7×y km=7y km AP-BP=7x-7y=70					
	$7(x-y)=7\times10$ x-y=10(i)					
	When they travel in the opposite direction, they meet after 1 hour.					
	Distance travelled by the first car in 1 hour AQ= $1\times x$ km= $x$ .					
	Distance travelled by the second car in 1 hour BQ=1×y km=y km					
	x+y=70(ii)					
	Solving equations i and ii , $x = 40$ ; $y = 30$					
	Therefore, the speed of the first car is 40 km/hr and the speed of the second car is 30 km/hr.					
	Second car is so minima					

29.	48 cm r r r A Fig. 1	
	using Pythagoras theorem	
	$AC^2 = AB^2 + BC^2$	
	$AC^2 = (14)^2 + (48)^2$	
	AC = 50cm	1
	area of ABC = area of $\triangle AOB$ + area of $\triangle BOC$	
	+area of $\triangle AOC$	1
	$\frac{1}{2} \times b \times h = \frac{1}{2} \times b_1 \times h_1 + \frac{1}{2} \times b_2 \times h_2 + \frac{1}{2} \times b_3 \times h_3$	
	$14 \times 48 = 14 \times r + 48 \times r + 50 \times r$	
	56r = 336	
	r = 336/56	1
	=r=6cm	
	Radius r of in circle is 6 cm	
30		

	$= (1 + \tan A + \sec A) (1 + \cot A - \csc A)$	
	$= \left(1 + \frac{\sin A}{\cos A} + \frac{1}{\cos A}\right) \left(1 + \frac{\cos A}{\sin A} - \frac{1}{\sin A}\right)$	1
	$= \left(\frac{\cos A + \sin A + 1}{\cos A}\right) \left(\frac{\sin A + \cos A - 1}{\sin A}\right)$	1/2
	$= \frac{(\cos A + \sin A)^2 - 1}{\sin A \cos A} \frac{\cos^2 A + \sin^2 A + 2\cos A \sin A - 1}{\sin A \cos A}$	1
	$= \frac{2\sin A\cos A}{\sin A\cos A} = 2 = RHS$	1/2
OR	We have, $\frac{\cos \theta - \sin \theta}{\cos \theta + \sin \theta} = \frac{1 - \sqrt{3}}{1 + \sqrt{3}} \Rightarrow \frac{\frac{\cos \theta - \sin \theta}{\cos \theta + \sin \theta}}{\frac{\cos \theta + \sin \theta}{\cos \theta}} = \frac{1 - \sqrt{3}}{1 + \sqrt{3}}$ [Dividing numerator & denominator of the LHS by $\cos \theta$ ] $1-\tan \theta/1 + \tan \theta = 1-\sqrt{3}/1+\sqrt{3}$ $Tan\theta = \tan 60^{\circ}$ $\theta = 60^{\circ}$	1 1 ½ ½
31.	i)15/36 0r 5/12	Each 1
	ii)25/36	mark
	iii)3/36 or 1/12	
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

	24x-x <sup>2</sup> +72-3x=180	1/2
	$21x-x^2-180+72=0$	/ 2
	$x^2-21x+108=0$	
	$x^2-12x-9x+108=0$	1/2
	$\Rightarrow x(x-12)-9(x-12)=0$	
	$\Rightarrow (x-9)(x-12)=0$	
	∴x=9,12	1/2
	the marks scored in Maths can be 9 or 12.	
	if she got 12 in Maths then she got 28-12=16 in science	
	if she got 9 in Maths then she got 28-9=19 in science	1
or		
	Let the speed of faster train be x km/h.	
	Then, the speed of slower train is $(x - 10)$ km/h.	1/2
	Given:	
	A faster train takes one hour less than a slower train for a journey of 200 km.	
	Distance /Speed=Time	
	Time taken by faster train to cover $200 \text{ km} = 200/\text{x} \text{ h}$	
	Time taken by slower train to cover $200 \text{ km} = 200/\text{x}-10 \text{ h}$	
	According to the question,	
	2007 10 2007 1	1/2
	200/x-10-200/x=1	1/
	$x^2-10x-2000=0$ $x^2-50x+40x-2000=0$	1/2
	(x-50)(x+40)=0	1/2
	x=50,-40	1/2
	But x is the speed of the train, which is always positive.	, 2
	Thus,x=50	
	and $x - 10 = 40$	1
	Honor the speed of fast twein is 50 km/h and the speed of slave tweir in 40	
	Hence, the speed of fast train is 50 km/h and the speed of slow train is 40 km/h.	
	KIII/II.	

