SQP SOLUTIONS

1. **(b) :** Since tangents drawn from an external point to a circle are equal in length.

$\therefore$ $PQ = PT = 7$ cm and $RQ = RS = 4$ cm

Now, $RP = PQ - RQ = (7 - 4)$ cm $= 3$ cm

2. **(b) :** Given, $\Delta ABC \sim \Delta PQR$

$\Rightarrow \dfrac{AB}{PQ} = \dfrac{BC}{QR} = \dfrac{CA}{RP} \Rightarrow \dfrac{z}{3} = \dfrac{8}{6} = \dfrac{4\sqrt{3}}{y}$

$\Rightarrow \dfrac{z}{3} = \dfrac{8}{6}$ and $\dfrac{8}{6} = \dfrac{4\sqrt{3}}{y}$

$\Rightarrow z = \dfrac{24}{6} = 4$ and $y = \dfrac{24\sqrt{3}}{8} = 3\sqrt{3}$

$\Rightarrow y + z = 4 + 3\sqrt{3}$

3. **(b) :** We know, graph of linear polynomial is a straight line. Only in option (b), the graph is a straight line. So, it represents linear polynomial.

4. **(c) :** Since AD is the median, so D is the mid point of BC.

$\therefore$ Coordinates of $D = \left(\dfrac{6+1}{2}, \dfrac{5+4}{2}\right)$ *i.e.*, $\left(\dfrac{7}{2}, \dfrac{9}{2}\right)$

5. **(a) :** The given equation is $x^2 + 5x + 5 = 0$.

Here, $a = 1$, $b = 5$ and $c = 5$

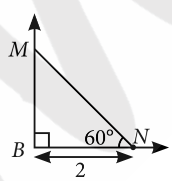
$\therefore$ $D = b^2 - 4ac = 25 - 4 \times 1 \times 5 = 5$

The roots are given by

$\alpha = \dfrac{-b + \sqrt{D}}{2a} = \dfrac{-5 + \sqrt{5}}{2}$ and $\beta = \dfrac{-b - \sqrt{D}}{2a} = \dfrac{-5 - \sqrt{5}}{2}$

6. **(d) :** Let MN be the length of the ladder.

In right-angled triangle MNB,



$\cos 60° = \dfrac{BN}{MN} \Rightarrow \dfrac{1}{2} = \dfrac{2}{MN}$

$\Rightarrow MN = 2 \times 2 = 4$ m

Therefore, the length of the ladder is 4 m.

7. **(a) :** We have,

$$\frac{\tan^2 60° + 4\cos^2 45° + 3\sec^2 30° + 5}{\operatorname{cosec} 30° + \sec 60° - \cot^2 30°}$$

$$= \frac{(\sqrt{3})^2 + 4\left(\frac{1}{\sqrt{2}}\right)^2 + 3\left(\frac{2}{\sqrt{3}}\right)^2 + 5}{2 + 2 - (\sqrt{3})^2} = \frac{3+2+4+5}{4-3} = 14$$

8. **(a) :** Here, diameter = 8 cm and $\theta = 90°$

$\therefore$ Area of sector $= \dfrac{\theta}{360°} \times \pi r^2 = \dfrac{90°}{360°} \times \pi\left(\dfrac{8}{2}\right)^2 = 4\pi$ cm^2.

9. **(a) :** Total number of possible outcomes = 6

Favourable outcomes of getting multiple of 2 are {2, 4, 6} *i.e.*, 3 in number.

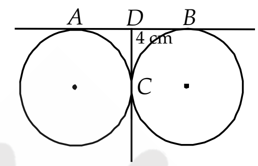
$\therefore$ Required probability $= \dfrac{3}{6} = \dfrac{1}{2}$

10. **(b) :** We have, $k^2 + 4k + 3 = 0 \Rightarrow k^2 + 3k + k + 3 = 0$

$\Rightarrow k(k + 3) + 1(k + 3) = 0 \Rightarrow (k + 3)(k + 1) = 0$

$\Rightarrow k = -1, -3$

11. **(c) :** $AD = CD$ and $BD = CD$



$\therefore$ $AB = AD + BD$

$\Rightarrow$ $AB = CD + CD$

$= 2CD$

$= 2 \times 4 = 8$ cm

12. **(b) :** Curved surface area of a hemisphere is $2\pi r^2$ and if, we join two solid hemispheres along their bases, then we get a solid sphere.

