Solutions to RSPL/1 (DS2)

1. (*b*), as $a = xy^2p$ and $b = xq$

$$lcm\ (a, b) = xy^2pq$$

2. (*d*)

3. (*b*), as $x - 3y + 5 = 0$ and $4ax - 3y + 16 = 0$

For inconsistent, $\frac{1}{4a} = \frac{-3}{-3} \neq \frac{5}{16}$

$\Rightarrow$ $a = \frac{1}{4}$.

4. (*a*), as point lies on the *x*-axis $\Rightarrow \frac{k+3}{k+1} = 0 \Rightarrow k = -3$

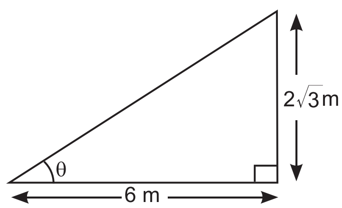
$\therefore$ Point is $\left(\frac{-6-3}{-3+1}, 0\right) = \left(\frac{9}{2}, 0\right)$

5. (*b*), as $\frac{ar(\Delta DEF)}{ar(\Delta ABC)} = \frac{DM^2}{AL^2} = \frac{49}{9}$

ar (ΔDEF) : ar (ΔABC) = 49 : 9.

6. (*a*), as $\cot\theta = \frac{4}{5}$ and $\frac{2\sin\theta - 5\cos\theta}{\sin\theta} = 2 - 5\cot\theta = 2 - 5 \times \frac{4}{5} = -2$

7. (*a*), as $\tan\theta = \frac{2\sqrt{3}}{6} = \frac{1}{\sqrt{3}} \Rightarrow \theta = 30°$



8. (*c*), as $\pi r^2 = 2 \times 2\pi r$

$\Rightarrow$ $r = 4$

Diameter = 8 units

9. (*b*), Total outcomes: {*HH*, *HT*, *TH*, *TT*}

Favourable outcomes: {*HH*, *HT*, *TH*}

Probability = $\frac{3}{4}$

10. (*c*), as total balls = 26

Favourable balls 8, i.e. numbers 5, 7, 11, 13, 17, 19, 23, 29

$\therefore$ Probability = $\frac{8}{26} = \frac{4}{13}$

11. 4, as $3k - 1$, $k + 3$, $k - 1$ are in *AP*.

$\Rightarrow$ $2k + 6 = 3k - 1 + k - 1$

$\Rightarrow$ $2k = 8 \Rightarrow k = 4$

12. $\sqrt{65}$ units, as point is (7, 3),

Distance of the point (7, 3) from point (–1, 4) is

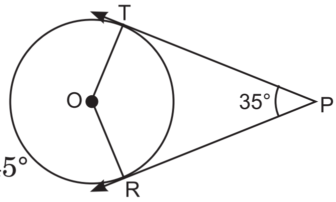
$$\sqrt{(7+1)^2 + (3-4)^2} = \sqrt{64+1} = \sqrt{65} \text{ units}$$

OR

Second, as mid-point of the line segment joining the points (3, –4) and (–6, 8) is $\left(\frac{3-6}{2}, \frac{-4+8}{2}\right)$, i.e. $\left(-\frac{3}{2}, 2\right)$ lies in the second quadrant.

13. is not, as not satisfied for all θ.

14. 145°, as $\angle TOR + \angle OTP + \angle TPR + \angle ORP = 360°$

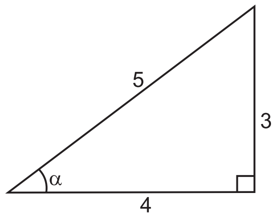


$\Rightarrow \quad \angle TOR + 90° + 35° + 90° = 360°$

$\Rightarrow \quad \angle TOR = 360° - 215° = 145°$

15. sec θ and cosec θ.

16. $\sin \alpha = \frac{3}{5}$



$\sec \alpha = \frac{5}{4}$

OR

No, as sin θ can take values 0 to 1.

17. If points (x, y), $(a, 0)$ and $(0, b)$ are collinear then

$$\frac{1}{2}|x(0-b) + a(b-y) + 0(y-0)| = 0$$

$\Rightarrow \quad -bx + ab - ay = 0$

$\Rightarrow \quad bx + ay = ab.$

18. Mode = 3 Median – 2 Mean.

19. If $x = -3$ is a solution of the equation $(x-2)^2 - 3x - 10 = 0$,

then $(-3-2)^2 - 3 \times (-3) - 10 = 0 \Rightarrow 25 + 9 - 10 = 0 \Rightarrow 24 = 0$, Not true.

