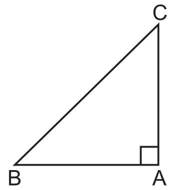
Solutions to RSPL/2 (DS2)

1. (*b*), as $\frac{91}{2^2 . 5 . 7} = \frac{13 \times 5}{100} = 0.65$

2. (*b*), as median is 525. So median class is 500 – 600

3. (*d*), as LCM = Product of numbers ÷ HCF = 3072 ÷ 16 = 192

4. (*a*), as for consistent $\frac{a_1}{a_2} \neq \frac{b_1}{a_2}$, i.e. $\frac{2}{4} \neq \frac{5}{3}$



5. (*b*), as

$$B + C = 90°$$
$$B = 90° - C \Rightarrow \sin B = \sin(90° - C)$$
$$\sin B = \cos C$$

6. (*c*), as

$$\sin 3A = \sin(90° - 2A) \Rightarrow 3A = 90° - 2A$$
$$\Rightarrow \quad 5A = 90° \Rightarrow A = 18°$$

7. (*d*), as

$$\sec (A + B) = \sqrt{2} \Rightarrow A + B = 45°$$

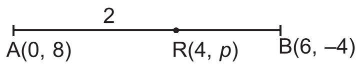
cosec $(A - B)$ is not defined $\Rightarrow A - B = 0 \Rightarrow B = 22.5°$

8. (*c*), as $P\left(\frac{1 \times 6 + 0 \times 2}{1+2}, \frac{1 \times (-4) + 2 \times 8}{1+2}\right)$, i.e. $P(2, 4)$

$$\therefore \quad AP = \sqrt{(2-0)^2 + (4-8)^2} = \sqrt{4+16} = \sqrt{20} = 2\sqrt{5} \text{ units}$$

9. (*a*), as point is (7, 3), distance from the x-axis = 3

10. (*a*), as $R\left(\frac{12}{3}, \frac{-8+8}{3}\right)$, i.e. $R(4, 0) = R(4, p) \Rightarrow p = 0$



11. Frustum.

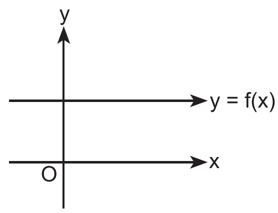
12. 14, as $\alpha + \beta = -\frac{k}{2}$ and $\alpha\beta = \frac{-7}{2}$

Given sum of the roots = twice the product of roots

$$\Rightarrow -\frac{k}{2} = 2 \times \left(-\frac{7}{2}\right) \Rightarrow k = 14$$

OR

No zeroes of $y = f(x)$, as the graph does not intersect the x-axis.



13. 5 : 7, as ratio of perimeters is equal to ratio of corresponding sides

$$\therefore \quad \frac{AB}{PQ} = \frac{BC}{QR} = \frac{AC}{PR} = \frac{35}{49} = \frac{5}{7}.$$

14. 7, as 4, 9, $2p$ are in $AP \Rightarrow 18 = 4 + 2p$

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

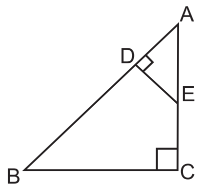
15. $\frac{6}{13}$, as for a square to be greater than 9, the number should be greater than 3 or less than –3.

∴ Favourable cases: –6, –5, –4, 4, 5, 6

∴ Probability = $\frac{6}{13}$.

16. $\sqrt{2} = 1.4142$, $\sqrt{3} = 1.732$, rational number = 1.5, irrational number = 1.6309003 ......

17. In ΔABC and ΔAED

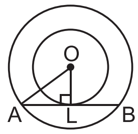


$\angle C = \angle ADE$ = (90° each)

$\angle A$ is common

$\therefore \Delta ABC \sim \Delta AED$ (AA – similarity)

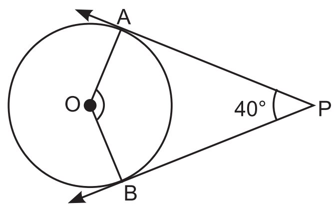
18. OA = 13 cm, OL = 12 cm, $OL \perp AB$ and OL bisects AB.



