# LIBERTY PAPER SET

**STD. 10 : Mathematics (Standard) [N-012(E)]**

**Full Solution**

**Time : 3 Hours** **ASSIGNMENT PAPER 9**

## Section-A

**1.** (B) 510 and 85 **2.** (C) $\frac{-c}{d}$ **3.** (D) 13.5 **4.** (C) Zero **5.** (C) 400 **6.** (C) 8.4 **7.** 3 : 2 **8.** 0.48 **9.** 3 **10.** 6 **11.** 31 **12.** 25 **13.** False **14.** False **15.** True **16.** True **17.** 72.8% **18.** M = 16 **19.** 1 : *abc* **20.** $k = 1$ **21.** (b) − 3 and − 2 **22.** (a) − 6 and 1 **23.** (b) $\sqrt{1}$ **24.** (a) − 1

## Section-B

**25.**

| | |
|---|---|
| 2 | 336 |
| 2 | 168 |
| 2 | 84 |
| 2 | 42 |
| 3 | 21 |
| 7 | 7 |
| | 1 |

| | |
|---|---|
| 2 | 54 |
| 3 | 27 |
| 3 | 9 |
| 3 | 3 |
| | 1 |

$336 = 2^4 \times 3 \times 7$

$54 = 2 \times 3^3$

$\therefore$ HCF (336, 54) $= 2 \times 3 = 6$

$\therefore$ LCM (336, 54) $= 2^4 \times 3^3 \times 7 = 3024$

HCF (336, 54) × LCM (336, 54) $= 6 \times 3024 = 18144$

Product of the two numbers $= 336 \times 54$

$= 18144$

$\therefore$ HCF (336, 54) × LCM (336, 54) $= 336 \times 54$

**26.** By the method of elimination :

$3x - 5y - 4 = 0$ ...(1)

$9x = 2y + 7$

$\therefore 9x - 2y - 7 = 0$ ...(2)

Multiply equation (1) by 2 and equation (2) by 5 and subtract

$$\begin{array}{r} 6x - 10y - 8 = 0 \\ 45x - 10y - 35 = 0 \\ - \quad + \quad\quad + \quad\quad \\ \hline \end{array}$$

$\therefore -39x + 27 = 0$

$\therefore -39x = -27$

$\therefore x = \frac{27}{39} = \frac{9}{13}$

Put $x = \frac{9}{13}$ in equation (1)

$3x - 5y - 4 = 0$

$\therefore\ 3\left(\frac{9}{13}\right) - 5y - 4 = 0$

$\therefore\ \frac{27}{13} - 5y - 4 = 0$

$\therefore\ \frac{27}{13} - 4 = 5y$

$\therefore\ 65y = 27 - 52$

$\therefore\ 65y = -25$

$\therefore\ y = -\frac{5}{13}$

The solution of the equation : $x = \frac{9}{13}$ , $y = -\frac{5}{13}$

**27.** Lets, the present age of Virat be $x$ years.

7 years ago, the age of Virat was $(x - 7)$ years and 7 years later the age of Virat will be $(x + 7)$ years.

According to the condition,

$(x - 7)(x + 7) = 480$

$\therefore\ x^2 - 49 = 480$

$\therefore\ x^2 - 49 - 480 = 0$

$\therefore\ (x + 23)(x - 23) = 0$

$\therefore\ x^2 - 529 = 0$

$\therefore\ x + 23 = 0$ OR $x - 23 = 0$

$\therefore\ x = -23$ OR $x = 23$

but $x$ is the age of Virat, so negative is not possible.

$\therefore\ x \neq -23$

$\therefore\ x = 23$ years

$\therefore$ The present age of virat = 23 years

**28.** Here $(k + 1)x^2 - 2(k - 1)x + 1 = 0$

then compare with $ax^2 + bx + c = 0$

$a = k + 1,\ b = -2(k - 1),\ c = 1$

the quadratic equation has equal roots so Discriminat.