Hence, not a solution.

20. Yes, consistent, dependent, they can have infinite solutions. Their graphs will overlap. If one equation is $2x - y + 7 = 0$ other can be $4x - 2y + 14 = 0$ or in general,

$2kx - ky + 7k = 0, k \neq 0.$

21. $124 = 2^2 \times 31$

$279 = 3^2 \times 31$

HCF (124, 279) = 31.

2	124	3	279
2	62	3	93
	31		31

22. *AP* is 3, 15, 27, 39, ... Here, $a = 3, d = 15 - 3 = 12$

Let $\quad a_n = a_{54} + 132$

$\Rightarrow \quad 3 + (n-1)12 = 3 + (54-1)12 + 132$

$\Rightarrow \quad (n-1)12 = 636 + 132$

$\Rightarrow \quad 12n = 768 + 12 = 780$

$\Rightarrow \quad n = 65$

Hence, 65^{th} term of the given *AP* is 132 more than its 54^{th} term.

OR

Given AP is – 11, –7, –3, ..., 49

Here, $a_n = 49, a = -11, d = -7-(-11) = 4$

$49 = -11 + (n-1)4 \Rightarrow 60 = (n-1)4$

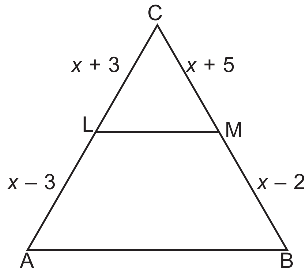
$\Rightarrow n - 1 = 15 \Rightarrow n = 16$

Middle most term(s) are 8th and 9th

$a_8 = -11 + 7 \times 4 = 17$

$a_9 = -11 + 8 \times 4 = 21.$

23. $CL = AC - AL = 2x - x + 3 = x + 3$, $CM = BC - BM = 2x + 3 - x + 2 = x + 5$



We have, $\frac{CL}{AL} = \frac{CM}{BM} \Rightarrow \frac{x+3}{x-3} = \frac{x+5}{x-2}$ [$\because$ LM is parallel to AB]

$\Rightarrow x^2 + 3x - 2x - 6 = x^2 + 5x - 3x - 15$

$\Rightarrow x - 6 = 2x - 15 \Rightarrow x = 9$

24. Yes, In first case it is rolled along length.

Therefore height = 44 cm, and circumference of base = 18 cm

$2\pi r = 18 \Rightarrow r = \frac{9}{\pi}$

$\therefore$ Volume $= \pi \times \frac{9}{\pi} \times \frac{9}{\pi} \times 44 = \frac{81}{22} \times 7 \times 44 = 1134 \text{ cm}^3$

In second case it is rolled along the breadth; height = 18 cm, circumference of base = 44 cm

$2\pi r = 44 \Rightarrow r = 7$ cm

$\therefore$ Volume $= \pi(7)^2 \times 18 = \frac{22}{7} \times 7 \times 7 \times 18 = 2772 \text{ cm}^3$

Hence, when it is rolled along breath it has more capacity.

25.

x_i	2	4	6	10	$p + 5$	
f_i	3	2	3	1	2	11
$f_i x_i$	6	8	18	10	$2p + 10$	$2p + 52$

Mean $= \frac{\Sigma x_i f_i}{\Sigma f_i} \Rightarrow 6 = \frac{2p+52}{11} \Rightarrow 66 = 2p + 52$

$\Rightarrow 2p = 14 \Rightarrow p = 7.$

26. Total area of park = 48 m^2

Cemented area = 30 m^2

Green area = (48 – 30) m^2 = 18 m^2

Probability that ball will land in green area $= \frac{18}{48} = \frac{3}{8}.$

OR

(*i*) There are 17 possible outcomes

(*ii*) Favourable outcomes for a prime number are 2, 3, 5, 7, 11, 13 and 17.

(*iii*) Favourable outcomes for composite numbers 4, 6, 8, 9, 10, 12, 14, 15, 16. i.e. 9

Probability that student with composite roll number will give the presentation $= \frac{9}{17}$.