$\therefore AL = \sqrt{(13)^2 - (12)^2}$ = 5 cm

$\therefore AB = 2AL = 2 \times 5$ cm = 10 cm

OR



$$\angle AOB + \angle APB = 180°$$

As $\angle A = \angle B = 90°$

$\Rightarrow \angle AOB = 180° - 40° = 140°$

19.
$$S_n = 3n^2 - 5$$
$$a_3 = S_3 - S_2 = [3(3)^2 - 5] - [3(2)^2 - 5]$$
$$= 27 - 5 - 12 + 5 = 15.$$

20. Given equation is $\sqrt{2}x^2 - 5\sqrt{3}x + 2\sqrt{2} = 0$

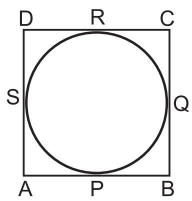
$D = (-5\sqrt{3})^2 - 4 \times \sqrt{2} \times 2\sqrt{2} = 75 - 16 = 59 > 0$

Hence, roots are real and unequal.

21. Parallelogram $ABCD$ circumscribes a circle,

$AP = AS$, $BP = BQ$, $CQ = CR$, $DR = DS$

[Lengths of tangents from a point outside the circle, to the circle are equal]



Consider $AB + CD = AP + PB + CR + DR$

$= AS + BQ + CQ + DS$

$= (AS + DS) + (BQ + CQ)$

$= AD + BC$

Also, $AB = CD$ and $AD = BC$ [Sides of a parallogram]

$\Rightarrow 2AB = 2AD \Rightarrow AB = AD$

As adjacent sides of a parallelogram are equal. Hence, it is a rhombus.

22. Let a_n is first negative term

AP is 19, 16, 13, ...

Here $a = 19$, $d = -3$

$$a_n < 0$$

$\Rightarrow \quad 19 + (n-1)(-3) < 0$

$\Rightarrow \quad 19 - 3n + 3 < 0$

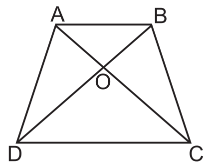
$\Rightarrow \quad 22 < 3n \Rightarrow n > \frac{22}{3}$

$\Rightarrow \quad n > 7\frac{1}{3}$

$\therefore \quad n = 8$

8th term is first negative term.

23. In ΔAOB and ΔCOD, $\frac{AO}{OC} = \frac{OB}{OD}$



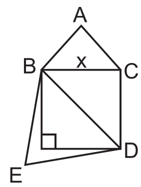
and $\angle AOB = \angle COD$

$\therefore \quad \Delta BOA \sim \Delta DOC$

$\therefore \quad \frac{AB}{CD} = \frac{OB}{OD} \Rightarrow \frac{4}{CD} = \frac{1}{2} \Rightarrow CD = 8$ cm

OR

Let side of square be x



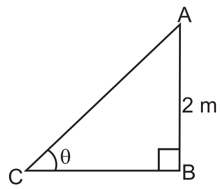
then length of the diagonal is $\sqrt{2}x$.

As triangles are equilateral. Hence similar.

$\therefore \quad \frac{\text{ar}(ABC)}{\text{ar}(BDE)} = \frac{BC^2}{BD^2} = \frac{x}{(\sqrt{2}x)^2} = \frac{1}{2}$

$\Rightarrow$ ar $(ABC) = \frac{1}{2}$ ar (BDE).

24. (*i*) $\sin 2\theta = \cos(2\theta - 30°)$



$= \sin[90° - 2\theta + 30°]$

$\Rightarrow \quad \sin 2\theta = \sin[120° - 2\theta]$

$\Rightarrow \quad 2\theta = 120° - 2\theta$

$\Rightarrow \quad 4\theta = 120°$

$\Rightarrow \quad \theta = 30°$

(*ii*) Length of shadow BC,

$$\frac{BC}{AB} = \cot 30° = BC = AB \cot 30° = 2\sqrt{3}\text{ m}$$

25. A throws a pair of dice, total possibilities are 36 and favourable cases are 4,

i.e. {(3, 6), (4, 5), (5, 4), (6, 3)}

$\therefore$ Probability of a total of 9 = $\frac{4}{36} = \frac{1}{9}$

B throws a die, 6 possibilities and possible records are 5, 6, 7, 8, 9, 10.