Hence, the curved surface area of new solid

$= 2\pi r^2 + 2\pi r^2 = 4\pi r^2$

13. **(c) :** Here, $n = 6$, which is even,

$\therefore$ Median $= \dfrac{1}{2}\left(\left(\dfrac{6}{2}\right)^{\text{th}} \text{term} + \left(\dfrac{6}{2}+1\right)^{\text{th}} \text{term}\right)$

$\Rightarrow 16 = \dfrac{1}{2}$ (3$^{\text{rd}}$ term + 4$^{\text{th}}$ term)

$\Rightarrow 32 = x - 2 + x \Rightarrow 2x = 34 \Rightarrow x = 17$

14. **(b) :** First monthly installment = ₹ 1000

Second monthly installment = ₹(1000 + 50) = ₹ 1050

Third monthly installment = ₹(1050 + 50) = ₹ 1100

and so on.

1000, 1050, 1100, ... forms an A.P., where $a = 1000$, $d = 50$, $n = 30$

Now, $a_n = a + (n - 1)d$

$\Rightarrow a_{30} = 1000 + (30 - 1)50 = 1000 + 1450 = 2450$

$\therefore$ 30$^{\text{th}}$ installment = ₹ 2450

15. **(a) :** In ΔABC, $\angle B = 90°$. Let $\angle ACB = \theta$

$\therefore \tan\theta = \dfrac{AB}{BC} = \dfrac{4}{4\sqrt{3}} = \dfrac{1}{\sqrt{3}}$

$\Rightarrow \tan\theta = \tan 30° \Rightarrow \theta = 30°$

Hence, the angle of depression from A is 30°.

16. **(d) :** Perimeter of $\Delta ABC = (9 + 6 + 7.5)$ cm

$= 22.5$ cm.

Let the perimeter of ΔDEF be p cm.

Given $\Delta DEF \sim \Delta ABC$

$\Rightarrow \dfrac{\text{Perimeter of } \Delta DEF}{\text{Perimeter of } \Delta ABC} = \dfrac{EF}{BC} \Rightarrow \dfrac{p}{22.5} = \dfrac{8}{6}$

$\Rightarrow p = \dfrac{22.5 \times 8}{6} = \dfrac{225 \times 8}{60} = 30$

17. **(c) :** Perimeter of the figure

$= BC + AB + CD +$ length of arc $\overset{\frown}{AED}$

$= 14 + 18 + 18 + \pi r = 50 + \dfrac{22}{7} \times \dfrac{14}{2} = 72$ cm

18. **(b) :** Total number of possible outcomes = 10 Sum of the given numbers

$= 2 + 4 + 4 + 6 + 6 + 6 + 8 + 8 + 8 + 8 = 60$

$\therefore$ Average $= \dfrac{\text{Sum of all the given numbers}}{\text{Total numbers}} = \dfrac{60}{10} = 6$

$\because$ 6 occurs 3 times.

So, favourable number of outcomes = 3

$\therefore$ Required probability = 3/10

19. **(d) :** Let breadth of a hall be x and height = $5x$

Length = $8 \times 5x = 40x$

$\therefore$ Volume of hall = $x \times 5x \times 40x = 200x^3$

But, volume of hall = 12.8 m^3

$\therefore$ $200x^3 = 12.8\ m^3 \Rightarrow x^3 = \dfrac{12.8}{200} = \dfrac{8}{125}$

$\Rightarrow$ $x = 0.4$ m = 40 cm

$\therefore$ Assertion (A) is false but reason (R) is true.

