SECTION – A

Questions 1 to 20 carry 1 mark each.

1. If the coordinates of one end of a diameter of a circle are (2, 3) and the coordinates of its centre are (-2, 5), then the coordinates of the other end of the diameter are
(a) (0, 8) (b) (0, 4) (c) (6, -7) (d)(-6, 7)

2. The perimeter of a triangle with vertices (0, 4), (0, 0) and (3, 0) is
(a) 5 (b) 12 (c) 11 (d) $7 + \sqrt{5}$

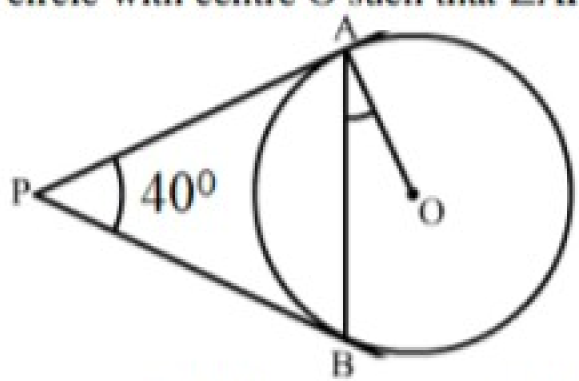
3. A bag has 5 white marbles, 8 red marbles and 4 purple marbles. If we take a marble randomly, then what is the probability of not getting purple marble?
(a) 0.5 (b) 0.66 (c) 0.08 (d) 0.77

4. In what ratio does the x-axis divide the join of A(2, -3) and B(5, 6)?
(a) 1 : 2 (b) 3 : 5 (c) 2 : 1 (d) 2 : 3

5. The pairs of equations $9x + 3y + 12 = 0$ and $18x + 6y + 26 = 0$ have
(a) Unique solution (b) Exactly two solutions
(c) Infinitely many solutions (d) No solution

6. If the distance between the points A(2, -2) and B(-1, x) is equal to 5, then the value of x is:
(a) 2 (b) -2 (c) 1 (d) -1

7. If PA and PB are tangents to the circle with centre O such that $\angle APB = 40°$, then $\angle OAB$ is equal to



(a) 40° (b) 30° (c) 20° (d) 25°

8. The least number that is divisible by all the numbers from 1 to 10 (both inclusive) is:
(a) 10 (b) 100 (c) 504 (d) 2520

9. The mode and mean is given by 7 and 8, respectively. Then the median is:
(a) 1/13 (b) 13/3 (c) 23/3 (d) 33

10. A sphere of diameter 18 cm is dropped into a cylindrical vessel of diameter 36 cm, partly filled with water. If the sphere is completely submerged then the water level rises by
(a) 4cm (b) 5 cm (c) 3 cm (d) 6 cm

11. If P(E) = 0.07, then what is the probability of 'not E'?
(a) 0.93 (b) 0.95 (c) 0.89 (d) 0.90

12. The roots of quadratic equation $2x^2 + x + 4 = 0$ are:
(a) Positive and negative (b) Both Positive (c) Both Negative (d) No real roots

13. If two dice are thrown in the air, the probability of getting sum as 3 will be
(a) 2/18 (b) 3/18 (c) 1/18 (d) 1/36

14. The value of $(\sin 30° + \cos 60°) - (\sin 60° + \cos 30°)$ is equal to:
(a) 0 (b) $1+2\sqrt{3}$ (c) $1-\sqrt{3}$ (d) $1+\sqrt{3}$

15. The angle of depression of a car, standing on the ground, from the top of a 75 m tower, is 30°. The distance of the car from the base of the tower (in metres) is
(a) $25\sqrt{3}$ (b) $75\sqrt{3}$ (c) 150 (d) $50\sqrt{3}$

16. If one equation of a pair of dependent linear equations is $-3x+5y-2=0$. The second equation will be:
(a) $-6x + 10y - 4 = 0$ (b) $6x - 10y - 4 = 0$ (c) $6x + 10y - 4 = 0$ (d) $-6x + 10y + 4 = 0$

17. HCF of $(2^3 \times 3^2 \times 5)$, $(2^2 \times 3^3 \times 5^2)$ and $(2^4 \times 3 \times 5^3 \times 7)$ is
(a) 60 (b) 48 (c) 30 (d) 105

18. If the equation $9x^2 + 6kx + 4 = 0$ has equal roots then k = ?
(a) -2 or 0 (b) 0 only (c) 2 or 0 (d) 2 or -2

Direction : In the question number 19 & 20 , A statement of Assertion (A) is followed by a statement of Reason(R) . Choose the correct option

(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A)
(b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of Assertion (A)
(c) Assertion (A) is true but reason(R) is false.
(d) Assertion (A) is false but reason(R) is true.

