PAPER # 02 - MATHEMATICS

1. (d) The mid-point of line segment joining (0, 0) and

(–4, –2) is $\left(\frac{(0-4}{2},\frac{0-2}{2}\right)$ i.e. (–2,–1).

2. (c) tan 45° cos 60° + sin 60° cot 60°

$$1\times\frac{1}{2}+\frac{\sqrt{3}}{2}\times\frac{1}{\sqrt{3}}=\frac{1}{2}+\frac{1}{2}=1$$

3. (a) Given equation, $2x^2 - \sqrt{5x} + 1 = 0$

On comparing it with $ax^2 + bx + c = 0$, we get

$a = 2, b = \sqrt{5}$ and $c = 1$

$\therefore D = \left(\sqrt{5}\right)^2 - 4(2)(1)$ $[\because D = b^2 - 4ac]$

= 5 – 8 = –3

4. (b) We have, $\sqrt{3}\sin\theta = \cos\theta$

$\Rightarrow \frac{\sin\theta}{\cos\theta}=\frac{1}{\sqrt{3}}$ $\qquad \Rightarrow \tan\theta = \frac{1}{\sqrt{3}}$

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

5. (d) Given, AB||EW

$\therefore \frac{DA}{AE}=\frac{DB}{BW}$ [by Thales theorem]

$$\Rightarrow \frac{DA}{DE-DA}=\frac{DB}{DW-DB}$$

$$\Rightarrow \frac{4}{12-4}=\frac{D8}{24-DB}$$

$$\Rightarrow \frac{4}{8}-\frac{DB}{24-DB}$$

$$\Rightarrow 24-DB=2DB$$

$$\Rightarrow 24=3DB$$

$$\Rightarrow DB=\frac{24}{3}=8\text{ cm}$$

6. (b) Let 4 be the event 'getting an even number.'

Clearly, event A occurs, if we obtain anyone of 2, 4, 6 as an outcome.

∴ Number of outcomes favourable to

A = 3

Hence, $P(A) = \frac{3}{6} = \frac{1}{2}$

7. (a) Length of the arc $=\frac{}{360^\circ}\times 2\pi r$

$$\Rightarrow 4.4=\frac{30^o}{360^\circ}\times 2\times\frac{22}{7}\times r$$

$$\Rightarrow 4.4=\frac{1}{12}\times\frac{44}{7}\times r$$

$$\Rightarrow r=\frac{4.4\times 12\times 7}{44}=8.4\text{cm}$$

8. (c) We know that

$$\text{Product of zeroes }=\frac{\text{Constant term}}{\text{Coefficient of }x^2}$$

$$\therefore \alpha\beta=\frac{7}{4}$$

9. (c) Total number of cards $= 52$

Kings which are red in colour $= 2$

$$\text{P(king of red colour) }=\frac{2}{52}=\frac{1}{26}$$

10. (a) If point P lies inside the circle then no tangent can be drawn.

11. (b) Let α and ß be the zeros of the polynomial $f(x) = ax^2 + bx + c$. Then,

$$\alpha+\beta=-\frac{b}{a}\text{ and }\alpha\beta=\frac{c}{a}$$

Let S and P denote respectively the sum and product of the zeros of a polynomial whose zeros are $\frac{1}{\alpha}$ and $\frac{1}{ß}$. Then,

$$S=\frac{1}{\alpha}+\frac{1}{\beta}=\frac{\alpha+\beta}{\alpha\beta}=\frac{-\frac{b}{a}}{\frac{c}{a}}=-\frac{b}{c}\text{ and}$$

$$P=\frac{1}{\alpha}\times\frac{1}{\beta}=\frac{1}{\alpha\beta}=\frac{1}{\frac{c}{a}}=\frac{a}{c}$$

Hence, the required polynomial g(x) is given by

$$g(x)=k(x^2-Sx+P)=k\left(x^2+\frac{bx}{c}+\frac{a}{c}\right),$$

where k is any non-zero constant.

12. (a) Class mark, frequency of the class

$$x = \frac{\sum fx}{\sum f} = \frac{\sum (A \times B)}{\sum A}$$

where B is the class mark.