$\therefore\ b^2 - 4ac = 0$

$\therefore\ [-2(k - 1]^2 - 4(k + 1)(1) = 0$

$\therefore\ 4(k - 1)^2 - 4(k + 1) = 0$

$\therefore\ (k - 1)^2 - (k + 1) = 0$

$\therefore\ k^2 - 2k + 1 - k - 1 = 0$

$\therefore\ k^2 - 3k = 0$

$\therefore\ k(k - 3) = 0$

$\therefore\ k = 0$ OR $k - 3 = 0$

$\therefore\ k = 0$ OR $k = 3$

Hence, $k = 0$ OR $k = 3$

**29.** $a_{12} = 37,\ d = 3,\ a =$ ______, $S_{12} =$ ______

Now, $a_{12} = 37$

$\therefore\ a + 11d = 37$

$\therefore\ a + 11(3) = 37$

$\therefore\ a + 33 = 37$

$\therefore\ a = 37 - 33$

$\therefore\ a = 4$

$$S_n = \frac{n}{2}[2a + (n-1)d]$$

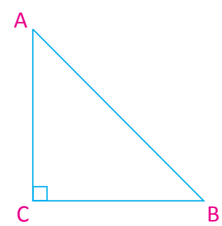
$$\therefore\ S_{12} = \frac{12}{2}[2(4) + (12-1)(3)]$$

$$= 6\,[8 + 33]$$

$$= 6 \times 41$$

$$\therefore\ S_{12} = 246$$

**30.** $sin\ A = \frac{3}{4}$




In right angled $\Delta$ ABC, $\angle B = 90°$

$$sin\ A\ \frac{BC}{AC} = \frac{3}{4}$$

$$\therefore\ \frac{BC}{3} = \frac{AC}{4}\ k,\ k = \text{Positive Real Number}$$

$\therefore$ BC = $3k$, AC = $4k$

According to pythagoras

$$AB^2 = AC^2 - BC^2$$

$$\therefore\ AB^2 = (4k)^2 - (3k)^2$$

$$\therefore\ AB^2 = 16k^2 - 9k^2$$

$$\therefore\ AB^2 = 7k^2$$

$$\therefore\ AB^2 = \sqrt{7}\,k^2$$

$$\therefore\ cos\ A = \frac{AB}{AC} = \frac{\sqrt{7}\,k}{4k} = \frac{\sqrt{7}}{4}$$

$$tan\ A = \frac{sin\ A}{cos\ A} = \frac{\frac{3}{4}}{\frac{\sqrt{7}}{4}} = \frac{3}{\sqrt{7}}$$

**31.** $$LHS = \frac{sin\theta - cos\theta + 1}{sin\theta + cos\theta - 1}$$

$$= \frac{tan\,\theta - 1 + sec\,\theta}{tan\,\theta + 1 - sec\,\theta}\quad (\because \text{ Divide each term by } cos\theta)$$

$$= \frac{(tan\,\theta + sec\,\theta) - 1}{(tan\,\theta - sec\,\theta) + 1} \times \frac{tan\theta - sec\theta}{tan\theta - sec\theta}$$

$$= \frac{(tan^2\theta - sec^2\theta) - (tan\,\theta - sec\,\theta)}{\{(tan\theta - sec\theta) + 1\}(tan\theta - sec\theta)}$$

$$= \frac{-1 - tan\,\theta + sec\,\theta}{(tan\,\theta - sec\,\theta + 1)(tan\,\theta - sec\,\theta)}$$

$$= \frac{-(1 + tan\,\theta - sec\,\theta)}{-(tan\theta - sec\theta + 1)(sec\,\theta - tan\,\theta)}$$

$$= \frac{1}{sec\theta - tan\theta} = \text{RHS}$$

**32.** A circle touches all the sides of □ ABCD. So the sum of opposite sides of □ ABCD is equal.

$\therefore$ AB + CD = AD + BC

$\therefore$ 6 + 8 = AD + 9

$\therefore$ 14 – 9 = AD

$\therefore$ AD = 5 cm

**33.** Hemisphere Cone

$r = 1$ cm $r = 1$ cm

$h = r = 1$ cm

Volume of solid = Volume of hemisphere + Volume of cone

$$= \frac{2}{3}\pi r^3 + \frac{1}{3}\pi r^2 h$$

$$= \frac{1}{3}\pi r^2 (2r + h)$$

$$= \frac{1}{3} \times \pi \times (1)^2 \times [(2 \times 1) + 1]$$

$$= \frac{1}{3} \times \pi \times 1(2 + 1)$$

$$= \frac{1}{3} \times \pi \times 3$$

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

Hence, the volume of the solid is $\pi$ cm$^3$.