19. **Assertion (A):** If two triangles are similar and have an equal area, then they are congruent.
Reason (R): Corresponding sides of two triangles are equal, then triangles are congruent.

20. **Assertion :** The HCF of two numbers is 18 and their product is 3072. Then their LCM = 169.
Reason : If a, b are two positive integers, then HCF x LCM = $a \times b$.

SECTION-B

Questions 21 to 25 carry 2M each

21. Find the quadratic polynomial, sum of whose zeroes is 8 and their product is 12. Hence, find the zeroes of the polynomial.

22. A card is drawn at random from a well shuffled pack of 52 cards. Find the probability of getting (i) a red king (ii) a queen or a jack

23. Two concentric circles are of radii 6.5 cm and 2.5 cm. Find the length of the chord of the larger circle which touches the smaller circle.

From an external point P, tangents PA and PB are drawn to a circle with center O. If CD is the tangent to the circle at a point E and PA = 14cm, find the perimeter of ΔPCD.

24. Solve for x and y: $71x + 37y = 253, 37x + 71y = 287$

25. Find all possible values of y for which the distance between the points A (2, -3) and B (10, y) is 10 units.

In what ratio does the point P(2,5) divide the join of A (8,2) and B(-6, 9)?

SECTION-C

Questions 26 to 31 carry 3 marks each

26. Prove that: $\dfrac{\sin\theta - \cos\theta + 1}{\sin\theta + \cos\theta - 1} = \sec\theta + \tan\theta$

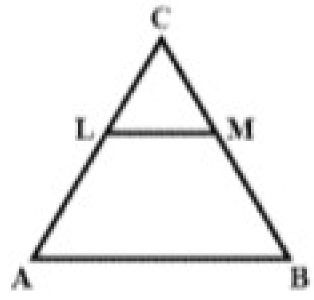
27. Prove that $\sqrt{5}$ is an irrational number.

If two positive integers p and q are written as $p = a^2b^3$ and $q = a^3b$, a and b are a prime number then. Verify LCM(p, q) x HCF (p, q) = p x q

28. The angles of depression of the top and bottom of a 50 m high building from the top of a tower are $45°$ and $60°$ respectively. Find the height of the tower and the horizontal distance between the tower and the building. (Use $\sqrt{3} = 1.73$)

29. A part of monthly hostel charges in a college are fixed and the remaining depends on the number of days one has taken food in the mess. When a student A takes food for 25days, he has to pay Rs. 4550 as hostel charges whereas a student B, who takes food for 30 days, pays Rs. 5200 as hostel charges. Find the fixed charges and the cost of the food per day.

30. In the below figure, LM || AB. If AL = x – 3, AC = 2x, BM = x – 2 and BC = 2x + 3, find the value of x.



31. Prove that opposite sides of a quadrilateral circumscribing a circle subtend supplementary angles at the centre of the circle.

Prove that the tangent drawn at any point of a circle is perpendicular to the radius through the point of contact.

SECTION-D

Questions 32 to 35 carry 5M each

32. Out of a group of swans, 7/2 times the square root of the total number of swans are playing on the shore of a tank. Remaining two are playing, with amorous fight, in the water. What is the total number of swans?

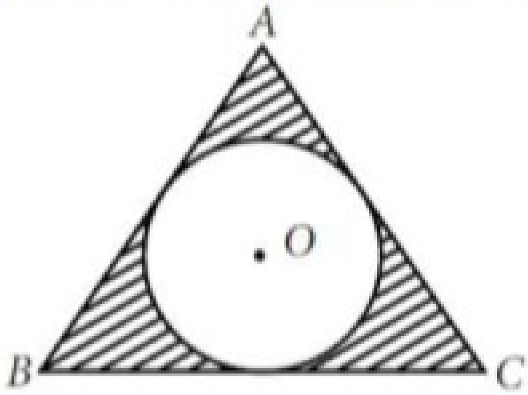
A plane left 30 minutes late than its scheduled time and in order to reach the destination 1500 km away in time, it had to increase its speed by 100 km/h from the usual speed. Find its usual speed.

33. Prove that "If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio."

In ΔABC, $DE \| BC$ and $\frac{AD}{DB} = \frac{3}{1}$ if $EA = 6.6$cm, then find AC using the above theorem.

34. A chord PQ of a circle of radius 10 cm subtends an angle of $60°$ at the centre of circle. Find the area of major and minor segments of the circle.