Favourable case 1, i.e. 9.

$\therefore$ Probability = $\frac{1}{6}$

As $\frac{1}{6} > \frac{1}{9}$, so, player B has better chance of getting number 9.

OR

Total numbers between 23 and 80 are 58. Favourable numbers divisible by 2 and 3 both, i.e. by 6 are 24, 30, 36, 42, 48, 54, 60, 66, 72, 78.

$\therefore$ Probability that the number is divisible by 2 and 3 both = $\frac{10}{58} = \frac{5}{29}$.

26. (*i*) Space for conical hole = $\frac{1}{3}\pi(2)^2 \cdot 1 = \frac{4}{3}\pi \text{ cm}^3$

Space for cylindrical hole = $\pi(1)^2 \cdot 1 = \pi \text{ cm}^3$

(*ii*) We notice conical hole has more space.

(*iii*) Volume of wood used $= (10 \times 5 \times 3 - 2 \times \frac{4}{3}\pi - \pi) \text{ cm}^3$

$$= (150 - \frac{11}{3}\pi) \text{ cm}^3$$

$$= (150 - 11.52)\text{cm}^3 = 138.48 \text{ cm}^3$$

27. Let if possible, $4 - 2\sqrt{7}$ is a rational number.

Let, $4 - 2\sqrt{7} = \frac{a}{b}, b \neq 0, a, b \in Z$

$$\Rightarrow \quad 2\sqrt{7} = 4 - \frac{a}{b} = \frac{4b - a}{b}$$

$$\Rightarrow \quad \sqrt{7} = \frac{4b - a}{2b} \quad \text{...}(i)$$

From (*i*), LHS is irrational and RHS is rational as $4b - a$ is an integer and $2b \neq 0$.

$\therefore$ LHS $\neq$ RHS

Our supposition is wrong.

Hence, $4 - 2\sqrt{7}$ is an irrational number.

OR

Given numbers are 24 and 36 using Euclid's division algorithm, we get

$$36 = 1 \times 24 + 12 \quad \text{...}(i)$$

Consider numbers 12 and 24

Again using Euclid's division algorithm, we get

$$24 = 2 \times 12 + 0$$

$\therefore$ d = HCF(24, 36) = HCF(12, 24) = 12

$\therefore$ $d = 12 = 1 \times 36 - 1 \times 24 = 36b + 24a$

$\therefore$ $a = -1, \quad b = 1$

28. Let a be first term and d the common difference of a given AP

then $a_p = a + (p - 1)d$ ...(*i*)

$a_{p+2q} = a + (p + 2q - 1)d$ ...(*ii*)

and $a_{p+q} = a + (p + q - 1)d$ ...(*iii*)

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

$$a_p + a_{p+2q} = 2a + (2p + 2q - 2)d = 2[a + (p + q - 1)d]$$

$$= 2a_{p+q} \quad \text{[From } (iii)\text{]}$$

29. Consider equations

$$231x + 148y = 527 \qquad ...(i)$$
$$148x + 231y = 610 \qquad ...(ii)$$

Adding (i) and (ii), we get

$$379x + 379y = 1137$$
$$\Rightarrow \quad x + y = 3 \qquad ...(iii)$$

Subtracting (ii) from (i), we get

$$83x - 83y = -83$$
$$\Rightarrow \quad x - y = -1 \qquad ...(iv)$$

Solving (iii) and (iv), we get

$$\begin{aligned} x + y &= 3 \\ x - y &= -1 \\ \hline 2x &= 2 \end{aligned}$$

$$\Rightarrow \quad x = 1 \text{ and } y = 2$$

OR

Consider equations, $\frac{x}{10} + \frac{y}{5} - 1 = 0 \quad \Rightarrow \quad x + 2y = 10 \qquad ...(i)$

and $\frac{x}{8} + \frac{y}{6} = 15 \quad \Rightarrow \quad 3x + 4y = 360 \qquad ...(ii)$