20. **(c) :** We have, $OR = 3$ cm, $PR = 5$ and $PQ = 4$

$\therefore$ $\sin R = \dfrac{PQ}{PR} = \dfrac{4}{5}$

$$\text{So, } \sin^2 R + \operatorname{cosec} R = \left(\frac{4}{5}\right)^2 + \frac{1}{4/5} = \frac{16}{25} + \frac{5}{4} = \frac{64+125}{25\times 4} = \frac{189}{100}$$

Also, cosec $A = (\sin A)^{-1}$

$\therefore$ Assertion (A) is true but reason (R) is false.

21. The given polynomial is $x^2 - p(x+1) + c$

i.e., $x^2 - px - p + c$

$\therefore$ Sum of zeroes $= \alpha + \beta = \dfrac{-(-p)}{1} = p$

and product of zeroes $= \alpha\beta = \dfrac{-p+c}{1} = -p + c$

Now, $(\alpha + 1)(\beta + 1) = 0 \Rightarrow \alpha\beta + \alpha + \beta + 1 = 0$

$\Rightarrow$ $-p + c + p + 1 = 0 \Rightarrow c + 1 = 0$

$\therefore$ $c = -1$

22. (a) Here, $a = 16$, $b = -24$, $c = -1$

$\therefore$ $D = b^2 - 4ac = (-24)^2 - 4(16)(-1) = 576 + 64$

$= 640 > 0 \therefore \sqrt{D} = \sqrt{640} = \sqrt{64\times 10} = 8\sqrt{10}$

By quadratic formula, we have

$$x = \frac{-b \pm \sqrt{D}}{2a} = \frac{24 \pm 8\sqrt{10}}{32} = \frac{3 \pm \sqrt{10}}{4}$$

Therefore, the roots are $\dfrac{3+\sqrt{10}}{4}$ and $\dfrac{3-\sqrt{10}}{4}$

OR

(b) We have, $(k-5)x^2 + 2(k-5)x + 2 = 0$

Given equation has equal roots.

$\therefore$ Discriminant, $D = 0$

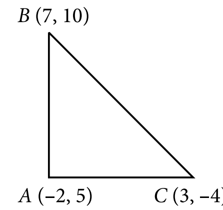
$\Rightarrow$ $[2(k-5)]^2 - 4(k-5)(2) = 0$

$\Rightarrow$ $k^2 + 25 - 10k - 2k + 10 = 0$

$\Rightarrow$ $k^2 - 12k + 35 = 0 \Rightarrow k^2 - 7k - 5k + 35 = 0$

$\Rightarrow$ $(k-7)(k-5) = 0 \Rightarrow k = 7$ $\quad [\because k \neq 5]$

23. Let the given points are $A(-2, 5)$, $B(7, 10)$ and $C(3, -4)$.



Then, $AB = \sqrt{(7+2)^2 + (10-5)^2}$

$= \sqrt{81+25} = \sqrt{106}$ units

$AC = \sqrt{(3+2)^2 + (-4-5)^2}$

$= \sqrt{25+81} = \sqrt{106}$ units

$\Rightarrow$ $AB = AC$

Also, $BC = \sqrt{(3-7)^2 + (-4-10)^2} = \sqrt{16+196}$

$= \sqrt{212}$ units

Since, $AB^2 + AC^2 = 106 + 106 = 212 = BC^2$

$\therefore$ ΔABC is a right angled isosceles triangle.

