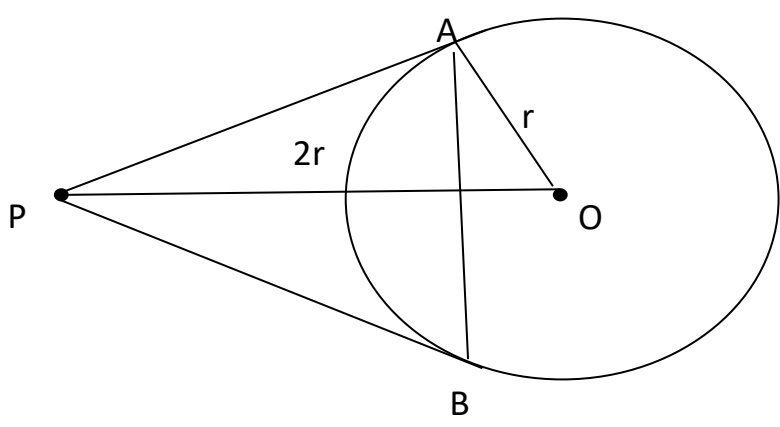


**Marking Scheme**  
**Class- X, Session- 2021-22**  
**TERM II**  
**Subject- Mathematics (Standard)**

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

5 Modal class is 40-60,  $h = 20$ ,  $f_1 = 40$ ,  $f_0 = 10$ ,  $f_2 = 6$  1/2

$$45 = 40 + 20 \times \left[ \frac{f_1 - 10}{2f_1 - 10 - 6} \right]$$

$$\Rightarrow \frac{1}{4} = \frac{f_1 - 10}{2f_1 - 16}$$

$$\Rightarrow 2f_1 - 16 = 4f_1 - 40 \Rightarrow f_1 = 12$$

1

6 Let the present age of Ritu be  $x$  years 1

$$(x - 5)^2 = 5x + 11$$

$$x^2 - 15x + 14 = 0$$

$$(x - 14)(x - 1) = 0 \Rightarrow x = 1 \text{ or } 14$$

$x = 14$  years (rejecting  $x = 1$  as in that case Ritu's age 5 years ago will be -ve) 1/2

**OR**

$$9x^2 - 6px + (p^2 - q^2) = 0$$

$$a = 9, \quad b = -6p, \quad c = p^2 - q^2$$

$$D = b^2 - 4ac = (-6p)^2 - 4(9)(p^2 - q^2) = 36q^2$$

$$x = \frac{-b \pm \sqrt{D}}{2a} = \frac{6p \pm 6q}{18} = \frac{p + q}{3} \text{ or } \frac{p - q}{3}$$

1/2

1

**SECTION B**

7

|                    |       |       |       |       |       |
|--------------------|-------|-------|-------|-------|-------|
| 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   |

$$\frac{n}{2} = \frac{250}{2} = 125 \Rightarrow \text{median class is } 2 - 3, l = 2, h = 1, cf = 120, f = 62$$

$$\text{median} = l + \frac{\frac{n}{2} - cf}{f} \times i$$

$$= 2 + \frac{5}{62}$$

$$= \frac{129}{62} = 2 \frac{5}{62} \text{ m or } 2.08 \text{ m}$$

50% of students jumped below  $2 \frac{5}{62}$  m and 50% above it. 1

1/2

8 Draw a circle of radius 4cm 1

Draw OA and construct  $\angle AOB = 120^\circ$  1

Draw  $\angle OAP = \angle OBP = 90^\circ$

PA and PB are required tangents 1

9

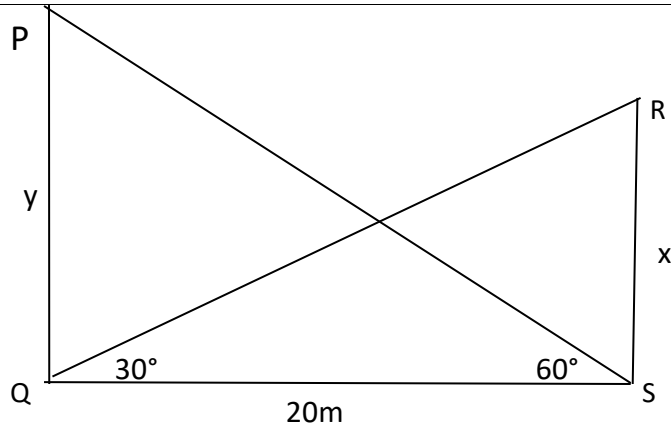
|                             |        |         |          |           |           |       |
|-----------------------------|--------|---------|----------|-----------|-----------|-------|
| Runs Scored                 | 0 - 40 | 40 - 80 | 80 - 120 | 120 - 160 | 160 - 200 | TOTAL |
| Number of Batsmen ( $f_i$ ) | 12     | 20      | 35       | 30        | 23        | 120   |

|           |     |      |      |      |      |       |
|-----------|-----|------|------|------|------|-------|
| $x_i$     | 20  | 50   | 100  | 140  | 180  | 130   |
| $f_i x_i$ | 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