27. Let unit's and ten's digits be x and y respectively.

$\therefore$ Number $= 10y + x$

Numbers obtained on interchanging the digits $= 10x + y$

Given $\quad x + y = 12 \quad$ ...(*i*)

$$10x + y = 10y + x + 18$$

$$\Rightarrow \quad 9x - 9y = 18$$

$$\Rightarrow \quad x - y = 2 \qquad \text{...}(ii)$$

Solving (*i*) and (*ii*), we get

$$x + y = 12 \qquad \text{...}(i)$$

$$x - y = 2 \qquad \text{...}(ii)$$

$$2x = 14$$

$$x = 7 \text{ and } y = 5$$

$\therefore$ Number $= 10y + x = 10 \times 5 + 7 = 57$.

OR

Given equations are $kx + 3y = k - 3$ and $12x + ky = k$

For consistent, dependent

$$\frac{k}{12} = \frac{3}{k} = \frac{k-3}{k} \qquad \text{...}(i)$$

$$\Rightarrow \quad k^2 = 36$$

$$\Rightarrow \quad k = \pm 6$$

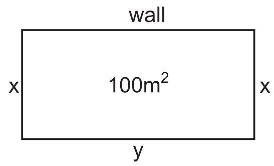
From (*i*),

When $k = 6$, $\quad \frac{6}{12} = \frac{3}{6} = \frac{6-3}{6} = \frac{1}{2}$, $\quad$ true

When $k = -6$, $\quad \frac{-6}{12} = \frac{3}{-6} = \frac{-6-3}{-6}$, $\quad$ not true

$\therefore \quad k = 6$.

28. Let the breadth and length of rectangle be x m and y m respectively.



Then (*i*) Perimeter is $2x + y = 30$

(*ii*) Area $= 100 \text{ m}^2 \Rightarrow xy = 100$

$$\Rightarrow \quad x(30 - 2x) = 100 \Rightarrow 30x - 2x^2 = 100$$

$$\Rightarrow \quad 2x^2 - 30x + 100 = 0 \Rightarrow x^2 - 15x + 50 = 0$$

$\Rightarrow \qquad (x - 10)(x - 5) = 0$

$\Rightarrow \qquad x - 10 = 0 \text{ or } x - 5 = 0$

$\Rightarrow \qquad x = 10 \text{ or } x = 5$

From (i),

when $x = 10$, $y = 30 - 2 \times 10 = 10$

$\therefore$ Sides are 10 m and 10 m, i.e. rectangle is a square.

when $x = 5$, $y = 30 - 2 \times 5 = 20$

Sides are 20 m and 5 m

As farmer has specified rectangular garden.

$\therefore$ Dimensions are 20 m and 5 m.

29. Three digit numbers which when divided by 11 leave remainder 5 are 104, 115, 126, ... 995.

These form an AP with $a = 104$, $d = 11$, $a_n = 995 \Rightarrow 995 = 104 + (n - 1)11$

$\Rightarrow \qquad (n - 1)\,11 = 995 - 104 = 891$

$\Rightarrow \qquad n - 1 = 81$

$\Rightarrow \qquad n = 82$

$\therefore \qquad S_{82} = \dfrac{82}{2}(104 + 995) = 41 \times 1099 = 45059.$

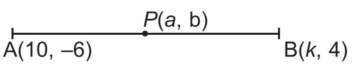
30. Let y-axis divides the join of points (–2, 4) and (4, 5) in the ratio $k : 1$ then point of division is $\left(\dfrac{4k - 2}{k + 1}, \dfrac{5k + 4}{k + 1}\right)$ ...(i)

If point lies on the y-axis then $\dfrac{4k-2}{k+1} = 0 \Rightarrow k = \dfrac{1}{2}$

$\therefore$ Ratio is $\dfrac{1}{2} : 1 \Rightarrow 1 : 2$

From (i), point of division is $\left(0, \dfrac{\frac{5}{2} + 4}{\frac{1}{2} + 1}\right)$, i.e. $\left(0, \dfrac{13}{3}\right)$.

OR



$P(a, b)$ is mid-point of the line segment joining the points $A(10, -6)$ and $B(k, 4)$.

