SECTION A

1. **(a)** Here

$a = -30, d = 6, n = 30$

$S_{30} = \frac{30}{2}[-60 + 29 \times 6]$

$= 1710$

OR

(b) $a = S_1 = 1(4 \times 1 + 1) = 5$

$a + (a + d) = S_2 = 2(4 \times 2 + 1) = 18$

$\therefore d = 8$

Hence, AP is

5,13,21, ...

2. $n \times \frac{1}{3} \cdot \pi \cdot (3.5)^2(3) = \frac{4}{3}\pi(10.5)^3$

$\Rightarrow n = 126$

3. **(a)** For real and equal roots

$4(m-1)^2 - 4(m-1) = 0$

$\Rightarrow m = 1$ or $m = 2$

$m \neq 1 \Rightarrow m = 2$

OR

(b) $\sqrt{3}x^2 + 10x + 7\sqrt{3} = 0$

or $\sqrt{3}x^2 + 3x + 7x + 7\sqrt{3} = 0$

or $(\sqrt{3}x + 7)(x + \sqrt{3}) = 0$

$\Rightarrow\ x = -\frac{7}{\sqrt{3}}, -\sqrt{3}$ or $-\frac{7}{3}\sqrt{3}, -\sqrt{3}$

4. Modal class is $40 - 50$

$\text{Mode} = 40 + 10 \times \frac{17 - 12}{34 - 12 - 4}$

$= 42 \cdot 7$ or $42\frac{7}{9}$

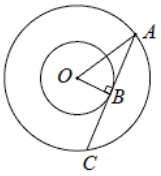
5. Let Rehan's present age be x years

$(x - 5)(x + 7) = 2x + 1$

$\Rightarrow x^2 = 36$

$\Rightarrow x = 6$

6.



For correct figure

Here $OB = 3$ cm, $OA = 4$ cm

$OB \perp AC$

$AB = \sqrt{4^2 - 3^2} = \sqrt{7}$ cm

Hence $AC = 2\sqrt{7}$ cm

SECTION B

7. Median class is $30 - 40$

Class	Frequency	c.f.
0-10	3	3
10-20	5	8

20-30	11	19
30-40	10	29
40-50	x	$29+x$
50-60	3	$32+x$
60-70	2	$34+x$

Correct table

$34 \cdot 5 = 30 + \frac{10}{10}\left(\frac{34+x}{2} - 19\right)$

$\Rightarrow x = 13$

8. Steps of construction:

Draw a circle with O as centre and radius as 3 cm.

Draw a diameter of it and extend both the sides and mark the points as P, Q such that $OP = OQ = 7$ cm.

Draw the perpendicular bisectors of OP and OQ to intersect PQ at M and N respectively.

With M as centre and OM as radius draw a circle to cut the given circle at A and C. With N as the centre and ON as radius draw a circle to cut the given circle at B and D.

Join PA, PC, QB, QD.

PA, PC and QB, QD are the required tangents from P and Q respectively.

Proof:

$\angle PAO = \angle QBO = 90°$ (Angle in a semi-circle)

$\therefore PA \perp AO, QB \perp BO$

In right angle triangle PAO ,

$OP = OQ = 7$ cm(By construction)

$OA = OB = 3$ cm(radius of the given circl)

$PA^2 = (OP)^2 - (OA)^2$

$= (7)^2 - (3)^2$

$= 49 - 9$

$= 40$

$PA = \sqrt{40}$

$= 6.3$ (approx.)

Also, in right triangle QBO,

$QB^2 = (OQ)^2 - (OB)^2$

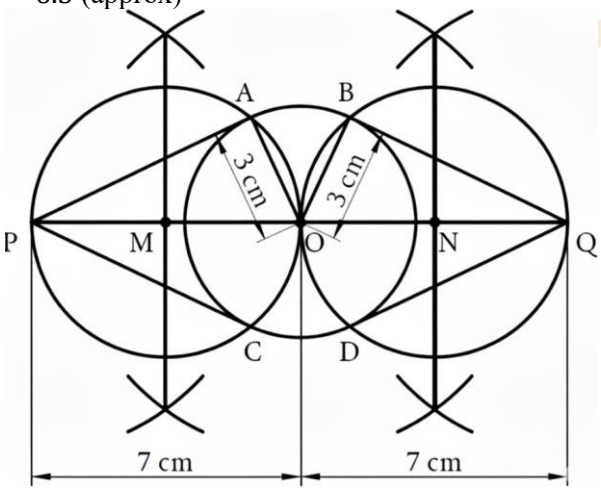
$= (7)^2 - (3)^2$

$= 49 - 9$

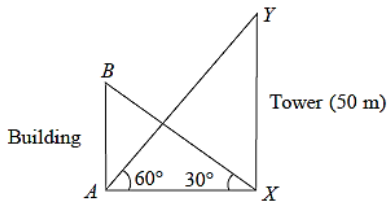
$= 40$

$QB = \sqrt{40}$

$= 6.3$ (approx)