In the given figure, a circle is inscribed in an equilateral triangle ABC of side 12 cm. Find the radius of inscribed circle and the area of the shaded region. [Use $\pi = 3.14$ and $\sqrt{3} = 1.73$]

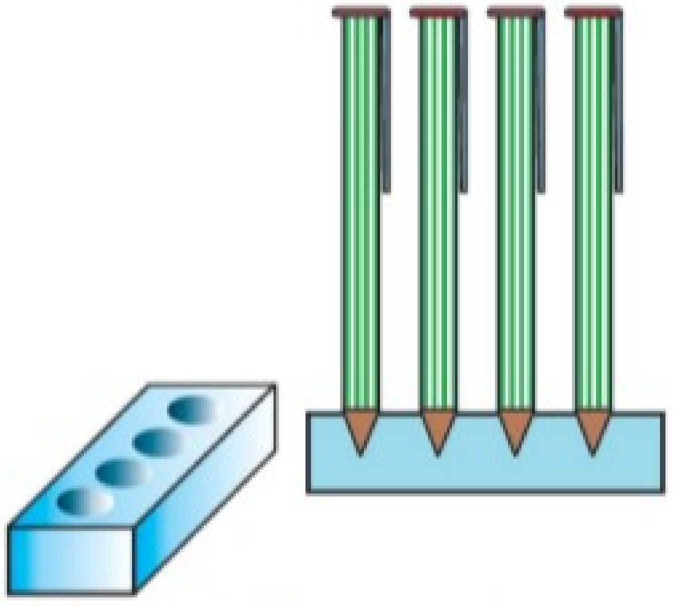


35. The median of the following data is 52.5. Find the values of x and y. if the total frequency is 100

Class	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Frequency	2	5	x	12	17	20	y	9	7	4

SECTION-E (Case Study Based Questions)
Questions 36 to 38 carry 4M each

36. A pen stand made of wood is in the shape of a cuboid with four conical depressions to hold pens. The dimensions of the cuboid are 15 cm by 10 cm by 3.5 cm. The radius of each of the depressions is 0.5 cm and the depth is 1.4 cm.



Based on the above information, answer the following questions.
(i) Find the volume of four conical depressions in the entire stand [2]
(ii) Find the volume of wood in the entire stand [2]

(ii) Three cubes each of side 15 cm are joined end to end. Find the total surface area of the resulting cuboid. [2]

37. Your elder brother wants to buy a car and plans to take loan from a bank for his car. He repays his total loan of Rs. 1,18,000 by paying every month starting with the first instalment of Rs. 1000. If he increases the instalment by Rs. 100 every month.

On the basis of above information, answer the following questions.

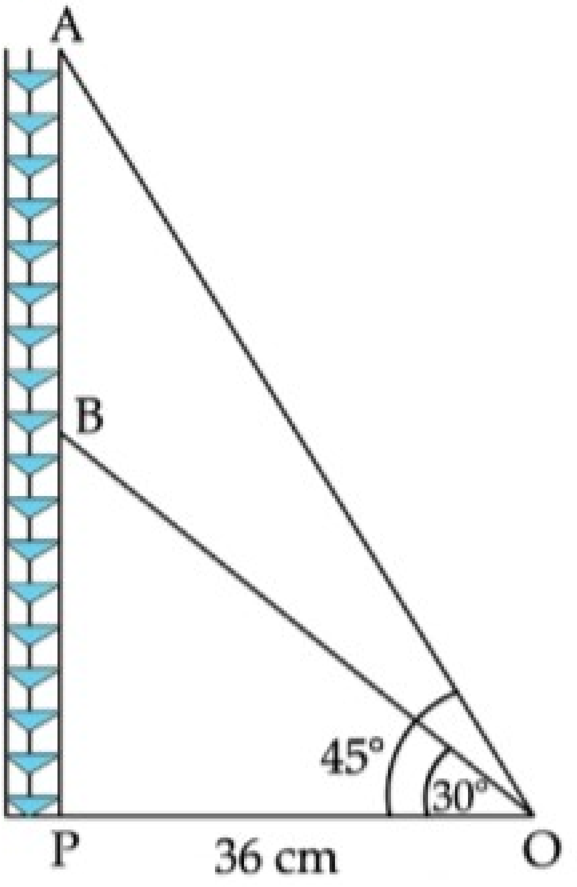
(i) What is the amount paid by him in 20th instalment?

(ii) What is the amount paid by him in 30th instalments?

(iii) What is the amount paid by him upto 20 instalments?

What is the amount paid by him upto 30 instalments?

38. 37. Radio towers are used for transmitting a range of communication services including radio and television. The tower will either act as an antenna itself or support one or more antennas on its structure. On a similar concept, a radio station tower was built in two Sections A and B. Tower is supported by wires from a point O.



Distance between the base of the tower and point O is 36 cm. From point O, the angle of elevation of the top of the Section B is $30°$ and the angle of elevation of the top of Section A is $45°$.

Based on the above information, answer the following questions:

(i) Find the length of the wire from the point O to the top of section B.