**34.** We have,

$$\text{Mode Z} = l + \left[\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right] \times h$$

$$= 40 + \left[\frac{7 - 3}{2(7) - 3 - 6}\right] \times 15$$

$$= 40 + \left[\frac{4}{14 - 9}\right] \times 15$$

$$= 40 + \left(\frac{4}{5}\right) \times 15$$

$$= 40 + \left(\frac{4 \times 5 \times 3}{5}\right)$$

$$= 40 + (4 \times 3)$$

$$= 40 + 12$$

$$\text{Z} = 52$$

**35.** Here mean $\overline{x} = 52$

| Life time (in hours) | Frequency ($f_i$) | $x_i$ | $u_i$ | $f_i u_i$ |
|---|---|---|---|---|
| 10 – 20 | 5 | 15 | –3 | –15 |
| 20 – 30 | 3 | 25 | –2 | –6 |
| 30 – 40 | 4 | 35 | –1 | –4 |
| 40 – 50 | $f$ | 45 – (equal) | 0 | 0 |
| 50 – 60 | 2 | 55 | 1 | 2 |
| 60 – 70 | 6 | 65 | 2 | 12 |
| 70 – 80 | 13 | 75 | 3 | 39 |
| | $\Sigma f_i = f + 33$ | | – | $\Sigma f_i u_i = -25 + 53 = 28$ |

$a = 45$, $h = 10$

Mean $\overline{x} = a + \frac{\Sigma f_i u_i}{\Sigma f_i} \times h$

$\therefore \quad 52 = 45 + \frac{28}{f + 33} \times 10$

$\therefore \quad 52 - 45 = \frac{28 \times 10}{f + 33}$

$\therefore \quad 7 = \frac{28 \times 10}{f + 33}$

$\therefore \quad f + 33 = \frac{\overset{4}{\cancel{28}} \times 10}{\cancel{7}}$

$\therefore \quad f + 33 = 40$

$\therefore \quad f + 40 - 33$

$\therefore f = 7$

Hence, the missing frequency $f = 7$

**36.** Total number of pen = 12 + 132 = 144

(i) Suppose A be the event "The selected pen is defective"

Number of defective pen = 12

$\therefore$ The number of outcomes favourable to A = 12

$\therefore$ P (A) = $\frac{12}{144} = \frac{1}{12}$

(ii) Suppose B be the event "The selected pen is good"

Number of good pen = 132

$\therefore$ The number of outcomes favourable to B = 132

$\therefore$ P (B) = $\frac{132}{144} = \frac{11}{12}$

**37.** A box contains 100 card boards labelled 1 to 100.

Total number of card boards = 100

(i) Suppose A be the event one digit number on the selected board.

There are 9 one digit number 1, 2, 3, 4, 5, 6, 7, 8, 9 in 1 to 100.

The number of outcomes favourable to A = 9.

$\therefore$ P (A) = $\frac{9}{100} = 0.09$

(ii) Suppose B be the event two digit number on the selected board.

There are 90 two digit number 10, 11, 12, ..... 99 in 1 to 100.

The number of outcomes favourable to B = 90.