From (i) and (ii), we get

$$\begin{aligned} 2x + 4y &= 20 \\ 3x + 4y &= 360 \\ - \quad - \quad &\quad - \\ \hline -x &= -340 \end{aligned}$$

$$\Rightarrow \quad x = 340$$

From (i), we get, $340 + 2y = 10 \Rightarrow 2y = -330 \Rightarrow y = -165$

$$\therefore \quad x = 340 \text{ and } y = -165$$

Given $y = \lambda x + 5$

$$\Rightarrow \quad -165 = 340\lambda + 5$$
$$\Rightarrow \quad -170 = 340\lambda$$
$$\Rightarrow \quad \lambda = -\frac{1}{2}.$$

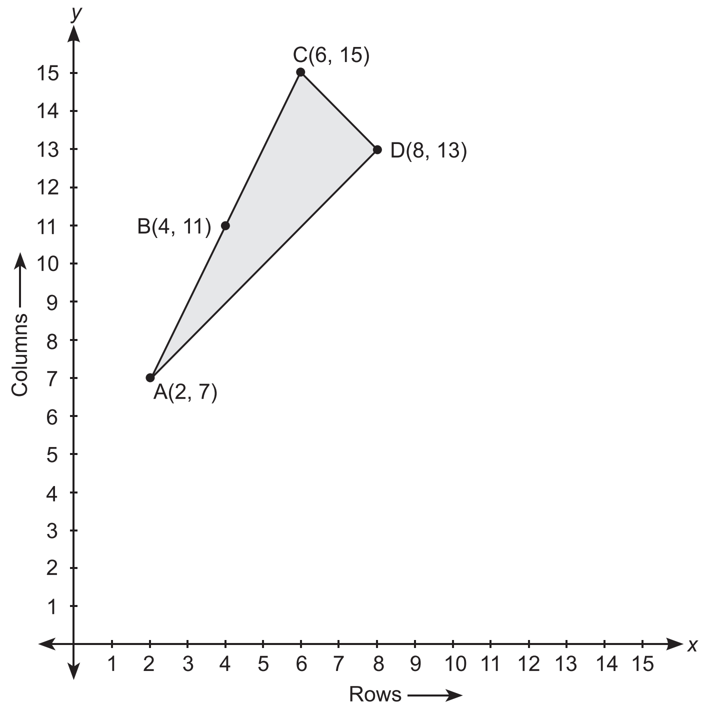
30. Given polynomial, $f(x) = 3x^3 - 2x^2 + 5x - 5$

$$\text{Quotient} = x^2 - x + 2$$
$$\text{Remainder} = -7$$
$$\therefore \quad 3x^3 - 2x^2 + 5x - 5 = (x^2 - x + 2) \,.\, p(x) - 7$$
$$\Rightarrow \quad 3x^3 - 2x^2 + 5x + 2 = (x^2 - x + 2) \,.\, p(x)$$
$$\Rightarrow \quad p(x) = \frac{3x^3 - 2x^2 + 5x + 2}{x^2 - x + 2}$$
$$\therefore \quad p(x) = 3x + 1$$

$$\begin{array}{r|l} & 3x + 1 \\ \hline x^2 - x + 2 & 3x^3 - 2x^2 + 5x + 2 \\ & 3x^3 - 3x^2 + 6x \\ & - \quad + \quad - \\ \hline & x^2 - x + 2 \\ & x^2 - x + 2 \\ & - \quad + \quad - \\ \hline & 0 \end{array}$$

31. x represents position of a student in a row and y represents position of a student in a column. So, we have

(i) $A(2, 7)$, $B(4, 11)$ and $C(6, 15)$



(ii) $AB = \sqrt{(4-2)^2 + (11-7)^2} = \sqrt{4+16} = \sqrt{20}$

$BC = \sqrt{(6-4)^2 + (15-11)^2} = \sqrt{4+16} = \sqrt{20}$

B is equidistant from A and C.