$\therefore \qquad (a, b) = \left(\dfrac{10 + k}{2}, \dfrac{-6 + 4}{2}\right)$

$\Rightarrow \qquad a = \dfrac{10 + k}{2}, b = -1$

Given $a - 2b = 18$

$\Rightarrow \qquad \dfrac{10 + k}{2} - 2(-1) = 18$

$\Rightarrow \quad \dfrac{10+k}{2} = 16$

$\Rightarrow \quad 10 + k = 32$

$\Rightarrow \quad k = 22.$

Points are $A(10, -6)$ and $B(22, 4)$

$\therefore$ Distance $AB = \sqrt{(22-10)^2+(4+6)^2} = \sqrt{144+100} = \sqrt{244} = 2\sqrt{61}$ units

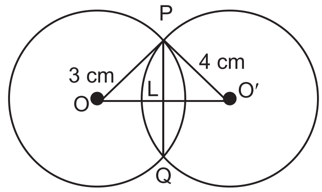
31. OP and $O'P$ are tangents. Therefore $OP \perp O'P$

$$\therefore \quad OO' = \sqrt{(3)^2+(4)^2} = 5 \text{ cm}$$

Let OO' meets PQ at L, then, L is mid-point of PQ and PQ is perpendicular to OO'.

$$PQ = 2PL = 2x \qquad [LP = x \text{ (say)}]$$

$$OL = \sqrt{9-x^2} \text{ and } O'L = \sqrt{16-x^2}$$



Also $\quad OL + O'L = 5$

$\Rightarrow \quad \sqrt{9-x^2} + \sqrt{16-x^2} = 5$

$\Rightarrow \quad \sqrt{9-x^2} = 5 - \sqrt{16-x^2}$

On squaring both sides, we get

$$9 - x^2 = 25 + 16 - x^2 - 10\sqrt{16-x^2}$$

$\Rightarrow \quad -32 = -10\sqrt{16-x^2} \Rightarrow \sqrt{16-x^2} = 3.2$

On squaring both sides, we get

$$16 - x^2 = 10.24 \Rightarrow x^2 = 16 - 10.24$$

$\Rightarrow \quad x^2 = 5.76 \Rightarrow x = 2.4$ cm

$\therefore \quad PL = 2.4$ cm

$\therefore \quad PQ = 2 \times 2.4$ cm $= 4.8$ cm.

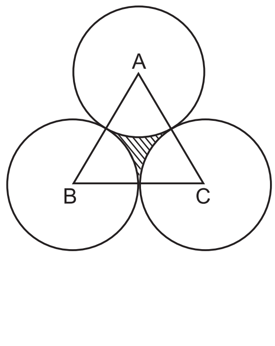
32. Consider $\dfrac{1}{\sec A + \tan A} - \dfrac{1}{\cos A} = \dfrac{1}{\cos A} - \dfrac{1}{\sec A - \tan A}$

$\Rightarrow \quad \dfrac{1}{\sec A + \tan A} + \dfrac{1}{\sec A - \tan A} = \dfrac{2}{\cos A}$

$$\text{LHS} = \frac{\sec A - \tan A + \sec A + \tan A}{(\sec A + \tan A)(\sec A - \tan A)}$$

$$= \frac{2 \sec A}{\sec^2 - \tan^2 A} = 2 \sec A = \frac{2}{\cos A} = \text{RHS}$$

33. Let side of an equilateral triangle be x m.



$\therefore \quad \dfrac{\sqrt{3}}{4}x^2 = 49\sqrt{3}$

$\Rightarrow \quad x^2 = 49 \times 4$

$\Rightarrow \quad x = 14$ m

(i) Perimeter of an equilateral triangle = 3 × 14 m = 42 m (*ii*) Radius of each circle = $\frac{x}{2} = \frac{14}{2} = 7$ m

$\therefore$ Area of 3 sectors = $3 \times \frac{60°}{360°} \times \pi(7)^2 = \frac{1}{2} \times \frac{22}{7} \times 7 \times 7 = 77 \text{ m}^2$

$\therefore$ Area not included in the circles = area of triangle – area of three sectors

$= (49\sqrt{3} - 77)\text{m}^2 = (49 \times 1.73 - 77)\text{m}^2$

$= (84.77 - 77)\text{m}^2$

$= 7.77 \text{ m}^2$

34. Let if possible, $\sqrt{5}$ is a rational number,

Let $\sqrt{5} = \frac{a}{b}$, $b \neq 0$, $a, b \in Z^+$, a, b are coprime

$\Rightarrow \qquad a^2 = 5b^2 \qquad$ ...(*i*)

$\Rightarrow$ a^2 is a multiple of 5.