$\therefore$ P (B) = $\frac{90}{100} = \frac{9}{10} = 0.09$

## Section-C

**38.** $3x^2 - x - 4 = 0$

$\therefore\ 3x^2 - 4x + 3x - 4 = 0$

$\therefore\ x\ (3x - 4) + 1\ (3x - 4) = 0$

$\therefore\ (3x - 4)\ (x + 1) = 0$

$\therefore\ 3x - 4 = 0$ and $x + 1 = 0$

$\therefore\ x = \frac{4}{3}$ and $x = -1$

Sum of the zeroes $= \frac{4}{3} - 1 = \frac{4-3}{3} = \frac{1}{3} = -\frac{-1}{3} = -\frac{b}{a} = -\frac{\text{coefficient of } x}{\text{coefficient of } x^2}$

Product of the zeroes $= \left(\frac{4}{3}\right)(-1) = \frac{-4}{3} = \frac{c}{a} = \frac{\text{constant term}}{\text{coefficient of } x^2}$

**39.** Let $P(x) = ax^2 + 11x + 12$

then compare with $P(x) = ax^2 + bx + c$

$\therefore\ a = 9,\ b = 11,\ c = 12$

Product of zeros $(\alpha\ .\ \beta) = 6$

$\therefore\ \frac{c}{a} = 6$

$\therefore\ \frac{12}{a} = 6$

$\therefore\ \frac{12}{6} = a$

$\therefore\ a = 2$

and sum of zeros $(\alpha + \beta) = \frac{-b}{a}$

$\therefore\ (\alpha + \beta) = \frac{-11}{2}$

Hence, $a = 2,\ \alpha + \beta = \frac{-11}{2}$

**40.** Here, $S_n = 4n - n^2$

$\therefore\quad S_1 = 4(1) - (1)^2 = 4 - 1 = 3$

$S_2 = 4(2) - (2)^2 = 8 - 4 = 4$

Now, the first term $= a = a_1 = S_1 = 3$

The sum of first two terms $= S_2 = 4$

$\therefore$ Second term $= a_2 = S_2 - S_1 = 4 - 3 = 1$

$\therefore$ Hence $a = 3,\ S_2 = 4,\ a_2 = 1$

**41.** Since the production increases uniformly by a fixed number every year, the number of TV sets manufactured in 1st, 2nd, 3rd, ..., years will form an AP.

Suppose, denote the number TV sets manufactured in the $n^{th}$ year by $a_n$

Here, $a_3 = 600$ i.e. $a + 2d = 600$ ...(1)

$a_7 = 700$ i.e. $a + 6d = 700$ ...(2)

Subtract equation (2) by (1),

$(a + 2d) - (a + 6d) = 600 - 700$

$\therefore\ a + 2d - a - 6d = -100$

$\therefore\ -4d = -100$

$\therefore\ d = 25$

Put $d = 25$ in equation (1)

$a + 2d = 600$

$\therefore\ a + 2(25) = 600$

$\therefore\ a + 50 = 600$

$\therefore\ a = 550$

(i) Production of TV sets in the first year is 550.

(ii) Now, $a_{10} = a + 9d = 550 + 9(25) = 550 + 225 = 775$

So, production of TV sets in the $10^{th}$ year is 775.

(iii) Now, $S_n = \frac{n}{2}[2a + (n-1)d]$

$\therefore\ S_7 = \frac{7}{2}[2(550) + (7-1)25]$

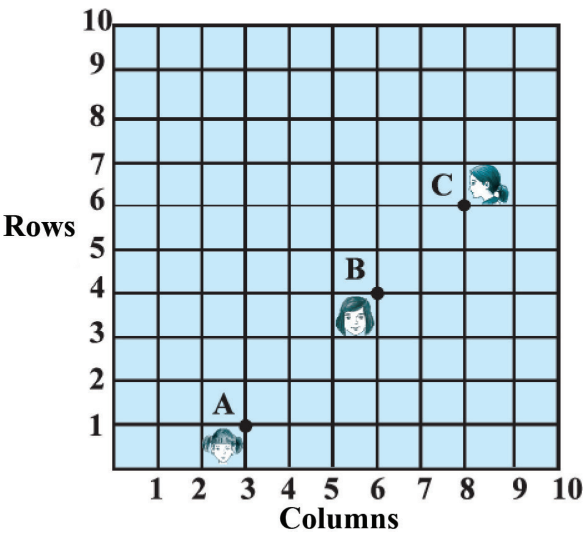
$\therefore\ S_7 = \frac{7}{2}(1100 + 150)$

$\therefore\ S_7 = \frac{7}{2} \times 1250$

$\therefore\ S_7 = 4375$

Thus, The total Production of TV sets in first 7 years is 4375.