Class mark = $\frac{1}{2}$ (upper limit + lower limit)

and A is the frequency of the class.

13. (a) Let d be the common difference of the AR According to the question,

$a_{17} - a_{10} = 7$

$\Rightarrow (a + 16d) - (a + 9d) = 7 \Rightarrow 7d = 7 \Rightarrow d = 1$

14. (b) The mode is the most frequent observation. Here, the mode is 14 with a frequency of 15.

15. (d) $(x + 2)(3x-5) = 0$

$\Rightarrow x + 2 = 0$ or $3x - 5 = 0$

$\Rightarrow x = -2$ or $x = \frac{5}{3}$

Hence, the roots of the given equation are -2 and $\frac{5}{3}$.

16. (d) Given, equation $2x^2 - 6x + 7 = 0$

On comparing it with $ax^2 + bx + c = 0$, we get

$a = 2, b = -6$ and $c = 7$

$\therefore D = b^2 - 4ac = (-6)^2 - 4(2)(7)$

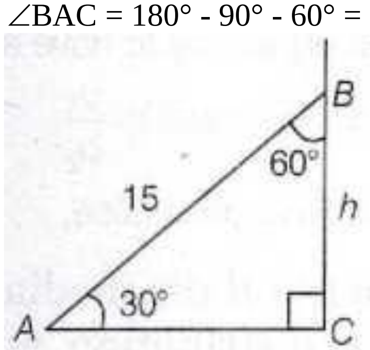
$= 36 - 56 = -20 < 0$

So, the roots are imaginary.

17. (c) Given, $\angle ABC = 60°$

In ΔASC, $\angle BAC + \angle ABC + \angle ACB = 180°$

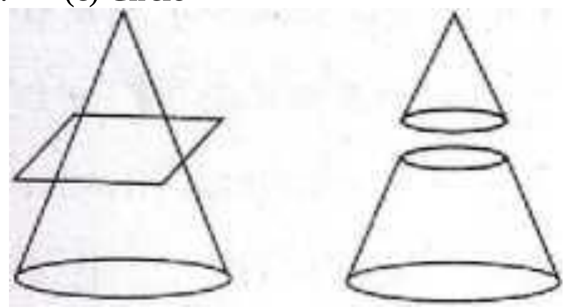
$\Rightarrow \angle BAC = 180° - 90° - 60° = 30°$



So, $\sin 30° = \frac{BC}{AB} = \frac{h}{15}$

$\Rightarrow \frac{1}{2} = \frac{h}{15} \Rightarrow h = \frac{15}{2}$ m

18. (c) Circle



19. (c). Assertion Given $x + y - 8 = 0$ and $x - y - 2 = 0$

Here, $a_1 = 1, b_1 = 1, c_1 = 8$

and $a_2 = 1, b_2 = -1, c_2 = -2$

So, $\frac{a_1}{a_2} = \frac{1}{1}, \frac{b_1}{b_2} = \frac{1}{-1}$ and $\frac{c_1}{c_2} = \frac{-8}{-2} = 4$

$\because \frac{a_1}{a_2} \neq \frac{b_1}{b_2}$

So, the system of equations has a unique solution and the Assertion is true.

Reason For equations to have a unique solution,

$\frac{a_1}{a_2}$ should not be equal to $\frac{b_1}{b_2}$.

$\therefore$ The given Reason is false.

20. (a) Reason is clearly true.

Using the relation given in reason, we have

2 Mean = 3 Median – Mode

$= 3 \times 150 - 154$

$= 296$

$\therefore$ Mean $= \frac{296}{2} = 148$, which is true.

Thus, both Assertion and Reason are true and Reason is the correct explanation of Assertion.