$\Rightarrow$ a is a multiple of 5.

Let $a = 5\,m, m \in N$ ...(*ii*)

From (*i*)

$$(5m)^2 = 5b^2 \Rightarrow b^2 = 5\,m^2$$

$\Rightarrow$ b^2 is a multiple of 5.

$\Rightarrow$ b is a multiple of 5.

Let $b = 5n, n \in N$ ...(*iii*)

From (*ii*) and (*iii*), we notice a and b are not coprime. Hence, our supposition is wrong. Hence, $\sqrt{5}$ is an irrational number.

OR

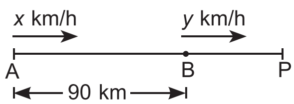
Let positive integer be of the form $2n$ or $2n + 1$.

Now $(2n)^2 = 4n^2 = 4q$, $q = n^2 \in N$

$(2n + 1)^2 = 4n^2 + 4n + 1 = 4(n^2 + n) + 1 = 4q + 1, q = n^2 + n \in N$

Hence, square of any positive integer is of the form $4q$ or $4q + 1$, for some integer q.

35. Let speed of the car starting from A be x km/h.



and speed of the car starting from B be y km/h.

If they move in the same direction they meet in 9 hours, at point P.

Distance covered in 9 hours by car starting from $A = 9x$ km $= AP$

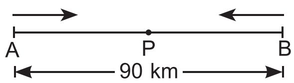
Distance covered in 9 hours by car starting from $B = 9y$ km $= BP$

Also $\qquad AP - BP = AB$

$\Rightarrow \qquad 9x - 9y = 90 \Rightarrow x - y = 10 \qquad$ ...(*i*)

If they move in opposite direction they meet in $\frac{9}{7}$ hours at point P.

Distance covered by car starting from A in $\frac{9}{7}$ hrs = $\frac{9}{7}x$ km



Distance covered by car starting from B in $\frac{9}{7}$ hrs = $\frac{9}{7}y$ km

$$AP + PB = AB$$

$$\Rightarrow \quad \frac{9}{7}x + \frac{9}{7}y = 90 \Rightarrow x + y = 70 \quad ...(ii)$$

Solving (*i*) and (*ii*), we get

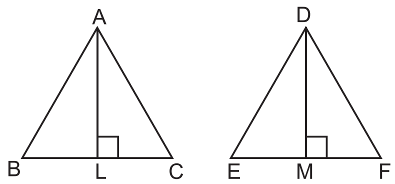
$$x - y = 10$$
$$x + y = 70$$
$$2x = 80$$

$$\Rightarrow \quad x = 40 \text{ and } y = 30.$$

$\therefore$ Speed of the car starting from A = 40 km/h

Speed of the car starting from B = 30 km/h.

36. **Given:** $\Delta ABC \sim \Delta DEF$, AL and DM are the altitudes of ΔABC and ΔDEF meeting BC at L and EF at M.



To prove: $\frac{ar(\Delta ABC)}{ar(\Delta DEF)} = \frac{AL^2}{DM^2}$

Proof: As $\Delta ABC \sim \Delta DEF$

$$\Rightarrow \quad \frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF} \quad ...(i)$$

$$\frac{ar(\Delta ABC)}{ar(\Delta DEF)} = \frac{\frac{1}{2}BC \cdot AL}{\frac{1}{2}EF \cdot DM} = \frac{BC}{EF} \cdot \frac{AL}{DM} \quad ...(ii)$$

Consider Δs ALB and DME

$$\angle B = \angle E \quad (\because \Delta ABC \sim \Delta DEF)$$

$$\angle ALB = \angle DME = 90° \text{ (Each)}$$

$$\therefore \quad \Delta ALB \sim \Delta DME \quad \text{(AA – similarity)}$$

$$\therefore \quad \frac{AB}{DE} = \frac{AL}{DM} \quad ...(iii)$$

From (*i*), (*ii*) and (*iii*), we get

$$\frac{ar(\Delta ABC)}{ar(\Delta DEF)} = \frac{AL}{DM} \cdot \frac{AL}{DM} = \frac{AL^2}{DM^2}$$