**42.**




$$AB = \sqrt{(6-3)^2 + (4-1)^2} = \sqrt{9+9} = \sqrt{18} = 3\sqrt{2}$$

$$BC = \sqrt{(8-6)^2 + (6-4)^2} = \sqrt{4+4} = \sqrt{8} = 2\sqrt{2}$$

$$AC = \sqrt{(8-3)^2 + (6-1)^2} = \sqrt{25+25} = \sqrt{50} = 5\sqrt{2}$$

$\therefore\ AB + BC = 3\sqrt{2} + 2\sqrt{2}$

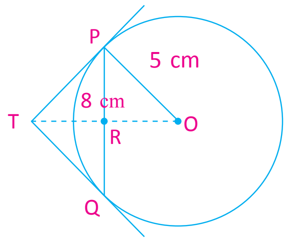
$= 5\sqrt{2}$

$= AC$

$\therefore$ We can say that the points A, B and C are collinear.

Therefore, they are seated in a line.

**43.**




Join OT. Let it intersect PQ at the point R.

Then Δ TPQ is isoscele and TO is the angle bisector of ∠PTQ.

So, OT ⊥ PQ and

Therefore, OT bisects PQ which gives

PR = RQ = 4 cm

In Δ PRO right angle,

$OR = \sqrt{OP^2 - PR^2} = \sqrt{(5)^2 - (4)^2} = \sqrt{25 - 16} = \sqrt{9} = 3$ cm

In Δ TPR, ∠TPR + ∠PTR = ∠PRT = 90°

Now, ∠TPR + ∠RPO = 90° = ∠TPR + ∠PTR

∴ ∠RPO = ∠PTR

In Δ TRP and Δ PRO,

∠PTR = ∠RPO

∠TRP = ∠PRO (Right angle)

∴ Δ TRP ~ Δ PRO (AA criterion)

$\therefore \frac{TP}{PO} = \frac{RP}{RO}$

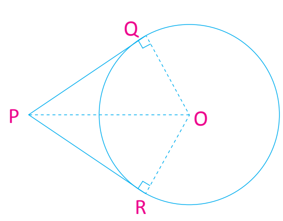
$\therefore \frac{TP}{5} = \frac{4}{3}$

$\therefore TP = \frac{20}{3}$ cm

**44.** Given : A circle with centre O, a point P lying outside the circle with two tangents PQ, QR on the circle from P.

To prove : PQ = PR

Figure :




Proof : Join OP, OQ and OR. Then ∠OQP and ∠ORP are right angles because these are angles between the radii and tangents and according to theorem 10.1 they are right angles.

Now, in right triangles OQP and ORP,

OQ = OR (Radii of the same circle)

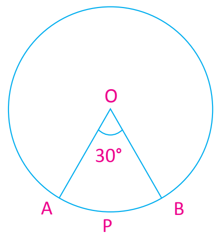
OP = OP (Common)

∠OQP = ∠ORP (Right angle)

Therefore, Δ OQP ≅ Δ ORP (RHS)

This gives, PQ = PR (CPCT)

**45.**




Area of the sector $= \frac{\theta}{360} \times \pi r^2$

$= \frac{30}{360} \times 3.14 \times 4 \times 4$

$= \frac{12.56}{3}$ cm$^2$

$= 4.19$ cm$^2$ (Approx)

Area of the corresponding major sector

$= \pi r^2$ – Area of sector OAPB

$= (3.14 \times 4 \times 4) - 4.19$

$= 50.24 - 4.19$

$= 46.05 = 46.1$ cm$^2$ (Approx)

**46.** Two dice are thrown same time, then the result are following :

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

∴ Total number of outcomes = 36

(i) Suppose A be the event "the sum of the digits on the dice is 7"

There are 6 results (1, 6), (2, 5), (3, 4), (4, 3), (5, 2) and (6, 1) for the event.

