

MARKING KEY
PREBOARD-1 EXAM – MATHEMATICS (STANDARD)
03-12-2023

	SETA		SETB		SETC	
1.	b)4	1.	d)	1.	c)5	
2.	a) $\sqrt{16} \sqrt{256}$	2.	a)	2.	a)12.6	
3	a)40	3	a) $\sqrt{16} \sqrt{256}$	3	d)30	
4	c) no solutions	4	a)2	4	a)3	
5	b)3	5	c) no solutions	5	b)160	
6	b)3/4	6	b)3	6	a)4	
7	a)4	7	a)0	7	a)40	
8	c)5	8	a)4	8	a)1/3	
9	d)35	9	c)5	9	a) $\sqrt{16} \sqrt{256}$	
10	a)(2,5)	10	d)35	10	a) 12.6	
11	a)12.6	11	a)(2,5)	11	d)	
12	b)14	12	a)12.6	12	a)	
13	d)30	13	b)14	13	b)4	
14	b) $4 + 3\sqrt{3}$	14	d)30	14	b)3/4	
15	a) 3	15	b)160	15	c) $4 + \sqrt{3}$	
16	c)20	16	b) $4 + 3\sqrt{3}$	16	c)20	
17	b)160	17	a) 3	17	b)3	
18	a)1/3	18	c)20	18	d)35	
19	d)	19	a)1/3	19	c) -12x + 8y = 7	
20	a)	20	b)4	20	a)(2,5)	
21	$x = \frac{k \times 3 + 1 \times -4}{k + 1}$ $0 = \frac{3k - 4}{k + 1}$ $3k = 4$ $k:1 = 4:3$ $y = \frac{k \times 0 + 1 \times 7}{k + 1} = \frac{\frac{4}{3} \times 0 + 7}{\frac{4}{3} + 1} = \frac{7}{\frac{7}{3}} = 3$					1
						1

22.	<p>Let, the zero of $2x^2 + 3x + \lambda$ be $\frac{1}{2}$ and β.</p> <p>Product of zeroes $\frac{c}{a}$, $\frac{1}{2}\beta = \frac{\lambda}{2}$</p> <p>or, $\beta = \lambda$</p> <p>and sum of zeroes $-\frac{b}{a}$, $\frac{1}{2} + \beta = -\frac{3}{2}$</p> <p>or $\beta = -\frac{3}{2} - \frac{1}{2} = -2$</p> <p>Hence $\lambda = \beta = -2$</p> <p>Thus other zero is -2.</p> <div style="background-color: #e0e0e0; padding: 10px; border: 1px solid black; margin-top: 10px;"> $px(x - 3) + 9 = 0$ <p>or $px^2 - 3px + 9 = 0$</p> <p>Let α, β be the zeroes of the polynomial.</p> <p>Then, $\alpha + \beta = 3$ and $\alpha\beta = \frac{9}{p}$</p> <p>Also $\alpha = \beta$ $\therefore 2\alpha = 3$</p> <p>or $\alpha = \beta = \frac{3}{2}$</p> <p>$\therefore \frac{9}{4} = \frac{9}{p}$</p> <p>$\Rightarrow p = 4$</p> </div>	$\frac{1}{2}$
23.	<p>Since G is the mid-point of PQ we have</p> $PG = GQ$ $\frac{PG}{GQ} = 1$ <p>We also have $GH \parallel QR$, thus by BPT we get</p> $\frac{PG}{GQ} = \frac{PH}{HR}$ $1 = \frac{PH}{HR}$ $PH = HR$ <p>Hence proved.</p> <p>Hence, H is the mid-point of PR.</p> <p>OR</p>	$\frac{1}{2}$

