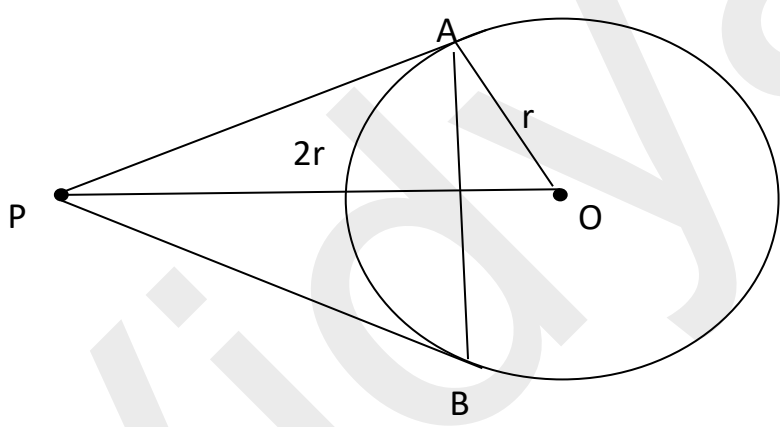


**Marking Scheme**  
**Class- X, Session- 2021-22**  
**TERM II**  
**Subject- Mathematics (Standard)**

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;"><b>OR</b></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 <math>\angle APO = \theta</math>  <math>\sin \theta = \frac{OA}{OP} = \frac{1}{2} \Rightarrow \theta = 30^\circ</math>  <math>\Rightarrow \angle APB = 2\theta = 60^\circ</math>  Also <math>\angle PAB = \angle PBA = 60^\circ</math> (<math>\because PA = PB</math>)  <math>\Rightarrow \Delta APB</math> is equilateral </p>	1/2 1/2 1/2 1/2
4	CSA (cone) = $\pi r l = 12320$ $\frac{22}{7} \times 56 \times l = 12320$ $l = 70 \text{ cm}$ $h = \sqrt{70^2 - 56^2} = 42 \text{ cm}$	1/2  1 1/2

5	<p>Modal class is <math>40 - 60, l = 40, h = 20, f_1 = ?, f_0 = 10, f_2 = 6</math></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 <math>x</math> years</p> $(x - 5)^2 = 5x + 11$ $x^2 - 15x + 14 = 0$ $(x - 14)(x - 1) = 0 \Rightarrow x = 1 \text{ or } 14$ <p><math>x = 14</math> years (rejecting <math>x = 1</math> as in that case Ritu's age 5 years ago will be -ve)</p> <p style="text-align: center;"><b>OR</b></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>1/2</p> <p>1</p>																		
<b>SECTION B</b>																				
7	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Distance (in m)</th> <th>0 - 1</th> <th>1 - 2</th> <th>2 - 3</th> <th>3 - 4</th> <th>4 - 5</th> </tr> </thead> <tbody> <tr> <td>Number of Students</td> <td>40</td> <td>80</td> <td>62</td> <td>38</td> <td>30</td> </tr> <tr> <td><math>cf</math></td> <td>40</td> <td>120</td> <td>182</td> <td>220</td> <td>250</td> </tr> </tbody> </table> <p><math>\frac{n}{2} = \frac{250}{2} = 125 \Rightarrow</math> median class is <math>2 - 3, l = 2, h = 1, cf = 120, f = 62</math></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 <math>2 \frac{5}{62}</math> 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 <math>\angle AOB = 120^\circ</math></p> <p>Draw <math>\angle OAP = \angle OBP = 90^\circ</math></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>Runs Scored</th> <th>0 - 40</th> <th>40 - 80</th> <th>80 - 120</th> <th>120 - 160</th> <th>160 - 200</th> <th>TOTAL</th> </tr> </thead> <tbody> <tr> <td>Number of Batsmen (<math>f_i</math>)</td> <td>12</td> <td>20</td> <td>35</td> <td>30</td> <td>23</td> <td>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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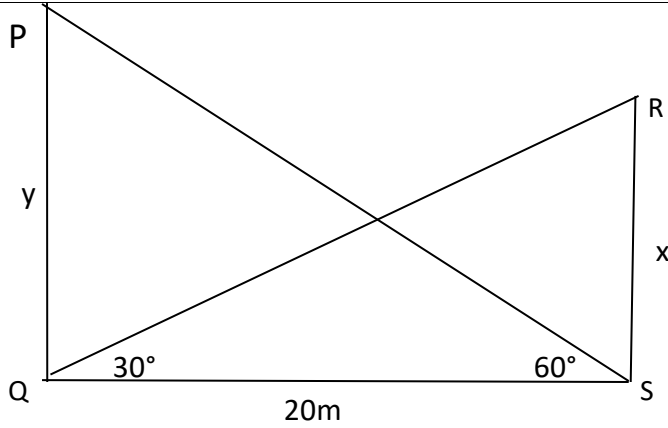
$x_i$	20	60	100	140	180	
$f_i x_i$	240	1200	3500	4200	4140	13280