21. Given, $x = a\cos\theta$ and $y = b\sin\theta$

$\therefore b^2x^2 + a^2y^2 = b^2(a\cos\theta)^2 + a^2(b\sin\theta)^2$ (1)

$= a^2b^2\cos^2\theta + a^2b^2\sin^2\theta$

$= a^2b^2(\cos^2\theta + \sin^2\theta)$

$= a^2b^2(1)$ [$\because \cos^2 A + \sin^2 A = 1$]

$= a^2b^2$ (1)

22. Let us assume that $\frac{2}{5\sqrt{3}}$ is a rational number.

$\therefore \frac{2}{5\sqrt{3}} = \frac{p}{q}$, where p,q (q ≠ 0) are integers and p, q are coprimes. (1)

$\Rightarrow \frac{2q}{5p} = \sqrt{3}$

Since, 2, 5, p and q are integers.

$\therefore \frac{2q}{5p}$ is rational, so $\sqrt{3}$ is rational.

But this contradicts the fact that $\sqrt{3}$ is irrational.

Hence, $\frac{2}{\sqrt{3}}$ is an irrational number.

Hence proved. (1)

OR

Let us assume that $6 - 2\sqrt{3}$ is rational number.

Then, it will be of the form $\frac{a}{b}$, where a, b are coprime integers and $b \neq 0$.

Now, $6 - 2\sqrt{3} = \frac{a}{b}$

On rearranging, we get

$6 - \frac{a}{b} = 2\sqrt{3}$ (1)

Since, 6 and $\frac{a}{b}$ are rational. So, their difference will be rational.

$\therefore 2\sqrt{3}$ is rational.

But we know that, $\sqrt{3}$ is irrational.

So, this contradicts the fact that $\sqrt{3}$ is irrational.

Therefore, our assumption is wrong.

Hence, $6 - 2\sqrt{3}$ is irrational.

Hence proved. (1)

23. We have, $p(x) = 5x^2 - 7x + 1$, whose zeroes are α and β.

$\therefore$ Sum of zeroes, $\alpha + \beta = -\frac{\text{Coefficent of x}}{\text{Coefficent of } x^2}$

$= -\frac{(-7)}{5} = \frac{7}{5}$ ...(i) (1)

and product of zeroes, $\alpha\beta = \frac{\text{Constant term}}{\text{Coefficent of } x^2}$

$= \frac{1}{5}$ ...(ii)

Now, $\frac{1}{\alpha} + \frac{1}{\beta} = \frac{\beta + \alpha}{\alpha\beta} = \frac{7/5}{1/5}$

[from Eqs. (i) and (ii)]

$= 7$ (1)

24. We have, $\frac{1}{x+1} + \frac{2}{x+2} = \frac{4}{x+4}$

$\Rightarrow \frac{(x+2)+2(x+1)}{(x+1)(x+2)} = \frac{4}{x+4}$ (1)

$\Rightarrow (x+4)(3x+4) = 4(x^2+3x+2)$

$\Rightarrow x^2 - 4x - 8 = 0$

On comparing it with $ax^2 + bx + c = 0$, we get

a = 1, b = -4 and c = -8

$\therefore x = \frac{-b\sqrt{b^2-4ac}}{2a}$

$\Rightarrow x = \frac{-(4)\sqrt{16-4(1)(-8)}}{2} = x = \frac{4\sqrt{48}}{2}$

$\Rightarrow x = 2 \pm 2\sqrt{3}$ (1)

25. $\because \Delta AGF \sim \Delta DBG$ ...(i)

[by AA similarity criterion]

Now, in ΔAGF and ΔEFC, we get

∠FAG = ∠CEF [each 90°]

and ∠AFG = ∠ECF [corresponding angles because GF||BC and AC is the transversal]

$\therefore \Delta AGF \sim \Delta EFC$ ...(ii) (1)

From Eqs. (i) and (ii), we get

$\Delta DBG \sim \Delta EFC$

$\Rightarrow \frac{BD}{EF} = \frac{DG}{EC}$

$\Rightarrow \frac{BD}{DE} = \frac{DE}{EC}$ [∵ DEFG is a square]

