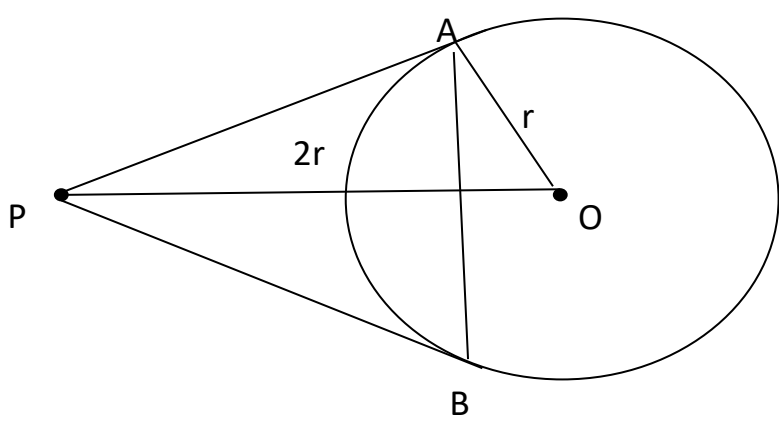


Marking Scheme
Class- X, Session- 2021-22
TERM II
Subject- Mathematics (Standard)

SECTION A		
Q.No	HINTS/SOLUTION	MARKS
1	$a = 6, d = 3$; $a_{25} = 6 + 24(3) = 78$ $a_{15} = 6 + 14(3) = 48$; $a_{25} - a_{15} = 78 - 48 = 30$ <p style="text-align: center;">OR</p> $7(a + 6d) = 5(a + 4d)$ $\Rightarrow 2a + 22d = 0 \Rightarrow a + 11d = 0 \Rightarrow t_{12} = 0$	1 1 1 1
2	$5mx^2 - 6mx + 9 = 0$ $b^2 - 4ac = 0 \Rightarrow (-6m)^2 - 4(5m)(9) = 0$ $\Rightarrow 36m(m - 5) = 0$ $\Rightarrow m = 0, 5$; rejecting $m=0$, we get $m = 5$	1 1
3	 <p>let $\angle APO = \theta$</p> $\sin \theta = \frac{OA}{OP} = \frac{1}{2} \Rightarrow \theta = 30^\circ$ $\Rightarrow \angle APB = 2\theta = 60^\circ$ <p>Also $\angle PAB = \angle PBA = 60^\circ$ ($\because PA = PB$)</p> $\Rightarrow \Delta APB$ is equilateral	1/2 1/2 1/2 1/2
4	CSA (cone) = $\pi r l = 12320$ $\frac{22}{7} \times 56 \times l = 12320$ $l = 70$ cm $h = \sqrt{70^2 - 56^2} = 42$ cm	1/2 1 1/2