9. (a)



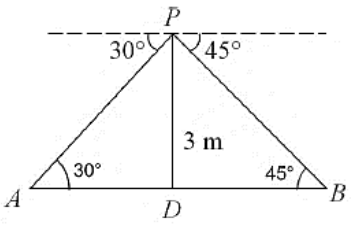
For correct figure

$\tan 30° = \frac{AB}{AX}$ and $\tan 60° = \frac{50}{AX}$

$\Rightarrow AB = \frac{1}{\sqrt{3}} AX$ and $AX = \frac{50}{\sqrt{3}}$

$\therefore AB = \frac{1}{\sqrt{3}} \cdot \frac{50}{\sqrt{3}} = \frac{50}{3}$ m

OR



(b)

Here, $\frac{PD}{AD} = \tan 30° = \frac{1}{\sqrt{3}} \Rightarrow AD = 3\sqrt{3}$ m and $\frac{PD}{BD} = \tan 45° = 1 \Rightarrow BD = 3$ m

So, $AB = AD + BD = (3\sqrt{3} + 3)\text{m} = 3(\sqrt{3} + 1)\text{m}$

10.

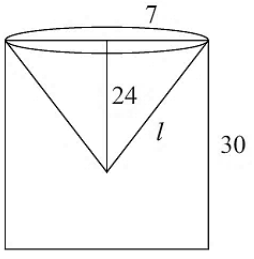
Class	***x***	***f***	***d***	**f.d**
100-120	110	8	-40	-320
120-140	130	3	-20	-60
140-160	150	8	0	0
160-180	170	6	20	120
180-200	190	5	40	200
		30		-60

For correct table

Mean $= 150 + \frac{-60}{30} = 148$

Therefore, mean expenditure = Rs. 148

11. (a) $l = \sqrt{576 + 49} = 25$ cm



TSA $= 2\pi rh + \pi r^2 + \pi rl$

$= \frac{22}{7} \times 7[60 + 7 + 25]$

$= 2024$ cm^2

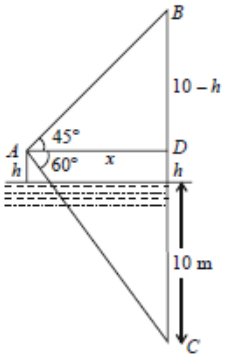
OR

(b) Distance covered by water in 1hr $= 12000$ m
Volume of water flown in 1 hr
$= 8 \times 6 \times 12000$ m^3
Hence area of field $\times\ 0 \cdot 05 = 8 \times 6 \times 12000$
$\Rightarrow$ Area of field $= 1152 \times 10^4$ m^2 or 11520000 m^2

12. PR = RB (tangents from external point) ……. (i)
Proving $\angle RPC = \angle RCP$
$\Rightarrow$ PR = CR …… (ii)
Using equations (i) and (ii)
BR = RC
Hence the tangent drawn at point P bisects BC

13. **(a)** Number of triangles in figures are 4,6,8, ...
This is an A.P. with $a = 4, d = 2$
$a_n = 4 + (n-1) \times 2 = 2n + 2$
(b) Number of matchsticks in figures are 12,19,26, ...
This is an A.P. with $a = 12, d = 7$
$61 = 12 + (n-1) \times 7$
$\Rightarrow n = 8$

14. **(a)**



(b) $\tan 45° = 1 = \frac{10-h}{x}$
$\Rightarrow x = 10 - h$ …… (i)
$\tan 60° = \sqrt{3} = \frac{10+h}{x}$
$\Rightarrow x = \frac{10+h}{\sqrt{3}}$ ……. (ii)
Solving (i) and (ii) $10(\sqrt{3}-1) = h(\sqrt{3}+1)$
$\Rightarrow h = \frac{10(\sqrt{3}-1)^2}{2}$
$= 2.67$ m or 2.7 m