33. BASIC PROPORTIONALITY THEOREM  GIVEN  TO PROVE  FIGURE – 1 MARK  PROOF 3 MARKS  ANSWER FOR QUESTION: $\Rightarrow \frac{BD}{DA} = \frac{BE}{EC} \qquad (By BPT) \qquad(i)$ In $\triangle BL DC    AL$ $\Rightarrow \frac{BD}{DA} = \frac{BC}{CL} \qquad (By BPT) \qquad(ii)$ From (i) and (ii) we get $\frac{BE}{EC} = \frac{BC}{CL} \Rightarrow \frac{4}{2} = \frac{6}{CL} \Rightarrow CL = 3 \text{ cm}$ 34  34  35 cm  Solution  Given- Radius of cylinder = 3.5 cm and height = 10 cm  Total surface area of Article = Curved surface area of cylinder + Curved surface area of two hemispheres  Curved surface area of cylinder  = $2\pi th$ = $2\pi th$							
GIVEN TO PROVE FIGURE – 1 MARK PROOF 3 MARKS ANSWER FOR QUESTION: $\Rightarrow \frac{BD}{DA} = \frac{BE}{EC} \qquad (By BPT) \qquad(i)$ In $\triangle ABL DC   IAL$ $\Rightarrow \frac{BD}{DA} = \frac{BC}{CL} \qquad (By BPT) \qquad(ii)$ From (i) and (ii) we get $\frac{BE}{EC} = \frac{BC}{CL} \Rightarrow \frac{4}{2} = \frac{6}{CL} \Rightarrow CL = 3 \text{ cm}$ 34  34  34  36  37  38  Solution Given- Radius of cylinder = 3.5 cm and height = 10 cm Total surface area of Article = Curved surface area of cylinder + Curved surface area of two hemispheres Curved surface area of cylinder = 2 $\pi$ rh			1				
TO PROVE  FIGURE – 1 MARK  PROOF 3 MARKS  ANSWER FOR QUESTION: $\Rightarrow \frac{BD}{DA} = \frac{BE}{EC} \qquad (By BPT) \qquad(i)$ In $\triangle BD$ = $\frac{BC}{DA} = \frac{BC}{CL}$ (By BPT)(ii)  From (i) and (ii) we get $\frac{BE}{EC} = \frac{BC}{CL} \Rightarrow \frac{4}{2} = \frac{6}{CL} \Rightarrow CL = 3 \text{ cm}$ 34  34  34  34  35 cm  Solution  Given- Radius of cylinder = 3.5 cm and height = 10 cm  Total surface area of Article = Curved surface area of cylinder + Curved surface area of two hemispheres  Curved surface area of cylinder = $\frac{1}{2}$	33.	BASIC PROPORTIONALITY THEOREM					
FIGURE – 1 MARK PROOF 3 MARKS  ANSWER FOR QUESTION: $\Rightarrow \frac{BD}{DA} = \frac{BE}{EC} \qquad \text{(By BPT)} \qquad \dots \text{(i)}$ In $\triangle BD$ and $\triangle BD$ we get $\frac{BE}{EC} = \frac{BC}{CL} \qquad \Rightarrow \frac{4}{2} = \frac{6}{CL} \qquad \Rightarrow CL = 3 \text{ cm}$ 34  34  35 cm Solution Given- Radius of cylinder = 3.5 cm and height = 10 cm Total surface area of Article = Curved surface area of cylinder + Curved surface area of two hemispheres Curved surface area of cylinder $\frac{1}{2\pi rh}$		GIVEN					
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$\Rightarrow \frac{BD}{DA} = \frac{BC}{CL} \qquad (By BPT) \qquad(ii) \qquad \qquad Fig. 7.32$ $\frac{BE}{EC} = \frac{BC}{CL} \Rightarrow \frac{4}{2} = \frac{6}{CL} \Rightarrow CL = 3 \text{ cm}$ 34 $34$ $Solution$ Given- Radius of cylinder = 3.5 cm and height = 10 cm Total surface area of Article = Curved surface area of cylinder + Curved surface area of two hemispheres Curved surface area of cylinder = $\frac{1}{2}$		$\Rightarrow \frac{BD}{DA} = \frac{BE}{EC} \qquad \text{(By BPT)} \qquad \dots \text{(i)}$					
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34  35 cm  Solution  Given- Radius of cylinder = 3.5 cm and height = 10 cm  Total surface area of Article = Curved surface area of cylinder + Curved surface area of two hemispheres  Curved surface area of cylinder  =2πrh  14							
3.5 cm Solution Given- Radius of cylinder = 3.5 cm and height = 10 cm Total surface area of Article = Curved surface area of cylinder + Curved surface area of two hemispheres Curved surface area of cylinder =2\pirh		$\frac{BE}{EC} = \frac{BC}{CL}  \Rightarrow  \frac{4}{2} = \frac{6}{CL} \qquad \Rightarrow  CL = 3 \text{ cm}$					
Solution Given- Radius of cylinder = 3.5 cm and height = 10 cm Total surface area of Article = Curved surface area of cylinder + Curved surface area of two hemispheres Curved surface area of cylinder $= 2\pi rh$ 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	34	10 cm					
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surface area of two hemispheres Curved surface area of cylinder $=2\pi rh$ 1/2		Given- Radius of cylinder = 3.5 cm and height = 10 cm	1				
$=2\pi rh$		surface area of two hemispheres					
1 1/2		-	1/2				
$=2\pi\times3.5\times10$		$=2\pi\times3.5\times10$	1/2				