$\therefore DE^2 = BD \times EC$ **Hence proved. (1)**

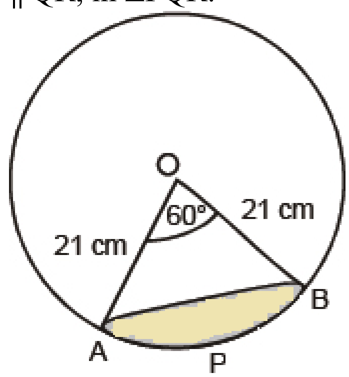
OR

Given,

In ΔPQO, DE || OQ

So by using Basic Proportionality Theorem,
PD/DO = PE/EQ ……. **..(i)**
Again given, in ΔPOR, DF || OR,
So by using Basic Proportionality Theorem,
PD/DO = PF/FR ……. **(ii)**
From equation **(i)** and **(ii)**, we get,
PE/EQ = PF/FR
Therefore, by converse of Basic Proportionality Theorem,
EF || QR, in ΔPQR.

26.



Given,
Radius = 21 cm
$\theta = 60°$

(i) Length of an arc = $\theta/360° \times$ Circumference ($2\pi r$)
$\therefore$ Length of an arc AB = $(60°/360°)\times 2\times(22/7)\times 21$
$= (1/6)\times 2\times(22/7)\times 21$
Or Arc AB Length = 22cm

(ii) It is given that the angle subtended by the arc = 60°
So, the area of the sector making an angle of 60°
$= (60°/360°)\times\pi r^2\ cm^2$
$= 441/6\times 22/7\ cm^2$
Or, the area of the sector formed by the arc APB is 231 cm^2

(iii) Area of segment APB = Area of sector OAPB – Area of ΔOAB
Since the two arms of the triangle are the radii of the circle and thus are equal, and one angle is 60°, ΔOAB is an equilateral triangle. So, its area will be $\sqrt{3}/4\times a^2$ sq. Units.
The area of segment APB = $231-(\sqrt{3}/4)\times(OA)^2$
$= 231-(\sqrt{3}/4)\times 21^2$
Or, the area of segment APB = $[231-(441\times\sqrt{3})/4]\ cm^2$

27. Given A circle inscribed in a ΔPQR such that
PQ = PR
To prove QT = TR
Proof We know that the tangents from an external points to a circle are equal in length.
PS = PU [tangents from P] ...(i)
QS =QT [tangents from O] ...(ii)
RT = RU [tangents from R] ...(iii)
Now, PQ = PR [given] (1 ½)
$\Rightarrow$ PQ - PS = PR-PS
[subtracting PS from both sides]
$\Rightarrow$ PQ – PS = PR – PU [from Eq. (i)]
$\Rightarrow$ QS =RU
$\Rightarrow$ QT = RU [from Eq. (ii)]
$\Rightarrow$ QT = RT [from Eq. (iii)]
Hence proved. (1 ½)

28. There are 6 possible outcomes (1, 2, 3, 4, 5 and 6) in a single throw of a die.

(i) We know that even prime number is only 2.
So, number of favourable outcomes = 1
$\therefore$ P (getting an even prime number) = $\frac{1}{6}$ (1 ½)

(ii) The numbers divisible by 2 are 2, 4 and 6.
So, number of favourable outcomes = 3
$\therefore$ P (getting a number divisible by 2)
$= \frac{3}{6} = \frac{1}{2}$

OR

Number of red cards = 26
Number of queens = 4
But, out of these 4 queens, 2 are red.
$\therefore$ Number of queens which are not red = 2
Now, number of cards which are red or queen
= 26 + 2 = 28 (1)
$\therefore$ P (getting either red card or queen)
$= \frac{\text{Number of card which are red or queen}}{\text{Total number of cards}}$
$= \frac{28}{52} = \frac{7}{13}$ (1)

Now, P (not getting either red card or queen)
= 1 – P (getting either red card or queen)

$$=1-\frac{7}{13}=\frac{13-7}{13}=\frac{6}{13}$$

29. Here, class intervals are not in inclusive form.
So, we first convert them in inclusive form by subtracting h/2 from the lower limit and adding h/2 to the upper limit of each class, where h is the difference between the lower limit of a class and the upper limit of the preceding class.
The given frequency distribution in inclusive form is as follows.