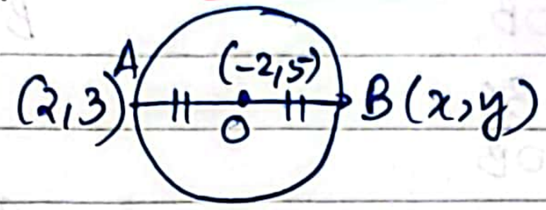
(ii) Find the distance AB.

Find the area of ΔOPB.

(iii) Find the height of the Section A from the base of the tower.

H.W-21 (Sample paper) **SECTION-A**

1)



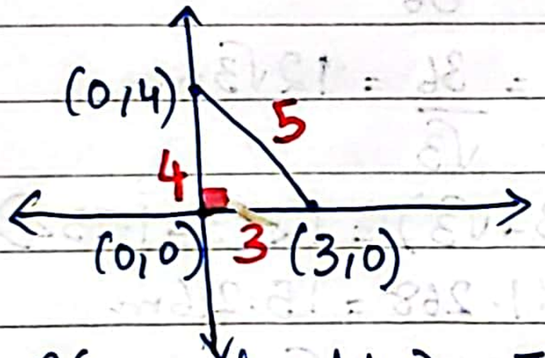
$$\left(\frac{2+x}{2}, \frac{3+y}{2}\right) = (-2,5)$$

$\Rightarrow \frac{2+x}{2} = -2$ | $\frac{3+y}{2} = 5$

$x = -4-2 = -6$ | $y = 7$

$\therefore (-6,7)$ (d)

2)



Perimeter $= 4+3+5$

$= 12$ units

(b)

3) $P(\text{not purple}) = \frac{5+8}{17} = \frac{13}{17} = 0.77$ (d)

4) A(2,−3) —k— P(x,0) —1— B(5,6)

$(x,0) = \left(\frac{5k+2}{k+1}, \frac{6k-3}{k+1}\right)$

$\therefore 6k-3=0$

$6k=3$

$k = \frac{1}{2}$ (a)

5) $a_1 = 9, b_1 = 3, c_1 = 12$

$a_2 = 18, b_2 = 6, c_2 = 26$

$\frac{a_1}{a_2} = \frac{9}{18} = \frac{1}{2}$

$\frac{b_1}{b_2} = \frac{3}{6} = \frac{1}{2}$

$\frac{c_1}{c_2} = \frac{12}{26} = \frac{6}{13}$

$\therefore \frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

No solution (d)

CamScanner

6) $\overset{5}{\overline{A(2,-2)\qquad B(-1,x)}}$

$5^2 = (-1-2)^2 + (x+2)^2$

$25 = 9 + (x+2)^2$

$(x+2)^2 = 16$

$x+2 = 4$

$x = 2$ (a)

7) $\angle OAB = \frac{1}{2}\angle APB = 20^\circ$ (c)

8) 2520 (d)

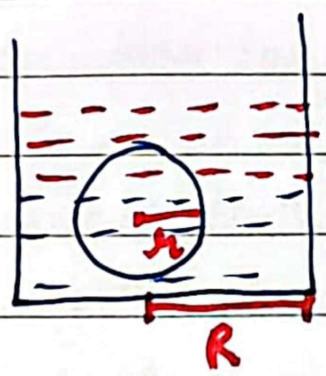
9) mode = 3Median − 2Mean

$7 = 3\text{Median} - 16$

$3\text{Median} = 23$

$\text{Median} = \frac{23}{3}$ (c)

10)



$\frac{4}{3}\cancel{\pi} r^3 = \cancel{\pi} R^2 h$

$\frac{4}{\cancel{3}_1} \times \cancel{9}^3 \times \cancel{9}^1 \times \cancel{9}^1 = \cancel{18}^2 \times \cancel{18}^2 \times h$

$h = \frac{4\times 3}{2\times 2} = 3cm$ (c)

$r = 9cm$

$R = 18cm$

11) $P(\text{not } E) = 1 - P(E) = 1 - 0.07 = 0.93$ (a)

12) $a = 2,\ b = 1,\ c = 4$

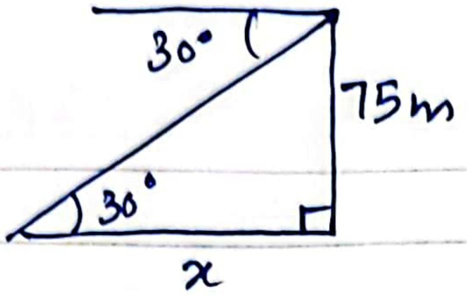
$b^2 - 4ac = 1 - 32 = -31 < 0$

No real roots (d)