24. We have, $2472 = 2^3 \times 3 \times 103$

$1284 = 2^2 \times 3 \times 107$

$N = 2 \times 2 \times 3 \times x$, where x is a natural number

[$\because$ HCF = 12 $\therefore$ 2, 2, 3 will be common values]

$\therefore$ LCM $= 2 \times 2 \times 2 \times 3 \times x \times 103 \times 107$ ...(i)

But LCM $= 2^3 \times 3^2 \times 5 \times 103 \times 107$ [Given] ...(ii)

Equating (i) and (ii), we get $x = 15$

$\therefore$ $N = 2^2 \times 3 \times 15 = 180$

25. (a) Let radius of hemisphere = r cm

Total surface area of hemisphere = 462 cm^2

$\Rightarrow$ $3\pi r^2 = 462 \Rightarrow r^2 = \dfrac{462\times 7}{3\times 22} = 49 \Rightarrow r = 7$

$\therefore$ Volume of hemisphere

$= \dfrac{2}{3}\pi r^3 = \dfrac{2}{3}\times\dfrac{22}{7}\times 7\times 7\times 7 = 718.67\ cm^3$

OR

(b) Volume of cubical ice cream brick = $(22)^3$ cm^3

Radius of ice cream cone (r) = 2 cm

Height of ice cream cone (h) = 7 cm

Volume of ice cream cone

$= \dfrac{1}{3}\pi r^2 h = \left(\dfrac{1}{3}\times\dfrac{22}{7}\times 2\times 2\times 7\right)$ cm^3

$\therefore$ Number of ice cream cones

$$= \frac{\text{Volume of cubical ice cream brick}}{\text{Volume of each ice cream cone}} = \frac{22\times 22\times 22}{\frac{1}{3}\times\frac{22}{7}\times(2)^2\times 7}$$

$= 363$

$\therefore$ 363 children will get the ice cream cones.

26. We have, $PQ = PR$

[$\because$ Length of tangents drawn from an external point are equal]

$\therefore$ $\angle PQR = \angle PRQ$ [Angles opposite to equal sides of a triangle are equal] ...(i)

In ΔPQR, $\angle P + \angle PQR + \angle PRQ = 180°$

$\Rightarrow$ $30° + \angle PQR + \angle PQR = 180°$ [Using (i)]

$\Rightarrow$ $2\angle PQR = 150° \Rightarrow \angle PQR = 75°$

Now, $\angle QSR = 75°$ [Given]

And $\angle PQR = \angle QRS = 75°$

[$\because$ Alternate interior angles, as $RS \| PQ$]

In ΔRQS,

$\angle RQS + \angle RSQ + \angle SRQ = 180°$ [By angle sum property]

$\Rightarrow \quad \angle RQS + 75° + 75° = 180°$

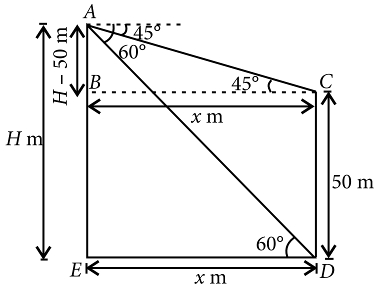
$\Rightarrow \quad \angle RQS = 180° - 150° = 30°$

27. (a) Let the height of tower, $AE = H$ m

The horizontal distance between tower and building = x m

In ΔABC,

$$\frac{H-50}{x} = \tan 45° \Rightarrow x = H - 50 \qquad \text{...(i)}$$



In ΔAED, $\frac{H}{x} = \tan 60° \Rightarrow x = \frac{H}{\sqrt{3}}$ ...(ii)

From (i) and (ii), $H - 50 = \frac{H}{\sqrt{3}} \Rightarrow H - \frac{H}{\sqrt{3}} = 50$

$$\Rightarrow H = \frac{50\sqrt{3}}{(\sqrt{3}-1)} = \frac{50(1.73)}{0.73} = 118.49$$

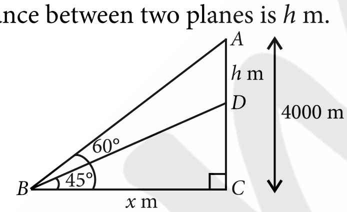
$\therefore$ Height of tower = 118.49 m

Distance between tower and building = $\frac{118.49}{\sqrt{3}}$

$$= \frac{118.49}{1.73} = 68.49 \text{ m}$$

OR

(b) Let one aeroplane be at A and second be at D such that vertical distance between two planes is h m.