∴ The number of outcomes favourable to A = 6

$\therefore P(A) = \frac{6}{36} = \frac{1}{6}$

(ii) Suppose B be the event "the sum of the digits on the dice is 11"

There are 2 results (5, 6) and (6, 5) for the event.

∴ The number of outcomes favourable to B = 2

$\therefore P(B) = \frac{2}{36} = \frac{1}{18}$

## Section-D

**47.** Suppose, the ten's and the unit's digits in the first number be $x$ and $y$. respectively

The first number = $10x + y$

Now, when the digits are reversed, $x$ become the ten's digit.

The second Number = $10y + x$

According to the first condition,

$$(10x + y) + (10y + x) = 66$$

$\therefore 10x + y + 10y + x = 66$

$\therefore 11x + 11y = 66$

$\therefore x + y = 6$ ...(1)

According to the second condition,

$x - y = 2$ OR ...(2)

$y - x = 2$ ...(3)

Then adding equation (1) and equation (2)

$x + y + x - y = 6 + 2$

$\therefore 2x = 8$

$\therefore x = 4$

Put $x = 4$ in equation (1)

$x + y = 6$

$\therefore 4 + y = 6$

$\therefore y = 2$

Now, we get $x = 4$ and $y = 2$, the number is 42.

Same as the solving equation (1) and (3) we get $x = 2$ and $y = 4$ we get the number 24.

Thus there are two such Numbers 42 and 24.

**48.** Suppose, the cost of a one bat is ₹ $x$ the cost of a one ball is ₹ $y$.

According to the first condition,

$$7x + 6y = 3800 \quad ...(1)$$

$$\therefore y = \frac{3800 - 7x}{6} \quad ...(2)$$

According to the second condition,

$$3x + 5y = 1750 \quad ...(3)$$

Put value of equation (2) in equation (3),

$3x + 5y = 1750$

$\therefore 3x + 5\left(\frac{3800 - 7x}{6}\right) = 1750$

$\therefore 3x + \frac{19000 - 35x}{6} = 1750$

$\therefore 18x + 19000 - 35x = 10500$

$\therefore 18x - 35x = 10500 - 19000$

$\therefore -17x = -8500$

$\therefore x = 500$

Put $x = 500$ in equation (2)

$y = \frac{3800 - 7x}{6}$

$\therefore y = \frac{3800 - 7(500)}{6}$

$\therefore y = \frac{3800 - 3500}{6} = \frac{300}{6} = 50$

$\therefore y = 50$

Therefore, the cost of one bat is ₹ 500 and the cost of a one balls is ₹ 50

**49.** (i) $\frac{AD}{DB} = \frac{AE}{EC}$ (Theorem : 6.1)

$\therefore \frac{AD}{7.2} = \frac{1.8}{5.4}$

$\therefore$ AD = $\frac{1.8 \times 7.2}{5.4}$

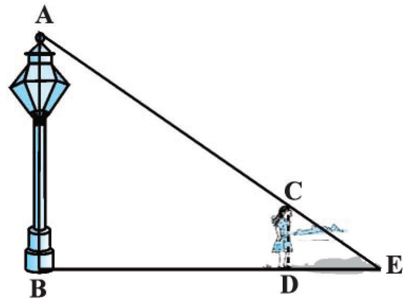
$\therefore$ AD = 2.4 cm

AB = AD + BD ($\because$ A – D – B)

= 2.4 + 7.2

AB = 9.6 cm

(ii)




Let AB denote the lamp-post, and CD the girl after walking for 4 seconds away from the lamp-post (see Fig.).

From the figure, you can see that DE is the shadow of the girl. Let DE be $x$ metres.