	$=70\pi$	1/2				
	Surface area of a hemisphere $=2\pi r^2$	1/2				
	$=2\pi \times 3.5 \times 3.5$	1/2				
	$=24.5\pi$					
	Hence, Total surface area of article = $70\pi+2\times(24.5\pi)$					
	$=70\pi+49\pi$ =119 $\pi$					
	$=119 \times 227 = 374 \text{ cm}^2$	1				
OR	T 🔼	Fig ½				
	3.5 cm					
	20 cm 13 cm					
	3.5 cm					
	Diameter of cylinder = 7 cm					
	Height of cylinder $= 20-7 = 13 \text{ cm} = \text{H}$	1				
	Total Volume = $\pi R^2 H + \frac{4}{3}\pi R^3 \ cm^2$					
	•	1				
	$=\pi\left(\frac{7}{2}\right)^2\cdot 13+\frac{4}{3}\pi\left(\frac{7}{2}\right)^3$					
		1				
	$=\frac{22}{7}\times\frac{49}{4}\left(13+\frac{4}{3}\cdot\frac{7}{2}\right)\ cm^3$					
	$=\frac{77\times53}{6}$	1				
		1/2				
	$=680.17 \ cm^3$	72				
		L				

35	Rent (in	Number of	CF		1 for cf
	Rupees)	tenants			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		l	I	
	5500-6500 is a	median class.			1/2
	1= 5500				1/2
	f=40				1/2
	cf=58				1/2
	h=1000				
	$Median = l + \left[ \frac{\frac{n}{2} - c}{f} \right]$	x h			1
	=5500+{65-58	8}/40 x 1000 =	5500+ 7 x 25 =	-5675	1

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

38.	i)400 m	1
	ii) 45 <sup>0</sup>	1
	iii) $\tan 30^0 = AB/BC$	1/2
	$1/\sqrt{3} = AB/15$	1/2
	$1/\sqrt{3} = AB/15$ $AB=15/\sqrt{3}$	1/2
	$=5\sqrt{3}$	1/2
	OR	
	AB =6 m	1
	$AC = 6\sqrt{2} \text{ m}$	1