In ΔABC, $\tan 60° = \frac{AC}{BC}$

$$\Rightarrow \sqrt{3} = \frac{4000}{x} \Rightarrow x = \frac{4000}{\sqrt{3}} \qquad \text{...(i)}$$

In ΔDBC, $\tan 45° = \frac{DC}{BC}$

$$\Rightarrow 1 = \frac{4000-h}{x} \Rightarrow x = 4000 - h$$

$$\Rightarrow \frac{4000}{\sqrt{3}} = 4000 - h \qquad \text{[Using (i)]}$$

$$\Rightarrow h = 4000 - \frac{4000}{\sqrt{3}} = 4000 - \frac{4000\sqrt{3}}{3}$$

$$= \frac{12000-6920}{3} = \frac{5080}{3} = 1693.33$$

Hence, vertical distance between the aeroplanes at that instant was 1693.33 m.

28. Given, points are $P(2, 2)$, $A(-2, k)$ and $B(-2k, -3)$.

Since, P is equidistant from A and B

$\therefore \quad AP = BP \Rightarrow AP^2 = BP^2$

$\Rightarrow \quad (2+2)^2 + (2-k)^2 = (2+2k)^2 + (2+3)^2$

$\Rightarrow \quad 16 + 4 + k^2 - 4k = 4 + 4k^2 + 8k + 25$

$\Rightarrow \quad 3k^2 + 12k + 9 = 0 \Rightarrow k^2 + 4k + 3 = 0$

$\Rightarrow \quad k^2 + 3k + k + 3 = 0$

$\Rightarrow \quad k(k+3) + 1(k+3) = 0$

$\Rightarrow \quad (k+1)(k+3) = 0 \Rightarrow k = -1$ or $k = -3$

For $k = -1$, $AP = \sqrt{(2+2)^2 + (2+1)^2}$

$= \sqrt{16+9} = \sqrt{25} = 5$ units

For $k = -3$, $AP = \sqrt{(2+2)^2 + (2+3)^2}$

$= \sqrt{16+25} = \sqrt{41}$ units

29. (a) Let the tens digit of a number be a and ones digit be b.

$\therefore$ The number be $10a + b$.

According to question,

$\frac{10a+b}{a+b} = 7 \Rightarrow 10a + b = 7a + 7b$

$\Rightarrow \quad 3a - 6b = 0 \Rightarrow a - 2b = 0$ ...(i)

and $10a + b - 27 = 10b + a$

$\Rightarrow \quad 10a - a + b - 10b = 27$

$\Rightarrow \quad 9a - 9b = 27 \Rightarrow a - b = 3$ ...(ii)

Subtracting (i) from (ii), we get $b = 3$

From (ii), $a - 3 = 3 \Rightarrow a = 6$

$\therefore$ Required number is $10 \times 6 + 3 = 63$

OR

(b) Let $x\,l$ of mixture be taken from 1st vessel and $y\,l$ of the mixture be taken from 2nd vessel and kept in 3rd vessel so that $(x + y)l$ of the mixture in third vessel may contains 25 l of milk and 10 l of water.

A mixture of $x\ l$ from 1st vessel contains $\frac{24}{30}x\,l = \frac{4}{5}x\,l$ of milk and $\frac{x}{5}l$ of water. And a mixture of $y\ l$ from 2nd vessel contains $\frac{3y}{5}l$ of milk and $\frac{2y}{5}l$ of water.