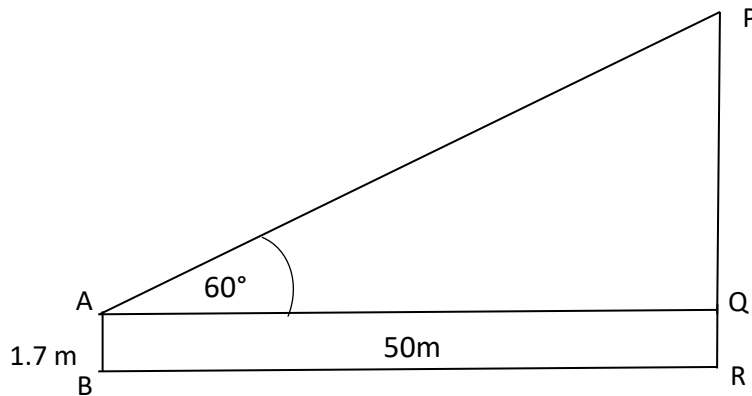


In  $\Delta PQS$ ,  $\tan 60^\circ = \frac{y}{20} \Rightarrow y = 20\sqrt{3}m$

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

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

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

$1\frac{1}{2}$

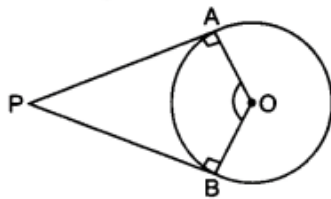
1

TSA of cylinder = [By Recommended Sample Paper Books - https://bit.ly/3EoIPsf](https://bit.ly/3EoIPsf)

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

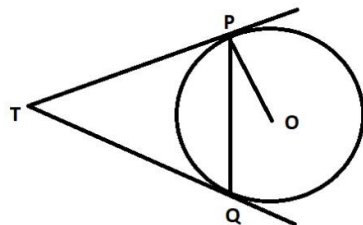
1½

12



$$\begin{aligned} \angle OAP + \angle OBP + \angle APB + \angle AOB &= 360^\circ \\ \Rightarrow 90^\circ + 90^\circ + \angle APB + \angle AOB &= 360^\circ \quad (\because \text{Tangent} \perp \text{radius}) \\ \Rightarrow \angle APB + \angle AOB &= 180^\circ \end{aligned}$$

OR



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

1½

1½

1½

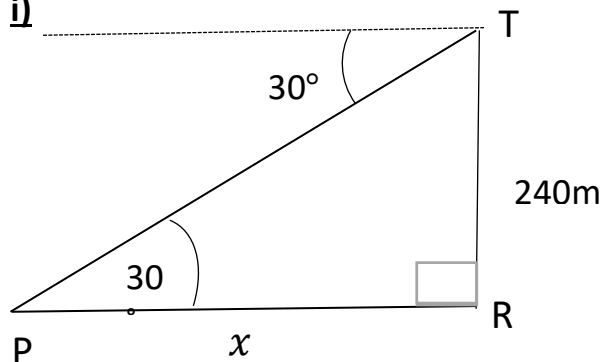
1½

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

| Buy Recommended Sample Paper Books - <a href="https://bit.ly/3EoIP5f">https://bit.ly/3EoIP5f</a> |  |  |
|--|--|--|
|  | ii) Distance of boat from tower = $240\sqrt{3} - 240(\sqrt{3} - 1) = 240m$<br>Let the angle of depression = $\theta$<br>$\tan\theta = \frac{240}{240} = 1 \Rightarrow \theta = 45^\circ$   | <b>1</b><br><br><b>1</b>                                 |
| <b>14</b>  | i) 3000, 3005, 3010, ..., 3900.<br>$a_n = a + (n - 1)d$<br>$3900 = 3000 + (n - 1)5$<br>$\Rightarrow 900 = 5n - 5 \Rightarrow 5n = 905 \Rightarrow n = 181$<br>Minimum number of days of practice = $n - 1 = 180$ days<br><br>ii) $S_n = \frac{n}{2}(a + l)$<br>$= \frac{181}{2} \times (3000 + 3900) = 624450$ pushups | <b>1</b><br><br><b>1</b><br><br><b>1</b><br><br><b>1</b> |