OR

Given: In ΔABC, $AD \perp BC$, such that $BD = 3CD$

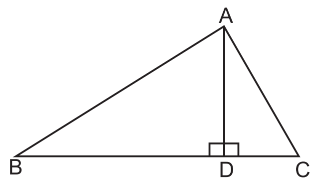
To prove: $2AB^2 = 2AC^2 + BC^2$

Proof: In right-angled triangle ADB

$$AB^2 = AD^2 + BD^2 \quad ...(i)$$

In right-angled triangle ADC

$$AC^2 = AD^2 + DC^2 \quad ...(ii)$$



Subtracting (*ii*) from (*i*), we get

$$AB^2 - AC^2 = BD^2 - DC^2 \quad ...(ii)$$

Also $\qquad BD = 3DC \Rightarrow BC = 3DC + DC = 4DC$

$\Rightarrow \qquad BD = \frac{3}{4}BC, DC = \frac{1}{4}BC$

From (*iii*),

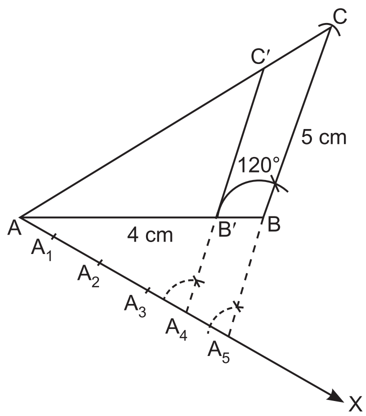
$$AB^2 - AC^2 = \left(\frac{3}{4}BC\right)^2 - \left(\frac{1}{4}BC\right)^2 = \frac{9}{16}BC^2 - \frac{1}{16}BC^2 = \frac{1}{2}BC^2$$

$\Rightarrow \qquad 2AB^2 - 2AC^2 = BC^2$

$\Rightarrow \qquad 2AB^2 = 2AC^2 + BC^2.$

37. Steps of construction:

(*a*) $AB = 4$ cm is drawn



(*b*) $\angle ABC = 120°$ is drawn on arm AB.

(*c*) $BC = 5$ cm is cut and AC is joined to get ΔABC.

(*d*) $\angle BAX$ is drawn below AB.

(*e*) Points $A_1, A_2 \ldots A_5$ are taken such that $AA_1 = A_1A_2 = A_2A_3 = A_3A_4 = A_4A_5$

(*f*) A_5B is joined.

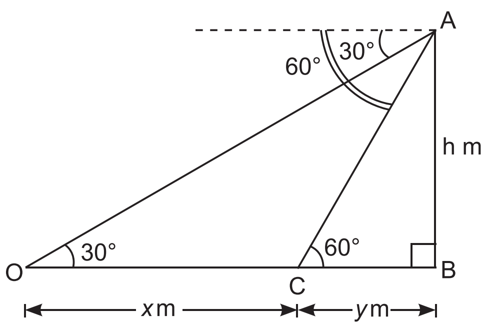
(*g*) A_4B' is drawn parallel to A_5B meeting AB at B'.

(*h*) $B'C'$ is drawn parallel to BC meeting AC at C' then $AB'C'$ is the required triangle.

38. Let h m be height of the tower and $OC = x$ m. OC distance is covered in 6 seconds.

Let $BC = y$ m

In right-angled triangle ABO,



$$\frac{h}{x+y} = \tan 30° \Rightarrow h = \frac{x+y}{\sqrt{3}} \qquad \ldots(i)$$

In right-angled triangle ABC

$$\frac{h}{y} = \tan 60° \quad \Rightarrow \quad h = \sqrt{3}y \qquad ...(ii)$$

From (i) and (ii), we have

$$\frac{x+y}{\sqrt{3}} = \sqrt{3}y$$

$$\Rightarrow \qquad x = 3y - y = 2y$$

$$\Rightarrow \qquad y = \frac{x}{2}.$$

As distance x m is covered in 6 seconds with uniform speed, so distance y m is covered in 3 seconds.