(iii) ar(ACD) : $A(2, 7)$, $C(6, 15)$, $D(8, 13)$

$= \frac{1}{2}|2(15-13) + 6(13-7) + 8(7-15)|$

$= \frac{1}{2}|4 + 36 - 64| = 12$ sq units.

32. Consider $\sin\alpha + \sin^2\alpha = 1$

$\Rightarrow \sin\alpha = 1 - \sin^2\alpha \Rightarrow \sin\alpha = \cos^2\alpha$

$\Rightarrow \sin^2\alpha = \cos^4\alpha$

$\Rightarrow 1 - \cos^2\alpha = \cos^4\alpha \Rightarrow \cos^4\alpha + \cos^2\alpha = 1$

OR

$2\sin[90° - (2A - B)] = 1 \Rightarrow \cos(2A - B) = \frac{1}{2}$

$\Rightarrow \qquad 2A - B = 60° \qquad ...(i)$

$\sqrt{3}\cot[90° - (A + B)] = 1 \Rightarrow \tan(A + B) = \frac{1}{\sqrt{3}}$

$\therefore \qquad A + B = 30° \qquad ...(ii)$

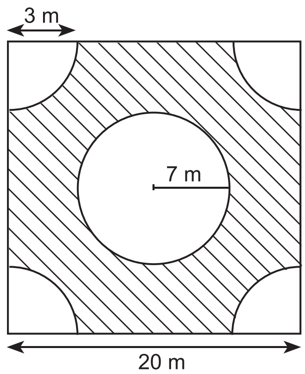
From (*i*) and (*ii*), we get

$$2A - B = 60°$$
$$A + B = 30°$$

$\Rightarrow$ $3A = 90°$

$\Rightarrow$ $A = 30°$ and $B = 0°$

33. Area of square $= 20 \times 20 \text{ m}^2 = 400 \text{ m}^2$



Area of four quadrants $= 4 \times \frac{90°}{360°} \times \pi(3)^2 = 9\pi \text{ m}^2$

Area of circle $= \pi(7)^2 = 49\pi \text{ m}^2$

$\therefore$ Area of the red coloured square left $= [400 - 49\pi - 9\pi]\text{m}^2$

$= [400 - 58 \times \frac{22}{7}]\text{m}^2$

$= (400 - 182.28)\text{m}^2$

$= 217.72 \text{ m}^2$.

34. (*i*) Increasing order of curve – less than type ogive.

Decreasing order of curve – 'more than type' ogive.

(*ii*) Two curves meet at the point (5, 7)

x-coordinate represents median

$\therefore$ median is 5.

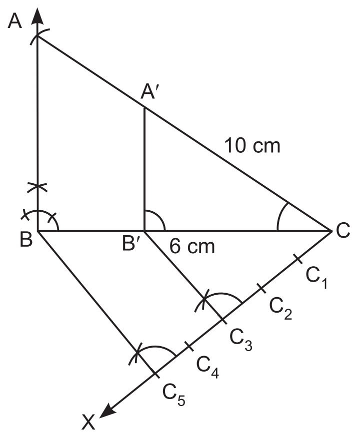
(*iii*) We know mode = 3 median – 2 mean

$\Rightarrow$ $7 = 3 \times 5 - 2 \times \text{mean}$

$\Rightarrow$ $2 \text{ mean} = 15 - 7 = 8$

$\Rightarrow$ $\text{mean} = 4$

35. Steps of construction.



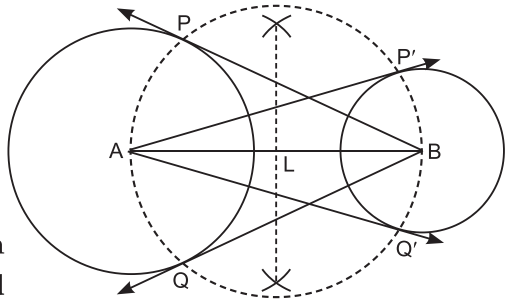
1. $BC = 6$ cm is drawn.
2. At B, AB is drawn perpendicular to BC.
3. From C, $AC = 10$ cm is cut meeting AB at A.