5	<p>Modal class is $40 - 60, l = 40, h = 20, f_1 = ?, f_0 = 10, f_2 = 6$</p> $45 = 40 + 20 \times \left[\frac{f_1 - 10}{2f_1 - 10 - 6} \right]$ $\Rightarrow \frac{1}{4} = \frac{f_1 - 10}{2f_1 - 16}$ $\Rightarrow 2f_1 - 16 = 4f_1 - 40 \Rightarrow f_1 = 12$	<p>1/2</p> <p>1/2</p> <p>1</p>																		
6	<p>Let the present age of Ritu be x years</p> $(x - 5)^2 = 5x + 11$ $x^2 - 15x + 14 = 0$ $(x - 14)(x - 1) = 0 \Rightarrow x = 1 \text{ or } 14$ <p>$x = 14$ years (rejecting $x = 1$ as in that case Ritu's age 5 years ago will be -ve)</p> <p style="text-align: center;">OR</p> $9x^2 - 6px + (p^2 - q^2) = 0$ $a = 9, \quad b = -6p, \quad c = p^2 - q^2$ $D = b^2 - 4ac = (-6p)^2 - 4(9)(p^2 - q^2) = 36q^2$ $x = \frac{-b \pm \sqrt{D}}{2a} = \frac{6p \pm 6q}{18} = \frac{p + q}{3} \text{ or } \frac{p - q}{3}$	<p>1</p> <p>1/2</p> <p>1/2</p> <p>1/2</p> <p>1</p>																		
SECTION B																				
7	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="padding: 5px;">Distance (in m)</th> <th style="padding: 5px;">0 - 1</th> <th style="padding: 5px;">1 - 2</th> <th style="padding: 5px;">2 - 3</th> <th style="padding: 5px;">3 - 4</th> <th style="padding: 5px;">4 - 5</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">Number of Students</td> <td style="padding: 5px;">40</td> <td style="padding: 5px;">80</td> <td style="padding: 5px;">62</td> <td style="padding: 5px;">38</td> <td style="padding: 5px;">30</td> </tr> <tr> <td style="padding: 5px;">cf</td> <td style="padding: 5px;">40</td> <td style="padding: 5px;">120</td> <td style="padding: 5px;">182</td> <td style="padding: 5px;">220</td> <td style="padding: 5px;">250</td> </tr> </tbody> </table> <p>$\frac{n}{2} = \frac{250}{2} = 125 \Rightarrow$ median class is $2 - 3, l = 2, h = 1, cf = 120, f = 62$</p> $\text{median} = l + \frac{\frac{n}{2} - cf}{f} \times i$ $= 2 + \frac{5}{62}$ $= \frac{129}{62} = 2 \frac{5}{62} \text{ m or } 2.08 \text{ m}$ <p>50% of students jumped below $2 \frac{5}{62}$ m and 50% above it.</p>	Distance (in m)	0 - 1	1 - 2	2 - 3	3 - 4	4 - 5	Number of Students	40	80	62	38	30	cf	40	120	182	220	250	<p>1</p> <p>1/2</p> <p>1</p> <p>1/2</p>
Distance (in m)	0 - 1	1 - 2	2 - 3	3 - 4	4 - 5															
Number of Students	40	80	62	38	30															
cf	40	120	182	220	250															
8	<p>Draw a circle of radius 4cm</p> <p>Draw OA and construct $\angle AOB = 120^\circ$</p> <p>Draw $\angle OAP = \angle OBP = 90^\circ$</p> <p>PA and PB are required tangents</p>	<p>1</p> <p>1</p> <p>1</p>																		
9	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="padding: 5px;">Runs Scored</th> <th style="padding: 5px;">0 - 40</th> <th style="padding: 5px;">40 - 80</th> <th style="padding: 5px;">80 - 120</th> <th style="padding: 5px;">120 - 160</th> <th style="padding: 5px;">160 - 200</th> <th style="padding: 5px;">TOTAL</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">Number of Batsmen (f_i)</td> <td style="padding: 5px;">12</td> <td style="padding: 5px;">20</td> <td style="padding: 5px;">35</td> <td style="padding: 5px;">30</td> <td style="padding: 5px;">23</td> <td style="padding: 5px;">120</td> </tr> </tbody> </table>	Runs Scored	0 - 40	40 - 80	80 - 120	120 - 160	160 - 200	TOTAL	Number of Batsmen (f_i)	12	20	35	30	23	120					
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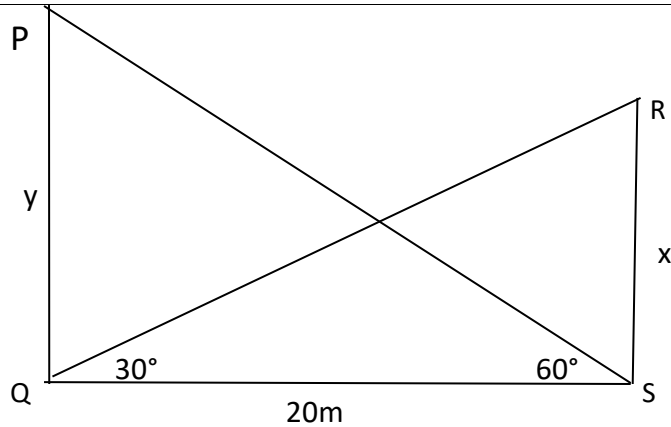
x_i	20	60	100	140	180	
$f_i x_i$	240	1200	3500	4200	4140	13280

$$\text{mean}(\bar{x}) = \frac{\sum f_i x_i}{\sum f_i} = \frac{13280}{120} = 110.67 \text{ runs}$$

$1\frac{1}{2}$

$1\frac{1}{2}$

10



In ΔPQS , $\tan 60^\circ = \frac{y}{20} \Rightarrow y = 20\sqrt{3}m$

In ΔRSQ , $\tan 30^\circ = \frac{x}{20} \Rightarrow x = \frac{20}{\sqrt{3}}m$

$$y - x = 20\sqrt{3} - \frac{20}{\sqrt{3}} = \frac{40}{\sqrt{3}} = \frac{40\sqrt{3}}{3} = 23.06m$$