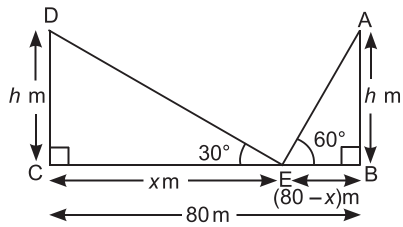
OR

Let $AB = CD = h$ m [Height of the poles]

Given: $BC = 80$ m [Width of the road]

Let $CE = x$ m

$\therefore$ $BE = (80 - x)$ m



In ΔDCE, right-angled at C, $\frac{CD}{CE} = \frac{h}{x} = \tan 30°$

$$\frac{h}{x} = \frac{1}{\sqrt{3}} \quad \Rightarrow \quad x = \sqrt{3}h \qquad ...(i)$$

In ΔABE, right-angled at B, $\frac{AB}{BE} = \tan 60° \quad \Rightarrow \quad \frac{h}{80-x} = \sqrt{3}$

$$\Rightarrow \qquad h = 80\sqrt{3} - \sqrt{3}x$$

$$\Rightarrow \qquad h = 80\sqrt{3} - 3h \qquad \text{[Using } (i)\text{]}$$

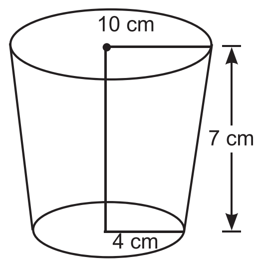
$$\Rightarrow \qquad 4h = 80\sqrt{3} \Rightarrow h = 20\sqrt{3}$$

Substituting h in equation (i), we get

$$x = h\sqrt{3} = 20\sqrt{3} \times \sqrt{3} = 60 \text{ m}$$

Hence, height of the poles is $20\sqrt{3}$ m each. Position of the point is at a distance of 60 m from pole CD and 20 m from pole AB.

39. Given $r_1 = 4$ cm, $r_2 = 10$ cm, $h = 7$ cm



$$\therefore \quad \text{Volume of container} = \frac{\pi}{3} \times 7[(4)^2 + (10)^2 + 4 \times 10]$$

$$= \frac{22 \times 7}{7 \times 3}(16 + 100 + 40)$$

$$= \frac{22}{3} \times 156 = 22 \times 52 = 1144 \text{ cm}^3$$

Cost of oil is ₹ 100 per litre

$$\therefore \text{ Total cost} = ₹\ 100 \times \frac{1144}{1000} = ₹\ 114.40.$$

OR

Let r_1 and r_2 be inner and outer radii of hollow right circular cylinder of height 14 cm.

Then $2\pi (r_2 - r_1).14 = 88$

$$\Rightarrow \quad r_2 - r_1 = \frac{88 \times 7}{14 \times 2 \times 22} = 1 \quad ...(i)$$

Also,

$$\pi(r_2^2 - r_1^2).14 = 176$$

$$\Rightarrow \quad r_2^2 - r_1^2 = \frac{176 \times 7}{22 \times 14} = 4$$

$$\Rightarrow \quad (r_1 + r_2)(r_2 - r_1) = 4$$

$$\Rightarrow \quad r_2 + r_1 = 4 \quad \text{[From (i)] ...(ii)}$$

Solving (*i*) and (*ii*), we get

$$r_1 = 1.5 \text{ cm}, \quad r_2 = 2.5 \text{ cm}$$

$\Rightarrow \quad d_1 = 2r_1 = 2 \times 1.5 = 3.0$ cm, $d_2 = 2r_2 = 2 \times 2.5 = 5.0$ cm.

Hence, inner and outer diameter of the cylinder are 3.0 cm and 5.0 cm respectively.

40. Grouped frequency data

(*i*)

Height (in cm)	Number of trees
0 – 7	26
7 – 14	55 – 26 = 29
14 – 21	92 – 55 = 37
21 – 28	140 – 92 = 48
28 – 35	216 – 140 = 76
35 – 42	298 – 216 = 82
42 – 49	338 – 298 = 40
49 – 56	360 – 338 = 22

(*ii*)

CI	*f*
0 – 7	26
7 – 14	29
14 – 21	37
21 – 28	48
28 – 35	76
35 – 42	82
42 – 49	40
49 – 56	22

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

where

$l \rightarrow$ lower limit of modal class

$f_0 \rightarrow$ maximum frequency

$f_1 \rightarrow$ frequency of class preceding modal class

$f_2 \rightarrow$ frequency of class succeeding modal class

$h \rightarrow$ class size

$f_0 = 82$, modal class: 35 – 42

$$\therefore \quad \text{Mode} = 35 + \frac{82 - 76}{164 - 76 - 40} \times 7 = 35 + \frac{6}{48} \times 7 = 35 + 0.87 = 35.87$$

Mode represents maximum number of plants are with height 35.87 cm.