Now, Distance = Speed × Time

$\therefore$ BD = 1.2 × 4

$\therefore$ BD = 4.8 m

In Δ ABE and Δ CDE

∠B = ∠D (Each is of 90°)

$\therefore$ ∠E = ∠E (Same angle)

$\therefore$ Δ ABE ~ Δ CDE (AA similarity criterion)

$\therefore \frac{BE}{DE} = \frac{AB}{CD}$

$\therefore \frac{BD + DE}{DE} = \frac{AB}{CD}$

$\therefore \frac{4.8 + x}{x} = \frac{3.6}{0.9}$ ($\because$ 90 cm = 0.9 m)

$\therefore$ 4.8 + $x$ = 4$x$

$\therefore$ 3$x$ = 4.8

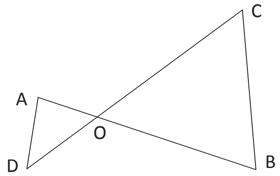
$\therefore$ $x$ = 1.6

So, the shadow of the girl after walking for 4 seconds is 1.6 m long.

**50.** Fill in the blank given in the proof of the question below. If OA · OB = OC · OD in the given figure, prove that ∠A = ∠C and ∠B = ∠D

Given = OA · OB = OC · OD    To Prove: ∠A = ∠C and ∠B = ∠D

Proof: OA OB = OC OD (Given)




∴ $\frac{OA}{OC} = \frac{OD}{OB}$ ........ (1)

(∵ Vertically opposite angles) ........ (2)

Hence from (1) and (2),

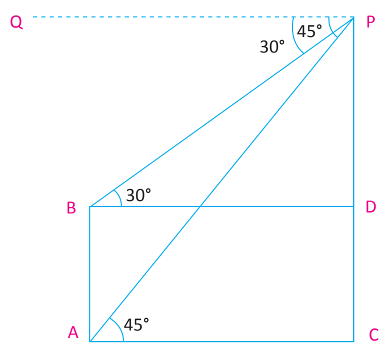
Δ AOD ~ Δ COB

(∵SAS symmetry)

∴ ∠A = ∠C and ∠D = ∠B

(∵ Corresponding angles of an isomer)

**51.**




In Fig., PC denotes the multistoreyed building and AB denotes the 8 m tall building.

The height of the multistoreyed building = PC and distance between the two building = AC

PB is a trasversal to the parallel lines PQ and BD.

∴ ∠QPB = ∠PBD = 30° and ∠QPA = ∠PAC = 45°

In right Δ PBD,

$$\therefore \tan 30° = \frac{PD}{BD}$$

$$\therefore \frac{1}{\sqrt{3}} = \frac{PD}{BD}$$

$$\therefore BD = \sqrt{3}PD$$

In right Δ PAC,

$$\therefore \tan 45° = \frac{PC}{AC}$$

$$\therefore 1 = \frac{PC}{AC}$$

$$\therefore PC = AC$$

But, PC = PD + DC

$$\therefore PD + DC = AC$$

Here, AC = BD and DC = AB = 8 m

$\therefore$ PD + 8 = BD

$\therefore$ PD + 8 = $\sqrt{3}$ PD  ($\because$ BD = $\sqrt{3}$ PD)

$\therefore$ $\sqrt{3}$ PD – PD = 8

$\therefore$ PD ( $\sqrt{3}$ – 1) = 8

$$\therefore \text{PD} = \frac{8}{\sqrt{3}-1} \times \frac{\sqrt{3}+1}{\sqrt{3}+1}$$

$$\therefore \text{PD} = \frac{8(\sqrt{3}+1)}{(\sqrt{3})^2-(1)^2} = \frac{8(\sqrt{3}+1)}{3-1} = \frac{8(\sqrt{3}+1)}{2}$$

$\therefore$ PD = 4 ( $\sqrt{3}$ + 1) m

So, the height of the multistoreyed building

$\therefore$ PC = PD + DC

= 4 ( $\sqrt{3}$ + 1) + 8

= 4 ( $\sqrt{3}$ + 1 + 2)