	<p>We have $DB \perp BC$, $DE \perp AB$ and $AC \perp BC$.</p> <p>In ΔABC, $\angle C = 90^\circ$, thus</p> $\angle 1 + \angle 2 = 90^\circ$ <p>But we have been given,</p> $\angle 2 + \angle 3 = 90^\circ$ <p>Hence $\angle 1 = \angle 3$</p> <p>In ΔABC and ΔBDE,</p> $\angle 1 = \angle 3$ <p>and $\angle ACB = \angle DEB = 90^\circ$</p> <p>Thus by AA similarity we have</p> $\Delta ABC \sim \Delta BDE$ <p>Thus $\frac{AC}{BC} = \frac{BE}{DE}$. Hence Proved</p>	$\frac{1}{2}$
24	<p>Degree swept by minute hand in 1 minute is $\frac{360^\circ}{60} = 6^\circ$ and degree swept by minute hand in 15 minutes,</p> $\theta = 6^\circ \times 15 = 90^\circ$ <p>Hence, $\theta = 90^\circ$</p> <p>and $r = 14$ cm</p> <p>Area swept by minute hand</p> $\frac{\theta}{360^\circ} \times \pi r^2 = \frac{90^\circ}{360^\circ} \times \frac{22}{7} \times (14)^2$ $= \frac{1}{4} \times \frac{22}{7} \times 14 \times 14 = 154 \text{ cm}^2$	$\frac{1}{2} + \frac{1}{2}$
25.	$4\pi r^2 = \frac{4}{3}\pi r^3 \quad \therefore r = 3$	1+1
26.	<p>i.e., $b^2 - 4ac = 0 \dots(2)$</p> <p>Comparing the given equation with $ax^2 + bx + c = 0$ we get $a = 1$, $b = p$ and $c = 16$</p> <p>Substituting above in equation (2) we have</p> $p^2 - 4 \times 1 \times 16 = 0$ $p^2 = 64 \Rightarrow p = \pm 8$ <p>When $p = 8$, from equation (1) we have</p> $x^2 + 8x + 16 = 0$ $x^2 + 2 \times 4x + 4^2 = 0$ $(x + 4)^2 = 0 \Rightarrow x = -4, -4$ <p>Hence, roots are -4 and -4.</p> <p>When $p = -8$ from equation (1) we have</p> $x^2 - 8x + 16 = 0$ $x^2 - 2 \times 4x + 4^2 = 0$ $(x - 4)^2 = 0 \Rightarrow x = 4, 4$ <p>Hence, the required roots are either $-4, -4$ or $4, 4$</p>	$\frac{1}{2}$
	OR	

	24 th term is the first negative term	1/2
31	The three numbers in AP are a-d, a and a + d $a - d + a + a + d = 6$ $3a = 6$ $a = 2$ $(a-d) \times a \times a(a+d) = 64$ $a^2 - d^2 = -32$ $4d^2 = 32$ d = negative ans FULL MARKS WILL BE AWARDED TILL STUDENT OBTAINS $d^2 = -28$	1/2 1/2 1/2 1/2 1/2 1/2
32	i) $6/28 = 3/14$ ii) $22/28 = 11/14$ iii) $21/28 = \frac{3}{4}$ OR iv) $\frac{3}{4}$	1 1 2 or 2
33	<p>i) ii) $\tan 30 = SR/QR$ $1/\sqrt{3} = 40/QR$ $QR = 40\sqrt{3}m$ iii) $\tan 60 = PQ/QR$ $\sqrt{3} = h/40\sqrt{3}$ $h = 120m$ OR iv) $\cos 60 = QR/PR$ $\frac{1}{2} = 40\sqrt{3}/PR$ $PR = 80\sqrt{3}m$</p>	1 1 2 or 2
34	i) $a10 = a+9d = 30+9 \times 10 = 120$ ii) middle row is 9 th row $a9 = a+8d = 30+80 = 110$ seats iii) $1500 = n/2 (2 \times 30 + (n-1)10)$ $n^2 + 5n - 300 = 0$ $n = -20$ or 15 OR iv) $S10 = 10/2(2 \times 30 + 9 \times 10)$ $= 5(60+90)$ $= 75$	1 1 2 2
35		

SOLUTION. Here, $h = 10$. Let the assumed mean be $a = 35$.

Class interval (Age in years)	Mid-value x_i	Number of persons f_i	$u_i = \frac{x_i - a}{h}$	$f_i u_i$
0 – 10	5	$100 - 90 = 10$	$\frac{5 - 35}{10} = -3$	-30
10 – 20	15	$90 - 75 = 15$	$\frac{15 - 35}{10} = -2$	-30
20 – 30	25	$75 - 50 = 25$	$\frac{25 - 35}{10} = -1$	-25
30 – 40	35	$50 - 25 = 25$	$\frac{35 - 35}{10} = 0$	0
40 – 50	45	$25 - 15 = 10$	$\frac{45 - 35}{10} = 1$	10
50 – 60	55	$15 - 5 = 10$	$\frac{55 - 35}{10} = 2$	20
60 – 70	65	$5 - 0 = 5$	$\frac{65 - 35}{10} = 3$	15
Total		$\sum f_i = 100$		$\sum f_i u_i = -40$

$$\text{Mean } \bar{x} = a + hu = a + h \left(\frac{\sum f_i u_i}{\sum f_i} \right)$$

$$= 35 + 10 \times \frac{(-40)}{100} = 35 - 4 = 31$$

SOLUTION. Since the mode of the given series is 154 and maximum frequency 20 is of the class 150 – 160. So, the modal class is 150 – 160.