13) $\{(1,2), (2,1)\}$

$P(\text{Sum} = 3) = \frac{2}{36} = \frac{1}{18}$ (c)

14) $\left(\frac{1}{2}+\frac{1}{2}\right) - \left(\frac{\sqrt{3}}{2}+\frac{\sqrt{3}}{2}\right) = 1 - \frac{\cancel{2}\sqrt{3}}{\cancel{2}1} = 1-\sqrt{3}$ (c)

15) 

$\tan 30° = \frac{75}{x}$

$\frac{1}{\sqrt{3}} = \frac{75}{x}$

$x = 75\sqrt{3}$ m (b)

16) $-3x+5y-2=0 \times 2$

$\Rightarrow -6x+10y-4=0$ (a)

17) $2^2 \times 3 \times 5 = 60$ (a)

18) $a=9,\ b=6k,\ c=4$

$b^2-4ac=0$

$36k^2-144=0$

$36k^2=144$

$k^2=4$

$k=\pm 2$ (d)

19) (b)

20) (d)

SECTION-B

21) Let the zeroes be α and β.

$\alpha+\beta=8$

$\alpha\beta=12$

$\therefore$ The polynomial is $k[x^2-(\alpha+\beta)x+\alpha\beta]$; where k is any non-zero real number

$\Rightarrow k[x^2-8x+12]$

$= x^2-8x+12$; where $k=1$

$=(x-6)(x-2)$

S P
-8 $12 < \begin{matrix} -6 \\ -2 \end{matrix}$

$\therefore$ The required zeroes are 6 or 2.

22) Total no. of outcomes = 52

$P(E) = \frac{\text{no. of favourable outcomes}}{\text{Total no. of outcomes}}$

(i) no. of red kings = 2

$\therefore$ P(getting a red king) = $\frac{2}{52} = \frac{1}{26}$

(ii) no. of favourable outcomes = 4+4 = 8

$\therefore$ P(getting a queen or a jack) = $\frac{8}{52} = \frac{2}{13}$

23) Since AB is a tangent to the smaller circle at C, $\angle OCA = 90°$

In rt. $\triangle OCA$, using Pythagoras theorem,

$AC^2 = OA^2 - OC^2 = 6.5^2 - 2.5^2 = 42.25 - 6.25 = 36$

$\therefore AC = 6cm$

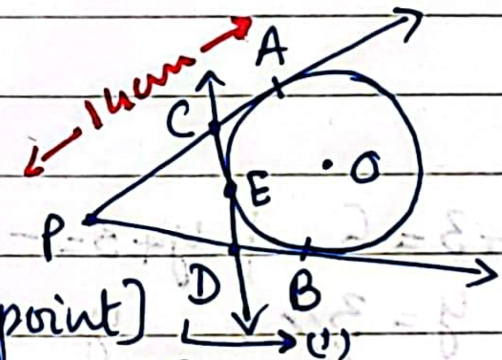
We know that the perpendicular drawn from the centre of a circle to the chord bisects the chord,

$AB = 2AC = 12cm.$

Hence, the length of the chord of the larger circle is 12cm.

OR

We know that the tangents drawn from an external point are equal in lengths,



PA = PB [$\because$ P is the external point] $\rightarrow$ (1)

CA = CE [$\because$ C is the external point] $\rightarrow$ (2)

DE = DB [$\because$ D is the external point] $\rightarrow$ (3)

PA = PC + CA = PC + CE $\rightarrow$ (4) [from eq: (2)]

PB = PD + DB = PD + DE $\rightarrow$ (5) [from eq: (3)]

(4) + (5) $\Rightarrow$ PA + PB = PC + (CE + DE) + PD

$\Rightarrow$ 2 PA = PC + CD + PD

$\Rightarrow$ 2×14 = Perimeter ($\triangle$PCD)

$\therefore$ Perimeter ($\triangle$PCD) = 28cm//

24) $71x+37y=253 \rightarrow (1)$
$37x+71y=287 \rightarrow (2)$

$(1)+(2) \Rightarrow 108x+108y=540$
$\div 108 \Rightarrow x+y=5 \rightarrow (3)$

$(1)-(2) \Rightarrow 34x-34y=-34$
$\div 34 \Rightarrow x-y=-1 \rightarrow (4)$

$(3)+(4) \Rightarrow 2x=4$
$\boxed{x=2}$
$\boxed{y=3}$

25) 10units

A(2,-3) B(10,y)

$d=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$

$AB^2=100=(10-2)^2+(y+3)^2$
$\Rightarrow 100=64+(y+3)^2$
$\Rightarrow (y+3)^2=36$
$y+3=\pm 6$

$y+3=6$, $y=3$ | $y+3=-6$, $y=-9$

QR) k : 1

A(8,2) P(2,5) B(-6,9)