Age (in yr)	**Number of cases**
4.5-14.5	6
14.5-24.5	11
24.5-34.5	21
34.5-44.5	23
44.5-54.5	14
54.5-64.5	5

(1)

We observe that the class 34.5-44.5 has the maximum frequency.
So, it is the modal class such that
I = 34.5, h = 10, f_1 = 23, f_0 = 21 and f_2 = 14

$$\therefore \text{Mode} = l+\frac{f_1-f_0}{2f_1-f_{0-f_2}}\times h,$$

$$\Rightarrow \text{Mode} = 34.5 + \frac{23-21}{46-21-14}\times 10$$

$$= 34.5 + \frac{2}{11}\times 10 = 36.31 \qquad (1)$$

30. The given equations are
10x + 3y = 75 ...(i)
6x - 5y = 11 ... (ii)
Multiplying Eq. (i) by 5 and Eq. (ii) by 3, we get
50x + 15y = 375 ...(iii)
18x - 15y = 33 …(iv) (1)
Adding Eqs. (iii) and (iv), we get
68x = 408

$$\Rightarrow x = \frac{408}{68} \Rightarrow x = 6 \text{ (1)}$$

Putting x = 6 in Eq.(i), we get
(10 × 6) + 3y = 75
⇒ 60 + 3y = 75
⇒ 3y = 75 – 60
⇒ 3y = 15
⇒ y = 5
∴ x = 6 and y = 5 (1)

OR

The given equations are
11x + 15y + 23 = 0 ... (i)
7x - 2y - 20 = 0 ...(ii)
Multiplying Eq. (i) by 2 and Eq. (ii) by 15 and adding the results, we get
22x + 105x = –46 + 300
⇒ 127x = 254

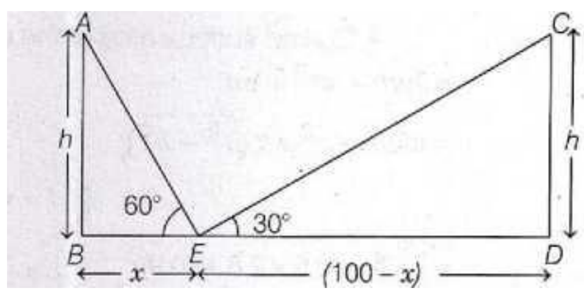
$$\Rightarrow x = \frac{254}{127} = 2 \text{ (1)}$$

Putting x = 2 in Eq. (i), we get
22 + 15y = -23
⇒ 15y = – 23 – 22
⇒ 15y = – 45

$$\Rightarrow y = \frac{-45}{15} \Rightarrow y = -3$$

Hence, x = 2 and y = – 3 (2)

31. Let AB and CD be two pillars of equal height h and distance between them be BD = 100 m.
Let E be a point on the road such that BE = x,
DE =(100- x), ∠AEB = 60° and ∠CED = 30°.



In right angled ΔABE,

$$\frac{AB}{BE} = \tan 60°$$

$$\Rightarrow \frac{h}{x} = \sqrt{3} \quad [\because \tan 60° = \sqrt{3}\,]$$

$$\Rightarrow h = \sqrt{3}\,x \text{ ... (i) (1)}$$

In right angled ΔCDE,

$\frac{CD}{DE}$ = tan 30°

$\Rightarrow \frac{h}{100-x} = \frac{1}{\sqrt{3}}$ ...(ii) (1)

From Eqs. (i) and (ii); we get

$\sqrt{3} = \frac{100-x}{\sqrt{3}}$

$\Rightarrow 3x = 100 - x$ $\Rightarrow 4x = 100$

$\therefore x = 25$

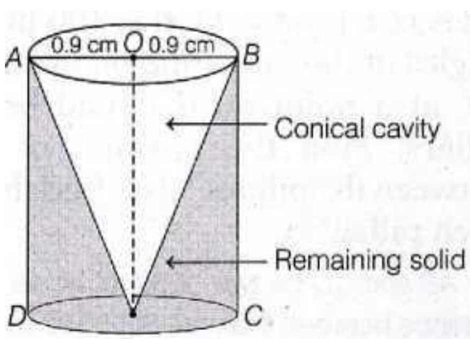
On putting x = 25 in Eq. (i), we get

$h = \sqrt{3} \times 25$

$= 25 \times 1.732$ $= 43.3$ m

Hence, height of each pillar is 43.3 m and position of the point from pillar making an angle of 60° is 25 m. (1)