$$\therefore l = 150, \quad h = 10, \quad f_1 = 20, \quad f_0 = f \quad \text{and} \quad f_2 = 8$$

$$\text{Mode} = l + h \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2} \right) \times h$$

$$\Rightarrow 154 = 150 + \left(\frac{20 - f}{2 \times 20 - f - 8} \right) \times 10$$

$$\Rightarrow 154 - 150 = \left(\frac{20 - f}{32 - f} \right) \times 10$$

$$\Rightarrow 4(32 - f) = (20 - f) \times 10$$

$$128 - 4f = 200 - 10f \quad \Rightarrow \quad 10f - 4f = 200 - 128$$

$$6f = 72 \quad \Rightarrow \quad f = 12$$

36

We have

$$2x - y = 1 \Rightarrow y = 2x - 1$$

x	0	1	3
y	-1	1	5

$$\text{and} \quad x + 2y = 13 \Rightarrow y = \frac{13 - x}{2}$$

x	1	3	5
y	6	5	4

3

1
1

1/2

1
1

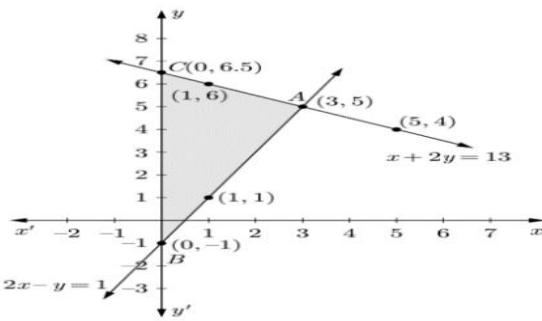
1

1/2

1

1

1+

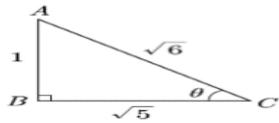


Solution: (3,5)

$$\text{Area} = \frac{1}{2} \times b \times h = \frac{1}{2} \times 7.5 \times 3 = 11.25 \text{ cm}^2$$

$\frac{1}{2}$
1

37. We draw the triangle as shown below and write all dimensions.



Now

$$\cot \theta = \frac{1}{\tan \theta} = \sqrt{5}$$

$$\sin \theta = \frac{1}{\sqrt{6}}$$

$$\cos \theta = \frac{\sqrt{5}}{\sqrt{6}}$$

$$(1) \frac{\cosec^2 \theta - \sec^2 \theta}{\cosec^2 \theta + \sec^2 \theta} = \frac{(1 + \cot^2 \theta) - (1 + \tan^2 \theta)}{(1 + \cot^2 \theta) + (1 + \tan^2 \theta)}$$

$$= \frac{\cot^2 \theta - \tan^2 \theta}{2 + \cot^2 \theta + \tan^2 \theta}$$

$$= \frac{(\sqrt{5})^2 - (\frac{1}{\sqrt{5}})^2}{2 + (\sqrt{5})^2 + (\frac{1}{\sqrt{5}})^2}$$

$$= \frac{5 - \frac{1}{5}}{2 + 5 + \frac{1}{5}} = \frac{25 - 1}{35 + 1} = \frac{24}{36} = \frac{2}{3}$$

1

$$:(\sin \theta + \cosec \theta)^2 + (\cos \theta + \sec \theta)^2$$

$$= \sin^2 \theta + \cosec^2 \theta + 2\sin \theta \cosec \theta + \cos^2 \theta + \sec^2 \theta + 2\cos \theta \sec \theta$$

$$= 1 + 2\sin \theta \cosec \theta + 2\cos \theta \sec \theta + \cosec^2 \theta + \sec^2 \theta$$

$$= 1 + 2 + 2 + 1 + \tan^2 \theta + 1 + \cot^2 \theta$$

$$= 7 + \tan^2 \theta + \cot^2 \theta$$

1

1

$\frac{1}{2}$

$\frac{1}{2}$

$1\frac{1}{2} + \frac{1}{2}$

- a) Proving identity : diagram
proof

38.

a) Given + TPT + ,DIAGRAM
PROOF

$\frac{1}{2} + \frac{1}{2} + \frac{1}{2}$

2

Four sides of a quadrilateral ABCD are tangent to a circle.