Let the ratio in which P(x,y) divides AB be k:1

$P(x,y)=P\left(\frac{m_1x_2+m_2x_1}{m_1+m_2}, \frac{m_1y_2+m_2y_1}{m_1+m_2}\right)$

$(2,5)=\left(\frac{-6k+8}{k+1}, \frac{9k+2}{k+1}\right)$

$\therefore \frac{-6k+8}{k+1}=2$

$-6k+8=2k+2$
$-8k=-6$
$k=\frac{6}{8}=\frac{3}{4}$

Hence, the required ratio is 3:4

SECTION-C

26) LHS $\div \cos\theta$

$$\Rightarrow \frac{\frac{\sin\theta}{\cos\theta} - \frac{\cos\theta}{\cos\theta} + \frac{1}{\cos\theta}}{\frac{\sin\theta}{\cos\theta} + \frac{\cos\theta}{\cos\theta} - \frac{1}{\cos\theta}} = \frac{\tan\theta - 1 + \sec\theta}{\tan\theta + 1 - \sec\theta} \quad \left[\because \frac{\sin\theta}{\cos\theta} = \tan\theta, \ \sec\theta = 1/\cos\theta\right]$$

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

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

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

$$= \frac{(\sec\theta + \tan\theta)\left[\cancel{1 - \sec\theta + \tan\theta}\right]}{\cancel{\tan\theta + 1 - \sec\theta}}$$

$$= \sec\theta + \tan\theta, \text{ RHS}$$

27) Do yourself

OR

$p = a^2b^3$

$q = a^3b$

$LCM(p,q) = a^3b^3$

$HCF(p,q) = a^2b$

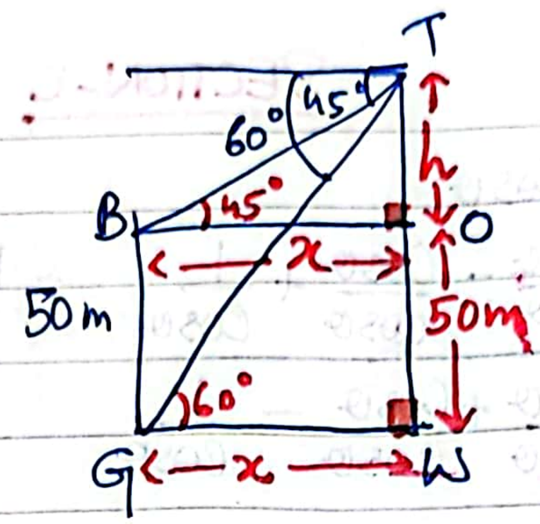
LHS, $LCM(p,q) \times HCF(p,q) = a^3b^3 \times a^2b = a^5b^4$

RHS, $p \times q = a^2b^3 \times a^3b = a^5b^4$

$\therefore$ LHS = RHS

Hence verified.

28)



Let TW be the height of the tower.

To find :- TW and OB

In rt. $\triangle TOB$,

$\tan 45° = \frac{TO}{BO}$

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

$\Rightarrow \boxed{x = h}$

In rt. $\triangle TWG$, $\tan 60° = \frac{TW}{GW}$

$\Rightarrow \sqrt{3} = \frac{h+50}{x}$

$\Rightarrow x\sqrt{3} = h+50$

$\Rightarrow h\sqrt{3} = h+50$

$\Rightarrow h\sqrt{3} - h = 50$

$\Rightarrow h(\sqrt{3}-1) = 50$

$\Rightarrow h = \frac{50(\sqrt{3}+1)}{(\sqrt{3}-1)(\sqrt{3}+1)}$

$= \frac{50(\sqrt{3}+1)}{3-1}$

$= 25(\sqrt{3}+1)$

$= 25(1.73+1)$

$= 25 \times 2.73$

$= 68.25\text{ m}$ //

Hence, height of the tower $= h+50 = 68.25+50$

$= 118.25\text{ m}$

Distance between the tower and the building

$= x = h = 68.25\text{ m}$

29) Let the fixed charges be ₹x and cost of the food per day be ₹y

ATQ, $x + 25y = 4550 \rightarrow (1)$

$x + 30y = 5200 \rightarrow (2)$

$(1)-(2) \Rightarrow -5y = -650$

$\boxed{y = 130}$

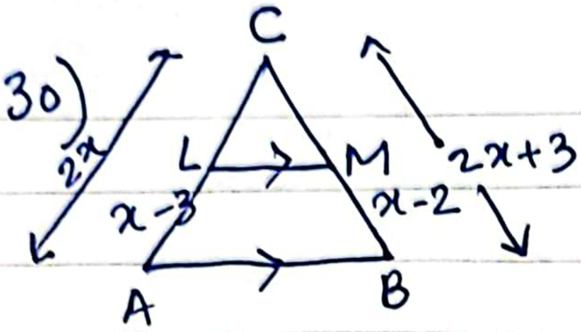
From eq: (1), $x + 3250 = 4550$

$\boxed{x = 1300}$

Hence,

fixed charge = Rs 1300

Cost of food/day = Rs 130

30) 