$\therefore \quad \frac{4}{5}x + \frac{3}{5}y = 25 \Rightarrow 4x + 3y = 125$ ...(i)

and $\frac{x}{5} + \frac{2}{5}y = 10 \Rightarrow x + 2y = 50$ ...(ii)

Multiplying (ii) by 4 and then subtracting (i) from it, we get

$4x + 8y - 4x - 3y = 200 - 125 \Rightarrow 5y = 75 \Rightarrow y = 15$

From (ii),

$x + 2 \times 15 = 50 \Rightarrow x = 50 - 30 \Rightarrow x = 20$

30. When two dice are thrown together, total number of possible outcomes = 36.

Then sum of numbers on dice is greater than 5 but not more than 10 for :

{(1, 5), (1, 6), (2, 4), (2, 5), (2, 6), (3, 3), (3, 4), (3, 5), (3, 6), (4, 2), (4, 3), (4, 4), (4, 5), (4, 6), (5, 1), (5, 2), (5, 3), (5, 4), (5, 5),(6, 1), (6, 2), (6, 3), (6, 4)}

$\therefore$ Number of favourable outcomes = 23

$\therefore$ Required probability $= \dfrac{23}{36}$

31. The prime factorisation of 40, 42, 45 is

$40 = 2 \times 2 \times 2 \times 5 = 2^3 \times 5^1$

$42 = 2 \times 3 \times 7$

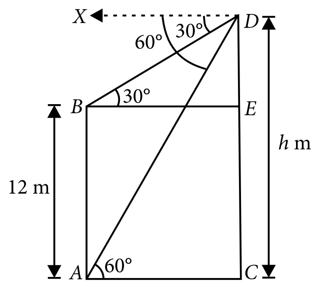
$45 = 3 \times 3 \times 5 = 3^2 \times 5$

$\therefore$ LCM (40, 42, 45) $= 2^3 \times 3^2 \times 5^1 \times 7^1$

$= 8 \times 9 \times 5 \times 7 = 2520$

$\therefore$ Required distance = 2520 cm or 0.0252 km.

32.



Let AB be the building and CD be the multi-storeyed building of height h m.

Here, $AB = CE = 12$ m and $DE = (h - 12)$ m

In ΔACD, $\tan 60° = \dfrac{CD}{AC}$

$\Rightarrow \quad \sqrt{3} = \dfrac{h}{AC} \quad \Rightarrow \quad AC = \dfrac{h}{\sqrt{3}}$

In ΔBDE, $\tan 30° = \dfrac{DE}{BE}$

$\Rightarrow \quad \dfrac{1}{\sqrt{3}} = \dfrac{(h-12)}{BE} \quad \Rightarrow \quad BE = (h-12)\sqrt{3}$ m

$\Rightarrow \quad \dfrac{h}{\sqrt{3}} = (h-12)\sqrt{3}$ $\qquad (\because\ AC = BE)$

$\Rightarrow \quad h = 3(h - 12) \Rightarrow h = 3h - 36 \Rightarrow -2h = -36 \Rightarrow h = 18$

$AC = \dfrac{18}{\sqrt{3}} = 6\sqrt{3}$

Thus, the height of the multi-storeyed building is 18 m. and distance between both buildings is $6\sqrt{3}$ m.

33. (a) The frequency distribution table for the given data can be drawn as :

Class	Modified class	(x_i)	(f_i)	$f_i x_i$
25-29	24.5-29.5	27	4	108
30-34	29.5-34.5	32	14	448
35-39	34.5-39.5	37	22	814
40-44	39.5-44.5	42	16	672
45-49	44.5-49.5	47	6	282
50-54	49.5-54.5	52	5	260
55-59	54.5-59.5	57	3	171
			$\Sigma f_i = 70$	$\Sigma f_i x_i = 2755$

$\therefore$ Mean age $= \dfrac{\sum f_i x_i}{\sum f_i} = \dfrac{2755}{70} = 39.35$ years

OR

(b) Here, the frequency table is given in discontinuous form. So, we first transform it into continuous form by subtracting and adding, 0.5 from the lower and to upper limits respectively.

Transforming the given table into continuous form and preparing the cumulative frequency table, we get

Weekly wages (in ₹)	Number of workers (f_i)	Cumulative frequency $(c.f.)$
59.5-69.5	5	5
69.5-79.5	15	5 + 15 = 20
79.5-89.5	20	20 + 20 = 40
89.5-99.5	30	40 + 30 = 70
99.5-109.5	20	70 + 20 = 90
109.5-119.5	8	90 + 8 = 98
Total	$\Sigma f_i = 98$	

We have, $n = 98 \Rightarrow n/2 = 49$

The cumulative frequency just greater than $n/2$ *i.e.*, 49 is 70 and the corresponding class is 89.5–99.5. So, 89.5–99.5 is the median class.