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

1½

1½

10

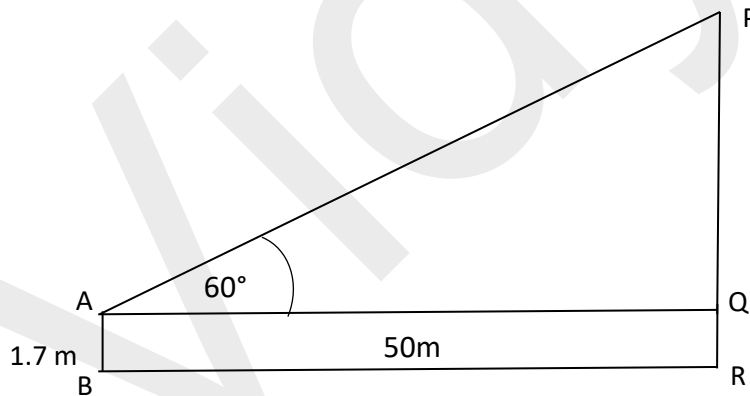


In  $\Delta PQS$ ,  $\tan 60^\circ = \frac{y}{20} \Rightarrow y = 20\sqrt{3}m$

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

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

OR



Let PR be the building and AB be the boy

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

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

1

1/2

1/2

1

1

1

1

**SECTION C**

11

Volume of shell = Volume of cylinder

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

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

1½

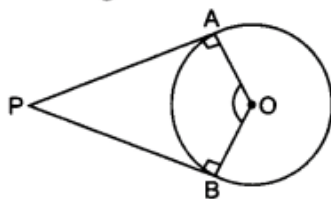
1

TSA of cylinder is

$$= 2\pi r(r+h) = 2 \times \frac{22}{7} \times 7 \times \left(7 + \frac{8}{3}\right) = 44 \times \frac{29}{3} = \frac{1276}{3} \text{ cm}^2 \text{ or } 425.33 \text{ cm}^2$$

$1\frac{1}{2}$

12

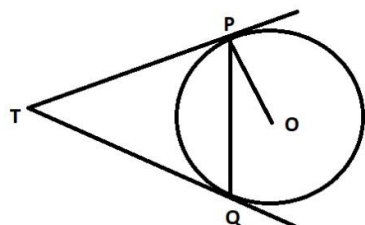


$$\angle OAP + \angle OBP + \angle APB + \angle AOB = 360^\circ$$

$$\Rightarrow 90^\circ + 90^\circ + \angle APB + \angle AOB = 360^\circ (\because \text{Tangent} \perp \text{radius})$$

$$\Rightarrow \angle APB + \angle AOB = 180^\circ$$

OR



$$\text{Let } \angle PTQ = \theta$$

TPQ is an isosceles triangle.

$$\angle TPQ = \angle TQP = \frac{1}{2}(180^\circ - \theta) = 90^\circ - \frac{\theta}{2}$$

$$\angle OPT = 90^\circ$$

$$\angle OPQ = \angle OPT - \angle TPQ = 90^\circ - \left(90^\circ - \frac{\theta}{2}\right) = \frac{\theta}{2}$$

$$\angle OPQ = \frac{1}{2} \angle PTQ$$

$$2\angle OPQ = \angle PTQ$$

1

$1\frac{1}{2}$

$1\frac{1}{2}$

$1\frac{1}{2}$

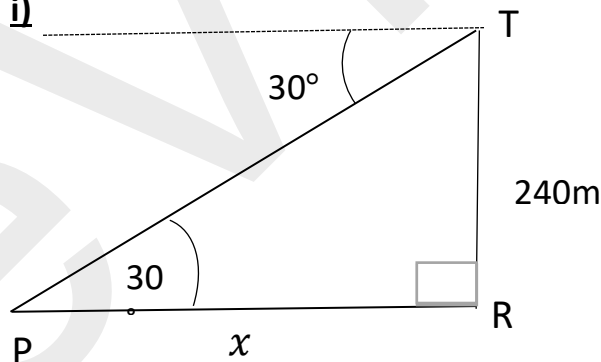
$1\frac{1}{2}$

1

13

**Case Study-1**

i)



$$\text{In } \Delta PTR, \tan 30^\circ = \frac{240}{x} \Rightarrow x = 240\sqrt{3} \text{ m}$$

1

1

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