Since $CM \parallel AB$ in $\triangle CAB$, using Thale's theorem,

$$\frac{CL}{LA} = \frac{CM}{MB}$$

$$\Rightarrow \frac{AC - LA}{LA} = \frac{CB - MB}{MB}$$

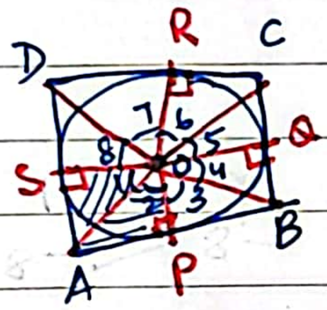
$$\Rightarrow \frac{2x - x + 3}{x - 3} = \frac{2x + 3 - x + 2}{x - 2}$$

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

$$\Rightarrow \cancel{x^2} + x - 6 = \cancel{x^2} + 2x - 15$$

$$-x = -9$$

$$\underline{\underline{x = 9cm}}$$

31) 

Given :- ABCD is a quadrilateral circumscribing a circle with centre O.

To prove :- $\angle AOB + \angle COD = 180°$

$\angle BOC + \angle AOD = 180°$

Construction :- let the quadrilateral ABCD touches the circle at P, Q, R and S.

Join OP, OQ, OR and OS.

Proof :- We know that radius is perpendicular to the tangent through the point of contact,

$\angle OSA = \angle OPA = 90°$

$OS = OP$ (radii of same circle)

$OA = OA$ (common side)

$\therefore \triangle OSA \cong \triangle OPA$ (RHS congruency)

Thus $\angle 1 = \angle 2$ (by cpct)

Similarly, we can prove $\angle 3 = \angle 4$, $\angle 5 = \angle 6$ and $\angle 7 = \angle 8$

But, $\angle 1 + \angle 2 + \angle 3 + \angle 4 + \angle 5 + \angle 6 + \angle 7 + \angle 8 = 360°$ (angles around a point)

$\Rightarrow 2\angle 2 + 2\angle 3 + 2\angle 6 + 2\angle 7 = 360°$

$2(\angle 2 + \angle 3) + 2(\angle 6 + \angle 7) = 360°$

$\Rightarrow (\angle 2+\angle 3)+(\angle 6+\angle 7)=180^\circ$

$\Rightarrow \angle AOB+\angle COD=180^\circ$

Similarly, $\angle BOC+\angle AOD=180^\circ$.

Hence proved.

OR Do yourself

SECTION-D

32) Let the total no. of swans be x.

ATQ, $\frac{7}{2}\sqrt{x}+2=x \rightarrow (1)$

Let $\sqrt{x}=y$

$\Rightarrow x=y^2$

From eq: (1), $\frac{7}{2}y+2=y^2$

$\Rightarrow 7y+4=2y^2$

$\Rightarrow 2y^2-7y-4=0$

$\Rightarrow 2y^2+y-8y-4=0$

$\Rightarrow y(2y+1)-4(2y+1)=0$

$\Rightarrow (y-4)(2y+1)=0$

$\therefore y=4, -\frac{1}{2}$

S P
-7 -8 1 -8

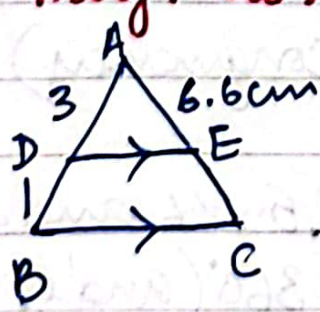
OR

Thus, $x=16$

$x=\frac{1}{4}$, which is not possible.

Hence, total no. of swans $=16$

33) Proof :- do yourself



Since DE || BC, using Thales theorem,

$\frac{AD}{DB}=\frac{AE}{EC}$

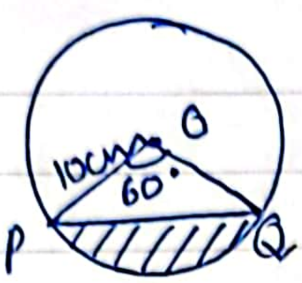
$\Rightarrow \frac{3}{1}=\frac{6.6}{EC}$

$\Rightarrow EC=\frac{6.6}{3}=2.2cm$

$\therefore AC=6.6+2.2$

$=8.8cm$

34)