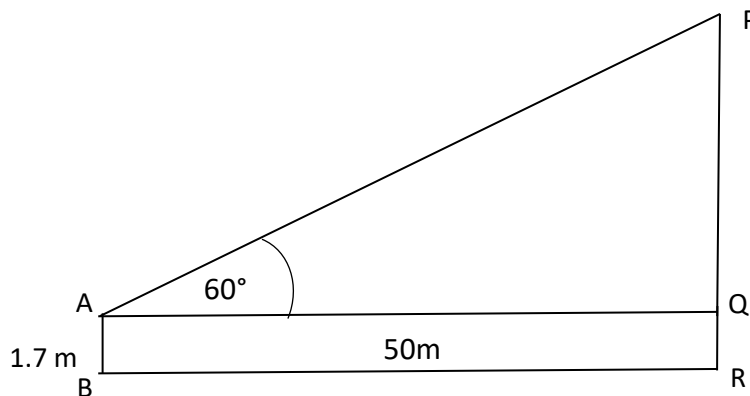
1

1/2

1/2

1

OR



Let PR be the building and AB be the boy

In ΔPQR , $\tan 60^\circ = \frac{PQ}{50} \Rightarrow PQ = 50\sqrt{3}m$

Height of the building = $PR = (50\sqrt{3} + 1.7)m = 88.2m$

1

1

1

SECTION C

11

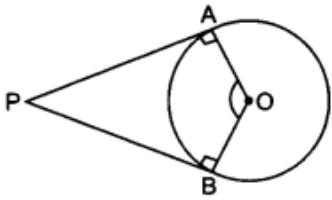
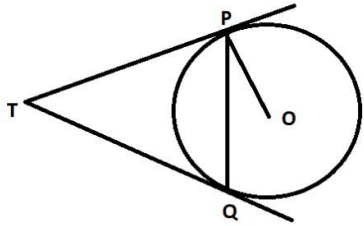
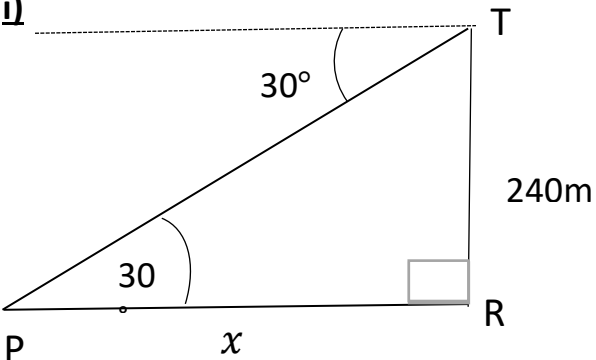
Volume of shell = Volume of cylinder

$$\Rightarrow \frac{4\pi}{3} [5^3 - 3^3] = \pi(7)^2 h$$

$$\Rightarrow h = \frac{8}{3} = 2\frac{2}{3}cm$$

$1\frac{1}{2}$

1

	<p>TSA of cylinder is</p> $= 2\pi r(r + h) = 2 \times \frac{22}{7} \times 7 \times \left(7 + \frac{8}{3}\right) = 44 \times \frac{29}{3} = \frac{1276}{3} \text{ cm}^2 \text{ or } 425.33 \text{ cm}^2$	$1\frac{1}{2}$
12	<div style="text-align: center;">  </div> <p> $\angle OAP + \angle OBP + \angle APB + \angle AOB = 360^\circ$ $\Rightarrow 90^\circ + 90^\circ + \angle APB + \angle AOB = 360^\circ$ (\because Tangent \perp radius) $\Rightarrow \angle APB + \angle AOB = 180^\circ$ </p> <p style="text-align: center;">OR</p> <div style="text-align: center;">  </div> <p> Let $\angle PTQ = \theta$ TPQ is an isosceles triangle. $\angle TPQ = \angle TQP = \frac{1}{2}(180^\circ - \theta) = 90^\circ - \frac{\theta}{2}$ $\angle OPT = 90^\circ$ $\angle OPQ = \angle OPT - \angle TPQ = 90^\circ - \left(90^\circ - \frac{\theta}{2}\right) = \frac{\theta}{2}$ $\angle OPQ = \frac{1}{2} \angle PTQ$ $2\angle OPQ = \angle PTQ$ </p>	1 $1\frac{1}{2}$ $1\frac{1}{2}$ $1\frac{1}{2}$ $1\frac{1}{2}$ 1
13	<p><u>Case Study-1</u></p> <p>i)</p> <div style="text-align: center;">  </div> <p>In ΔPTR, $\tan 30^\circ = \frac{240}{x} \Rightarrow x = 240\sqrt{3} \text{ m}$</p>	1 1

	<p>ii) Distance of boat from tower = $240\sqrt{3} - 240(\sqrt{3} - 1) = 240m$</p> <p>Let the angle of depression = θ</p> $\tan\theta = \frac{240}{240} = 1 \Rightarrow \theta = 45^\circ$	<p>1</p> <p>1</p>
14	<p>i) 3000, 3005, 3010, ..., 3900.</p> $a_n = a + (n - 1)d$ $3900 = 3000 + (n - 1)5$ $\Rightarrow 900 = 5n - 5 \Rightarrow 5n = 905 \Rightarrow n = 181$ <p>Minimum number of days of practice = $n - 1 = 180$ days</p> <p>ii) $S_n = \frac{n}{2}(a + l)$</p> $= \frac{181}{2} \times (3000 + 3900) = 624450 \text{ pushups}$	<p>1</p> <p>1</p> <p>1</p> <p>1</p>