   Then ABC is required triangle.
4. Below BC, $\angle BCX$ is drawn.
5. On CX points C_1, C_2, C_3, C_4, C_5 are taken such that $CC_1 = C_1C_2 = C_2C_3 = C_3C_4 = C_4C_5$
6. C_5 and B are joined.
7. From C_3, C_3B' is drawn parallel to C_5B meeting BC at B'.
8. From B', $B'A'$ is drawn parallel to AB meeting AB at A'.

Then $A'B'C$ is required triangle.

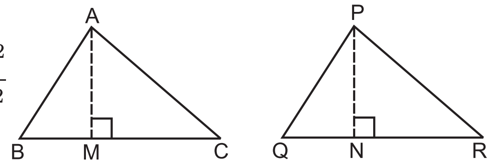
OR

Steps of construction:



1. $AB = 7$ cm is drawn.
2. At A circle of radius 3 cm is drawn and at B circle of radius 2 cm is drawn.
3. AB is bisected at L.
4. With L as centre AL as radius circle is drawn meeting circle with centre A at P and Q and circle with centre B at P' and Q'.
5. AP' and AQ' are drawn which are tangents to circle with centre B.
6. BP and BQ are drawn which are tangent to circle with centre A.

36. Given: $\Delta ABC \sim \Delta PQR$



To Prove: $\dfrac{\text{ar}(\Delta ABC)}{\text{ar}(\Delta PQR)} = \dfrac{AB^2}{PQ^2} = \dfrac{BC^2}{QR^2} = \dfrac{AC^2}{PR^2}$

Construction: Draw $AM \perp BC$ and $PN \perp QR$.

Proof:
$$\frac{\text{ar}(\Delta ABC)}{\text{ar}(\Delta PQR)} = \frac{\frac{1}{2}BC \times AM}{\frac{1}{2}QR \times PN}$$

$$\Rightarrow \quad \frac{\text{ar}(\Delta ABC)}{\text{ar}(\Delta PQR)} = \frac{BC}{QR} \times \frac{AM}{PN} \qquad ...(i)$$

$\Delta ABC \sim \Delta PQR$ [Given]

$$\therefore \quad \frac{AB}{PQ} = \frac{BC}{QR} = \frac{AC}{PR} \qquad ...(ii)$$

[Ratio of corresponding sides of similar triangles]

In ΔABM and ΔPQN,

$\angle B = \angle Q$ [Corresponding angles of similar triangles]

$\angle AMB = \angle PNQ$ [Each 90°]

$\therefore \quad \Delta BMA \sim \Delta QNP$ [AA similarity]

$$\therefore \quad \frac{AM}{PN} = \frac{AB}{PQ}$$

But $\dfrac{AB}{PQ} = \dfrac{BC}{QR}$ [From (ii) $\dfrac{AB}{PQ} = \dfrac{BC}{QR}$]

$$\frac{AM}{PN} = \frac{BC}{QR} \qquad ...(iii)$$

From equation (i) and (iii), we get

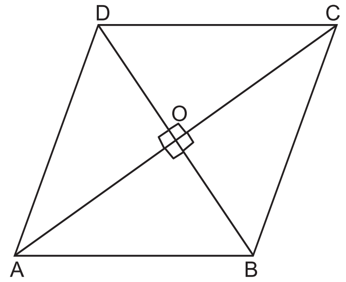
$$\frac{\text{ar}(\Delta ABC)}{\text{ar}(\Delta PQR)} = \frac{BC}{QR} \times \frac{BC}{QR} = \frac{BC^2}{QR^2}$$

$$\therefore \quad \frac{\text{ar}(\Delta ABC)}{\text{ar}(\Delta PQR)} = \frac{AB^2}{PQ^2} = \frac{BC^2}{QR^2} = \frac{AC^2}{PR^2} \qquad \text{[From } (ii)\text{]}$$

OR

Given: A rhombus $ABCD$, diagonals AC and BD intersect at O.