1

$$AB + CD = BC + AD$$

$\frac{1}{2}$

$$6 + 4 = 7 + AD$$

$\frac{1}{2}$

$$AD = 10 - 7 = 3 \text{ cm}$$

$\frac{1}{2} + \frac{1}{2}$

OR

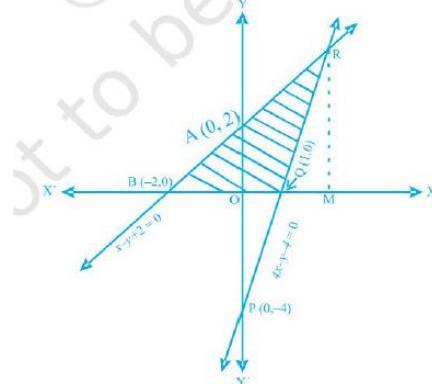
	<p>$\text{PR} \parallel \text{AQ}$ $\angle 1 = \angle 4$ corresponding angles $\angle 2 = \angle 3$ Alternate angles $\text{PA} = \text{PQ}$ $\angle 1 = \angle 2$ base angles $\therefore \angle 3 = \angle 4$ $\text{QR} = \text{BR}$ tangents from external point $\Delta \text{PQR} \cong \Delta \text{PBR}$ SSS $\angle Q = \angle B$ cpct $\angle Q = 90^\circ$ tangent perpendicular to radius $\angle B = 90^\circ$ $\therefore \text{BR is tangent at B}$</p>	1 1 1
SET B		
21	$PQ = \sqrt{(\sqrt{2} + \sqrt{2})^2 + (\sqrt{2} + \sqrt{2})^2} = \sqrt{(2\sqrt{2})^2 + (2\sqrt{2})^2} = \sqrt{16} = 4$ $PR = \sqrt{(\sqrt{2} + \sqrt{6})^2 + (\sqrt{2} - \sqrt{6})^2} = \sqrt{2 + 6 + 2\sqrt{12} + 2 + 6 - 2\sqrt{12}} = \sqrt{16} = 4$ $RQ = \sqrt{(-\sqrt{2} + \sqrt{6})^2 + (-\sqrt{2} - \sqrt{6})^2} = \sqrt{2+6-2\sqrt{12}+2+6+2\sqrt{12}} = \sqrt{16} = 4$ Triangle PQR is equilateral	1 1 $\frac{1}{2}$ $\frac{1}{2}$
25	Surface area of the cone = $\pi r l + \pi r^2$ $= \frac{22}{7} \times 7 \times \sqrt{7^2 + 14^2} + \frac{22}{7} (7)^2$ $= \frac{22}{7} \times 7 \times \sqrt{245} + 154 = (154\sqrt{5} + 154) \text{ cm}^2 = 154(\sqrt{5} + 1) \text{ cm}^2$	$\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$
27	Let the circle touches the sides BC, CA, AB of the right triangle ABC at D, E and F respectively, where BC = a , CA = b and AB = c . Then AE = AF and BD = BF. Also CE = CD = r . i.e., $b - r = AF, a - r = BF$ or $AB = c = AF + BF = b - r + a - r$ This gives $r = \frac{a + b - c}{2}$	$\frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$ 1 $\frac{1}{2}$
31	The three numbers in AP are $a-d, a$ and $a+d$ $a-d+a+a+d=6$ $3a=6$ $a=2$ $(a-d)x ax a(a+d)=64$ $a^2-d^2=-32$ $4-d^2=32$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$

x	0	-2
$y = x + 2$	2	0

x	0	1
$y = 4x - 4$	-4	0

Solution = (2,4)

$$\text{area of } \triangle BQR = \frac{1}{2} \times 3 \times 4 = 6 \text{ sq. units.}$$



1+1

2

1+1