32. Lets be the total surface area of the remaining solid.



Then, S = Curved surface area of the cylinder + Area of the base of the cylinder + Curved surface area of the cone

$= 2\pi rh + \pi r^2 + \pi rl$ (1)

$= \pi[2rh + r^2 + r\sqrt{r^2+h^2}]$

$[\because l = \sqrt{r^2+h^2}]$

$= \frac{22}{7}[5.04 + 0.81 + 0.9\sqrt{0.81+7.84}]$

$= \frac{22}{7}[5.85 + 0.9\sqrt{8.65}]$

$= \frac{22}{7}[5.85 + 0.9 \times 2.94]$

$= \frac{22}{7} \times [5.85 + 2.64] = \frac{186.78}{7}$

$= 26.68\ cm^2$ (2)

OR

Given, speed of flow of water = 10 km /h

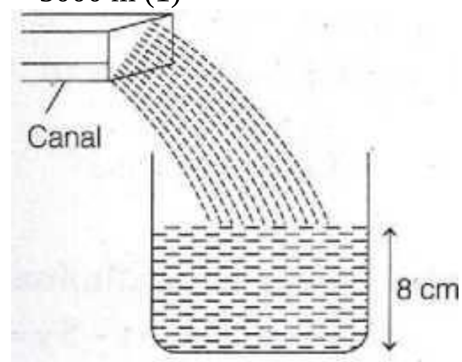
= 10 × 1000 m/h [∵ 1 km = 1000 m]

⇒ Length of water flow in 1 h = 10 × 1000 m

⇒ Length of water flow in 30 min (i.e. in $\frac{1}{2}$ h)

$= \frac{1}{2} \times 10 \times 1000$

= 5000 m (1)



(1)

Now, volume of water flowing in 30 min

= Volume of cuboid of length 5000 m, width 6 m and depth 1.5 m

$= 500 \times 6 \times 1.5\ m^3 = 45000\ m^3$ (1)

Hence, the required area covered for irrigation with 8 cm or m of standing water

$= \frac{4500}{8} \times 100$ $= 562500\ m^2$

$= \frac{562500}{1000}$ hec [∵ 1 hec = 10000 m^2]

= 56.25 hec (2)

33. Given, equations are 5x – y = 5 ...(i)

and 3x-y = 3 ...(ii)

Table for 5x – y = 5 or y = 5x – 5 is

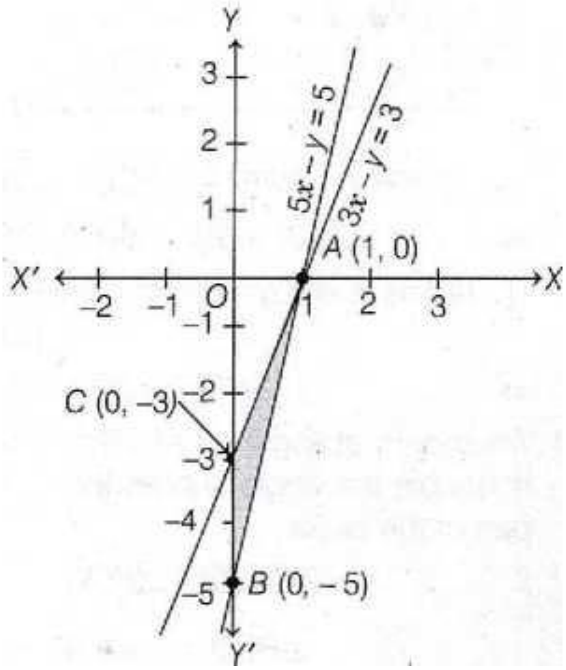
X	1	0
Y	0	–5
Points	A (1,0)	B (0, – 5)

Plot the points A(1, 0) and B(0, - 5) on a graph paper and join these points to form line AB. (1)