To Prove: $AB^2 + BC^2 + CD^2 + DA^2 = AC^2 + BD^2$



Proof: We know in a rhombus diagonals bisect each other at right angles.

$\therefore\ \angle AOB = \angle BOC = \angle COD = \angle DOA = 90°$ ...(*i*)

and $AO = OC = \frac{1}{2}AC;\ OB = OD = \frac{1}{2}BD$ ...(*ii*)

In right angled triangle AOB, right angled at O

$$OA^2 + OB^2 = AB^2$$ ...(*iii*) (Pythagoras theorem)

In right angled triangle BOC, right angled at O

$$OB^2 + OC^2 = BC^2$$ ...(*iv*) (Pythagoras theorem)

In right angled triangle COD, right angled at O

$$OC^2 + OD^2 = CD^2$$ ...(*v*) (Pythagoras theorem)

In right angled triangle DOA, right angled at O

$$OD^2 + OA^2 = AD^2$$ ...(*vi*) (Pythagoras theorem)

Adding corresponding sides of (*iii*), (*iv*), (*v*), (*vi*), we get

$$2(OA^2 + OB^2 + OC^2 + OD^2) = AB^2 + BC^2 + CD^2 + DA^2$$

$$\Rightarrow\quad 2\left[\left(\frac{1}{2}AC\right)^2 + \left(\frac{1}{2}BD\right)^2 + \left(\frac{1}{2}AC\right)^2 + \left(\frac{1}{2}BD\right)^2\right] = AB^2 + BC^2 + CD^2 + DA^2$$ [From (*ii*)]

$$\Rightarrow\quad 2\left[\frac{2}{4}AC^2 + \frac{2}{4}BD^2\right] = AB^2 + BC^2 + CD^2 + DA^2$$

$$\Rightarrow\quad AC^2 + BD^2 = AB^2 + BC^2 + CD^2 + DA^2$$

$$\Rightarrow\quad AB^2 + BC^2 + CD^2 + DA^2 = AC^2 + BD^2$$

37. Speed of the boat = 15 km/h

Let speed of the stream be x km/h

Then speed of the boat for upstream = $(15 - x)$ km/h

Speed of the boat for downstream = $(15 + x)$ km/h

According to the given

$$\frac{30}{15 - x} + \frac{30}{15 + x} = \frac{9}{2}$$

$$\Rightarrow \quad \frac{450+30x+450-30x}{(15-x)(15+x)} = \frac{9}{2}$$

$$\Rightarrow \quad \frac{900}{225-x^2} = \frac{9}{2} \Rightarrow 200 = 225 - x^2$$

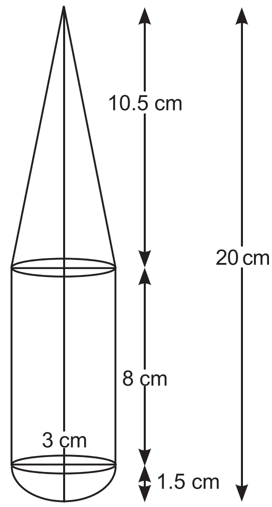
$$\Rightarrow \quad x^2 = 25 \Rightarrow x = \pm 5$$

($x = -5$, rejected as the speed of the stream can not be negative)

$$\therefore \quad x = 5$$

$\therefore$ Speed of the stream = 5 km/h

38. Volume of toy rocket



= Volume of hemisphere + Volume of cylinder + Volume of cone

$= \frac{2}{3}\pi(1.5)^3 + \pi(1.5)^2 \times 8 + \frac{1}{3}\pi(1.5)^2 \times 10.5$

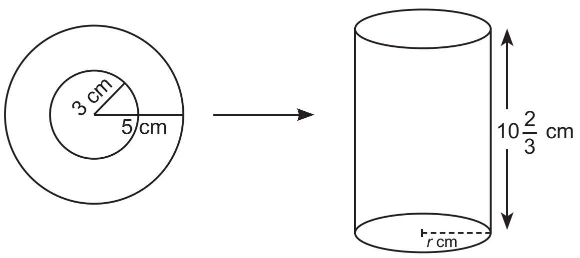
$= \frac{\pi}{3}(1.5)^2[3 + 24 + 10.5]$ cm^3