$\therefore \quad l = 89.5, h = 10, f = 30$ and $c.f. = 40$

Now, median $= l + \left(\dfrac{\frac{n}{2} - c.f.}{f}\right) \times h = 89.5 + \left(\dfrac{49-40}{30}\right) \times 10$

$= 89.5 + 3 = 92.5$

34. (a) Let n be the number of terms of the given A.P., whose sum is 116.

Here, $a = 25$, $d = 22 - 25 = -3$

We know that, $S_n = \dfrac{n}{2}[2a + (n-1)d]$

$\Rightarrow \quad 116 = \dfrac{n}{2}[2 \times 25 + (n-1)(-3)]$ $\qquad$ (Given)

$\Rightarrow \quad 232 = n[50 + 3 - 3n] \Rightarrow n[53 - 3n] = 232$

$\Rightarrow \quad 3n^2 - 53n + 232 = 0 \Rightarrow 3n^2 - 24n - 29n + 232 = 0$

$\Rightarrow \quad 3n(n-8) - 29(n-8) = 0$

$\Rightarrow \quad (n-8)(3n-29) = 0 \Rightarrow n = 8$ or $n = \dfrac{29}{3}$

So, $n = 8$ $\qquad \left(\because\ n = \dfrac{29}{3}\right.$ is not possible)

Thus, 116 is the sum of 8 terms of the A.P.

The last term is given by

$a_8 = a + (8-1)d = a + 7d = 25 + 7 \times (-3) = 4$

OR

(b) Let a be the first term and d be the common difference of the A.P.

n^{th} term of the A.P. is $a_n = a + (n-1)d$

Now, we have $a_4 + a_8 = 24$

$\Rightarrow \quad a + 3d + a + 7d = 24$

$\Rightarrow \quad 2a + 10d = 24 \Rightarrow a + 5d = 12$ $\qquad$ ...(i)

Also, $a_6 + a_{10} = 44$

$\Rightarrow \quad a + 5d + a + 9d = 44 \Rightarrow 2a + 14d = 44$

$\Rightarrow \quad a + 7d = 22$ $\qquad$ ...(ii)

On subtracting (i) from (ii), we get

$2d = 10 \Rightarrow d = 5$

On substituting the value of d in (i), we get

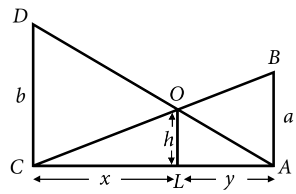
$a + 5(5) = 12 \Rightarrow a = -13$

Thus, the A.P. is $-13, -8, -3, \ldots$

$\therefore$ Sum of first 10 terms, $S_{10} = \frac{10}{2}[2a + (10-1)d]$

$= 5[2(-13) + 9 \times 5] = 5(-26 + 45) = 5 \times 19 = 95$

35. Let AB and CD be two poles of heights a metres and b metres respectively such that the poles are p metres apart *i.e.*, $AC = p$ metres. Suppose the lines AD and BC meet at O such that $OL = h$ metres.



Let $CL = x$ and $LA = y$. Then $x + y = p$

In ΔABC and ΔLOC, we have

$\angle CAB = \angle CLO$ [Each equal to 90°]

$\angle ACB = \angle LCO$ [Common]

$\therefore$ $\Delta CAB \sim \Delta CLO$ [By AA similarity]

$\Rightarrow \frac{CA}{CL} = \frac{AB}{LO} \Rightarrow \frac{p}{x} = \frac{a}{h} \Rightarrow x = \frac{ph}{a}$ ...(i)

In ΔALO and ΔACD, we have

$\angle ALO = \angle ACD$ [Each equal to 90°]