Table for 3x – y = 3 or y = 3x – 3 is

X	1	0
Y	0	-3
Points	A (1, 0)	C (0, -3)

Plot the points A (1, 0) and C (0, -3) on the same graph paper and join these points to form line AC. (1)



(2)

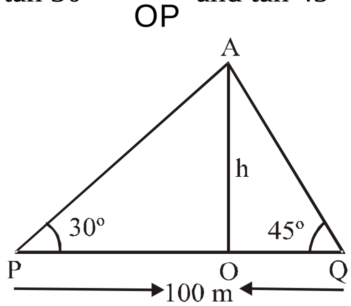
Hence, the triangle formed by given lines is ΔABC whose vertices are A(1, 0), B(0, - 5) and C(0, – 3).

(1)

34. Let OA be the tree of height h metre.

In triangles POA and QOA, we have

$\tan 30^\circ = \frac{OA}{OP}$ and $\tan 45^\circ = \frac{OA}{OQ}$



$\Rightarrow \frac{1}{\sqrt{3}} = \frac{h}{OP}$ and $1 = \frac{h}{OQ}$

$\Rightarrow OP = \sqrt{3}\,h$ and $OQ = h$

$\Rightarrow OP + OQ = \sqrt{3}\,h + h$

$\Rightarrow PQ = (\sqrt{3} + 1)h$

$\Rightarrow 100 = (\sqrt{3} + 1)h$ [$\because$ PQ = 100 m]

$\Rightarrow \quad h = \frac{100}{\sqrt{3}+1}$ m

$\Rightarrow h = \frac{100(\sqrt{3}-1)}{2}$ m

$\Rightarrow h = 50(1.732 – 1)$ m = 36.6 m

Hence, the height of the tree is 36.6 m

OR

Let P and Q be the positions of two aeroplanes when Q is vertically below P and OP = 4000 m. Let the angles of elevation of P and Q at a point A on the ground be 60° and 45° respectively.

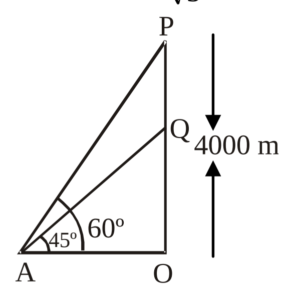
In triangles AOP and AOQ, we have

$\tan 60^\circ = \frac{OP}{OA}$ and $\tan 45^\circ = \frac{OQ}{OA}$

$\Rightarrow \quad \sqrt{3} = \frac{4000}{OA}$ and $1 = \frac{OQ}{OA}$

$\Rightarrow \quad OA = \frac{4000}{\sqrt{3}}$ and OQ = OA

$\Rightarrow \quad OQ = \frac{4000}{\sqrt{3}}$ m



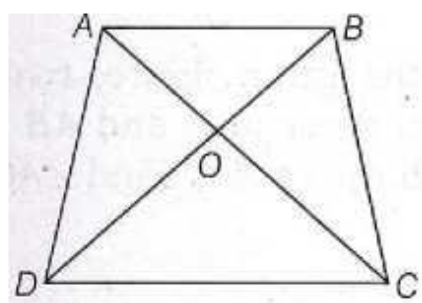
$\therefore$ Vertical distance between the aeroplanes

= PQ = OP – OQ

$= \left(4000 - \frac{4000}{\sqrt{3}}\right)$ m $= 4000\frac{(\sqrt{3}-1)}{\sqrt{3}}$ m

= 1690.53 m

35. Given ABCD is a trapezium in which AB || DC.



To prove $\frac{OA}{OC} = \frac{OB}{OD}$ (2)

Proof In ΔOAS and ΔODC, we have

AB || DC

Then, ∠OAB = ∠OCD [alternate interior angles]

$\angle AOB = \angle DOC$ [vertically opposite angles]

and $\angle ABO = \angle CDO$ [alternate interior angles]

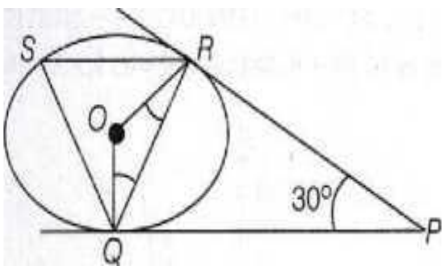
$\therefore$ $\Delta OAB \sim \Delta OCD$ [by AAA similarity criterion]