= 4 (3 + $\sqrt{3}$ ) m

and the distance between the two building

$\therefore$ AC = PD + DC

= 4 (3 + $\sqrt{3}$ ) m

**52.**

| Cylinder | Cone |
|---|---|
| $r$ = 0.7 cm | $h$ = 2.4 cm |
| $r$ = 0.7 cm | $r$ = 0.7 cm |

$\therefore$ $r = \frac{1.4}{2}$ = 0.7 cm  $l$ = 2.5 cm

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

$\therefore$ $l = \sqrt{(0.7)^2 + (2.4)^2}$

$\therefore$ $l = \sqrt{0.49 + 5.76}$

$\therefore$ $l = \sqrt{6.25}$

$\therefore$ $l$ = 2.5 cm

The total surface area of the remaining solid will be

= CSA of cylinder + CSA of cone + Area of cylindrical base

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

= $\pi r\ (2h + r + l)$

= $\frac{22}{7}$ × 0.7 × (2 × 2.4 + 0.7 + 2.5)

= 2.2 × (4.8 + 0.7 + 2.5)

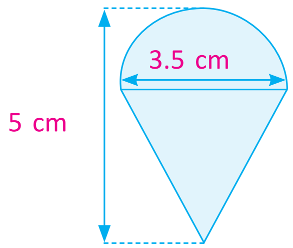
= 2.2 × 8

= 17.6 $cm^2$

= 18 $cm^2$ (Approx)

Hence, it is clear that the total surfce area of the remaining solid to the nearest $cm.^2$ is 18 $cm^2$.

**53.**




Diameter of hemisphere = 3.5 cm

$$\therefore\ r = \frac{3.5}{2} = 1.75 \text{ cm}$$

Radius of cone = A radius of hemisphere = $r$ = 1.75 cm

Height of cone $h$ = Total height of top – Radius of hemisphere

$$\therefore\ h = 5 - 1.75 = 3.25 \text{ cm}$$

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

$$\therefore\ l = \sqrt{(1.75)^2 + (3.25)^2}$$

$$= \sqrt{3.0625 + 10.5625}$$

$$\therefore\ l = \sqrt{13.625}$$

$$\therefore\ l = 3.69 \text{ cm}$$

$\therefore$ TSA of the top = CSA of a hemisphere + CSA of a cone

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

$$= \pi r\ (2r + l)$$

$$= \frac{22}{7} \times 1.75 \times [2(1.75) + 3.69]$$

$$= 22 \times 0.25 \times (3.5 + 3.69)$$

$$= 22 \times 0.25 \times 7.19$$

$$= 39.545$$

$$= 39.6 \text{ cm}^2$$

Thus, the total surface area of the whole part of the top colouring is 39.6 $\text{cm}^2$.

**54.**

| Age (in years) | $f_i$ | $cf$ |
|---|---|---|
| 15 – 20 | 2 | 2 |
| 20 – 25 | 4 | 6 |
| 25 – 30 | 18 | 24 |
| 30 – 35 | 21 | 45 |
| 35 – 40 | 33 | 78 |
| 40 – 45 | 11 | 89 |
| 45 – 50 | 3 | 92 |
| 50 – 55 | 6 | 98 |
| 55 – 60 | 2 | 100 |
| Total | $n$ = 100 | – |

Here, $n = 100$

$$\therefore \frac{n}{2} = \frac{100}{2} = 50$$

The cumulative version 78 immediately after 50 is included in the observation class 35–40 so median class is 35-45.

Now, $l$ = lower limit of median class= 35

$\frac{n}{2}$ = 50

$cf$ = cumalative frequency of class preceding the median class = 45

$f$ = frequency of median class = 33

$h$ = class size = 5

$$\text{Median } M = l + \left(\frac{\frac{n}{2} - cf}{f}\right) \times h$$

$$\therefore M = 35 + \left(\frac{50 - 45}{33}\right) \times 5$$

$$\therefore M = 35 + \frac{5 \times 5}{33}$$

$$\therefore M = 35 + 0.76$$

$$\therefore M = 35.76$$

So, median are is 35.76 years.