$\angle LAO = \angle CAD$ [Common]

$\therefore$ $\Delta ALO \sim \Delta ACD$ [By AA similarity]

$\Rightarrow \frac{AL}{AC} = \frac{OL}{DC} \Rightarrow \frac{y}{p} = \frac{h}{b} \Rightarrow y = \frac{ph}{b}$ ...(ii)

From (i) and (ii), we get

$$x + y = \frac{ph}{a} + \frac{ph}{b} \Rightarrow p = ph\left(\frac{1}{a} + \frac{1}{b}\right)$$

$$\Rightarrow 1 = h\left(\frac{a+b}{ab}\right) \Rightarrow h = \frac{ab}{a+b} \text{ metres}$$

Hence, the height of the intersection of the lines joining the top of each pole to the foot of the opposite pole is $\frac{ab}{a+b}$ metres.

36. (i) Product of zeroes $= \frac{8\sqrt{3}}{\sqrt{3}} = 8$

(ii) Sum of zeroes $= \frac{-(-14)}{\sqrt{3}} = \frac{14}{\sqrt{3}}$

(iii) (a) We have, $10x^2 - x - 3$

$= 10x^2 - 6x + 5x - 3 = (2x + 1)(5x - 3)$

So, the value of $10x^2 - x - 3$ is zero when $2x + 1 = 0$

or $5x - 3 = 0$

i.e., $x = \frac{-1}{2}$ or $\frac{3}{5}$

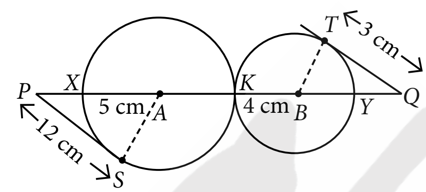
Thus, the zeroes are $\frac{3}{5}$ and $\frac{-1}{2}$.

OR

(b) Required polynomial $= x^2 - 0 \cdot x + 1 = x^2 + 1$

37. Join AS and BT.

Here, $AS = 5$ cm, $BT = 4$ cm [$\because$ Radii of circles]



(i) Since, radius at point of contact is perpendicular to tangent.

$\therefore$ By Pythagoras theorem, we have

$$PA = \sqrt{PS^2 + AS^2} = \sqrt{12^2 + 5^2} = \sqrt{169} = 13 \text{ cm}$$

(ii) $PK = PA + AK = 13 + 5 = 18$ cm

(iii) (a) By Pythagoras theorem, we have

$$BQ = \sqrt{TQ^2 + BT^2} = \sqrt{3^2 + 4^2} = \sqrt{25} = 5 \text{ cm}$$

OR

(b) $QY = BQ - BY = 5 - 4 = 1$ cm

38. (i) Lateral surface area of *Hermika* which is cubical in shape $= 4a^2 = 4 \times (8)^2 = 256 \text{ m}^2$

(ii) Given, radius of *Pradakshina Path* $(r) = 25$ m

$\therefore$ Perimeter of *path* $= 2\pi r$

$$= \left(2 \times \frac{22}{7} \times 25\right) \text{ m}$$

$\therefore$ Distance covered by priest $= 14 \times 2 \times \frac{22}{7} \times 25 = 2200$ m

(iii) (a) Diameter of cylindrical base = 42 m

$\therefore$ Radius of cylindrical base $(r) = 21$ m

Height of cylindrical base $(h) = 12$ m

$\therefore$ Number of bricks used $= \dfrac{\frac{22}{7} \times 21 \times 21 \times 12}{0.01} = 1663200$

OR

(b) Given, diameter of *Anda* which is hemispherical in shape = 42 m

$\Rightarrow$ Radius of *Anda* $(r) = 21$ m

$\therefore$ Volume of *Anda* $= \frac{2}{3}\pi r^3 = \frac{2}{3} \times \frac{22}{7} \times 21 \times 21 \times 21$

$= 44 \times 21 \times 21 = 19404 \text{ m}^3$

☺☺☺