Hence, $\frac{OA}{OC} = \frac{OB}{OD}$

[if two triangles are similar, then their corresponding sides are proportional]

Hence proved. (1)

36. (i) In quadrilateral POOR, we have



$\angle QPR + \angle PRO + \angle PQO + \angle ROQ = 360°$

$\Rightarrow 30° + 90° + 90° + \angle ROQ = 360°$

[$\because$ radius is always perpendicular to the tangent at point of contact]

$\Rightarrow \angle ROQ = 360° – 210° = 150°$

(ii) We know that angle subtended by an arc at centre is double the angle subtended by it at any other part of the circle.

$2\angle RSQ = \angle ROQ$

$\angle RSQ = \frac{1}{2} \times 150° = 75°$

(iii) In ΔQOR, OQ = OR [radii]

$\angle ORQ = \angle OQR$

Now, $\angle ROQ + \angle ORQ + \angle OQR = 180°$

$\Rightarrow 2\angle OQR = 180° – 150°$

$\Rightarrow 2\angle OQR = 30°$

$\Rightarrow \angle OQR = 15°$

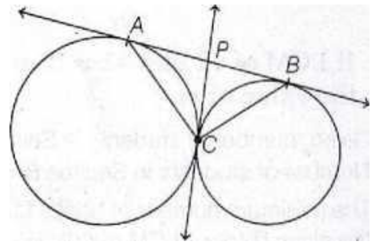
Again, $\angle OQP = 90°$ [$\because OQ \perp QP$]

$\Rightarrow \angle OQR + \angle RQP = 90°$

$\Rightarrow \angle RQP = 90°-15° = 75°$

OR

Draw a tangent to the circles at point C. Let it meets AB at P



Then, PA = PC and PS = PC

[the tangents from an external points to a circle are equal in length]

$PA = PC \Rightarrow \angle PAC = \angle PCA$

$PB = PC \Rightarrow \angle PBC = \angle PCB$

$\therefore$ $\angle PAC + \angle PBC = \angle PCA + \angle PCB = \angle ACB$

$\Rightarrow \angle PAC + \angle PBC + \angle ACB = 2\angle ACB$

$\Rightarrow 180° = 2\angle ACB$

$\Rightarrow \angle ACB = 90°$

37. (i) For first metre, the charge is Rs. 100

i.e. first term, a = 100

As, there is increasing of Rs. 25 for each subsequent metres, therefore common differenece, d = 25

So, the AP thus formed is

100,125, 150, ...

(ii) Labour charge to dig the wellis the 15th term of AP.

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

$\therefore$ $a_{15} = 100 + (15 - 1)25$

$= 100 + 14 \times 25 = 450$

$\therefore$ Labour charge = Rs. 450

(iii) Money saved by Ram = Rs. 450 - Rs. 400 = Rs. 50

OR

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

Sum of 15 terms, $S_{15} = \frac{15}{2}[2\times100+14\times25]$

$= \frac{15}{2}$ [200 + 350] $= \frac{15}{2}\times550$ = 4125

38. (i) Given, number of students in Section A = 32

Number of students in Section B = 36

The minimum number of books to be acquired for the class library = LCM of (32, 36)

$=2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3$

$= 2^5 \times 3^2$

$= 32 \times 9 = 288$

(ii) The prime factors of 36 are

$36 = 2 \times 2 \times 3 \times 3 = 2^2 \times 3^2$

(iii) HCF (867, 255) = 51

OR

Given, LCM (12, 42) = 10m + 4

Factors of 12 = $2 \times 2 \times 3$

and factors of 42 = $2 \times 3 \times 7$

Now, LCM (12, 42) = $2 \times 2 \times 3 \times 7 = 84$

$\therefore$ 84 = 10m + 4

$\Rightarrow$ 84 – 4 = 10m

$\therefore m = \frac{80}{10} = 8$