$= \pi \times 1.5 \times 0.5 \times 37.5$ cm^3

$= \frac{22}{7} \times 0.75 \times 37.5$ cm^3

$= 88.39$ cm^3

OR



For spherical shell

$r_1 = 3$ cm ; $r_2 = 5$ cm Let radius of base of the cylinder be r cm

$\therefore$ Volume of spherical shell = Volume of cylinder

$$\Rightarrow \quad \frac{4}{3}\pi[(5)^3 - (3)^3] = \pi \times r^2 \times \frac{32}{3}$$

$$\Rightarrow \quad \frac{4}{3}(125 - 27) = \frac{32}{3}r^2$$

$$\Rightarrow \quad \frac{98}{8} = r^2 \Rightarrow r^2 = \frac{49}{4} \Rightarrow r = \frac{7}{2} \text{ cm}$$

$$\therefore \quad \text{Volume of cylinder} = \pi \times \left(\frac{7}{2}\right)^2 \times \frac{32}{3} \text{ cm}^3$$

$$= \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times \frac{32}{3} \text{ cm}^3$$

$$= 410.67 \text{ cm}^3$$

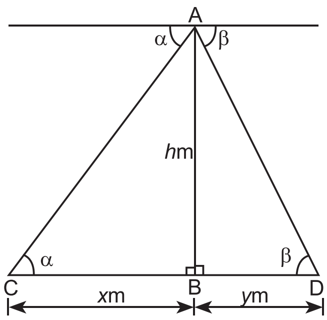
Total surface area of the cylinder $= 2\pi r(r + h)$

$$= 2 \times \frac{22}{7} \times \frac{7}{2}\left(\frac{7}{2} + \frac{32}{3}\right) \text{ cm}^2$$

$$= 22\left(\frac{21+64}{6}\right) = \frac{11 \times 85}{3} \text{ cm}^2$$

$$= 311.67 \text{ cm}^2$$

39. AB is lighthouse of height h m.



Points C and D represent ships.

Let ships C and D be x m and y m away from the lighthouse.

In right-angled ΔABC,

$$\frac{h}{x} = \tan\alpha \Rightarrow x = \frac{h}{\tan\alpha} \quad ...(i)$$

In right-angled ΔABD

$$\frac{h}{y} = \tan\beta \Rightarrow y = \frac{h}{\tan\beta} \quad ...(ii)$$

Distance between ships $= x + y = h\left[\frac{1}{\tan\alpha} + \frac{1}{\tan\beta}\right]$ m $= h\left\{\frac{\tan\beta + \tan\alpha}{\tan\alpha\tan\beta}\right\}$ m.

40. Here, $h = 20$, $A = 50$ (say)

CI	x_i	f_i	$d_i = \frac{x_i - 50}{20}$	$f_i d_i$
0 – 20	10	17	–2	–34
20 – 40	30	f_1	–1	$-f_1$
40 – 60	50	32	0	0
60 – 80	70	f_2	1	f_2
80 – 100	90	19	2	38
		$\Sigma f_i = 120$		$\Sigma f_i d_i = f_2 - f_1 + 4$

Arithmetic mean $= A + \frac{\Sigma f_i d_i}{\Sigma f_i} \times h$

$\Rightarrow \quad 50 = 50 + \frac{f_2 - f_1 + 4}{120} \times 20$

$\Rightarrow \quad f_2 - f_1 + 4 = 0$

$\Rightarrow \quad f_1 - f_2 = 4 \quad ...(i)$

Also, $\quad 17 + f_1 + 32 + f_2 + 19 = 120$

$\Rightarrow \quad f_1 + f_2 = 120 - 68$

$\Rightarrow \quad f_1 + f_2 = 52 \quad ...(ii)$

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

$f_1 + f_2 = 52$

$f_1 - f_2 = 4$

$2f_1 = 56$

$\Rightarrow \quad f_1 = 28$ and $f_2 = 24$.