$r = 10cm$

$\theta = 60°$

Area of minor segment = area of minor Sector − area(ΔOPQ)

Area of $\Delta OPQ = \frac{\sqrt{3}r^2}{4} = \frac{100\sqrt{3}}{4} = 25\sqrt{3}\,cm^2$

area of sector $= \frac{\theta}{360°} \times \pi r^2 = \frac{\cancel{60}^{1}}{\cancel{360}_{63}} \times \frac{\cancel{22}^{11}}{7} \times 100 = \frac{1100}{3\times7}\,cm^2$

$\therefore$ area of minor segment $= \frac{1100}{3\times7} - 25\sqrt{3}$

$= 52.38 - 25 \times 1.732$

$= 52.38 - 43.3 = \underline{9.08\,cm^2}$

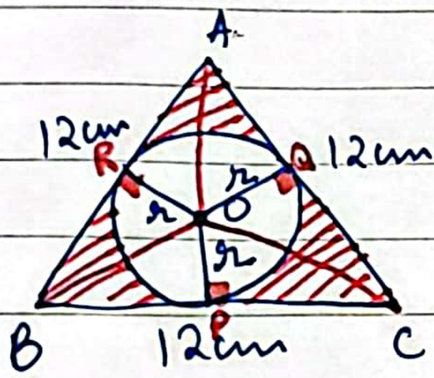
Area of major segment = area of circle − area of minor segment

$= \pi r^2 - 9.08$

$= \frac{22}{7}\times 100 - 9.08 = 314.28 - 9.08$

$= \underline{305.2\,cm^2}$

OR



Since radius ⊥ tangent through the point of contact,

OR ⊥ AB
OP ⊥ BC
OQ ⊥ AC

Area of equilateral $\Delta ABC = \frac{\sqrt{3}a^2}{4}$

$= \frac{\sqrt{3} \times 12 \times \cancel{12}^{3}}{\cancel{4}_{1}}$

$= 36\sqrt{3}\,cm^2$

area (ΔABC) = area(ΔAOB) + area(ΔBOC) + area(ΔAOC)

$= \frac{1}{2}\times AB \times r + \frac{1}{2}\times BC \times r + \frac{1}{2}\times AC\times r$

$36\sqrt{3} = \frac{1}{2} r (AB + BC + AC) = \frac{1}{2} r \times 36$

$\therefore r = \frac{36\sqrt{3}\times 2}{36} = 2\sqrt{3}\,cm$ //

$= 2 \times 1.73 = 3.46\,cm$ //

area of shaded region = area (ΔABC) − area of circle

$= 36\sqrt{3} - \pi r^2$

$= 36\sqrt{3} - 3.14 \times 2\sqrt{3} \times 2\sqrt{3}$

$= 62.28 - 37.68 = \underline{2\ldots\,cm}$

35) median = 52.5

$\Sigma f_i = 100$

C.I	f	c.f
0-10	2	2
10-20	5	7
20-30	x	$7+x$
30-40	12	$19+x$
40-50	17	$36+x$ c.f
$\boxed{50-60}$	20 f	$56+x$
60-70	y	$56+x+y$
70-80	9	$65+x+y$
80-90	7	$72+x+y$
90-100	4	$76+x+y$

$h = 10$

median class = 50-60

$l = 50,\ f = 20,\ c.f = 36+x,$

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

$\text{median} = l + \frac{\frac{n}{2} - c.f}{f} \times h$

$= 50 + \frac{50 - 36 - x}{20} \times 10$

$= 50 + \frac{14-x}{2}$

$\therefore 52.5 = 50 + \frac{14-x}{2}$

$2.5 \times 2 = 14 - x$

$x = 14 - 5$

$\boxed{x = 9}$

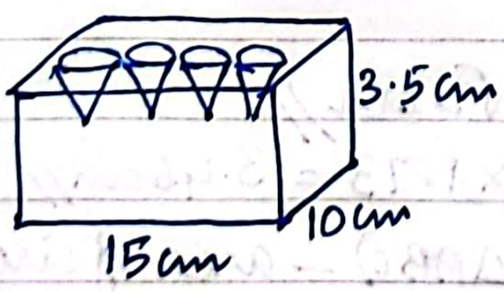
$\Sigma f_i = 76 + x + y = 100$

$x + y = 24$

$\boxed{y = 15}$

SECTION - E

36)



Cone :- $r = 0.5$ cm

$h = 1.4$ cm

Cuboid :- $L = 15$ cm

$B = 10$ cm

$H = 3.5$ cm

(i) Volume of four conical depression $= 4 \times \frac{1}{3}\pi r^2 h$

$$= \cancel{4} \times \frac{22}{\cancel{7}_1} \times \frac{1}{3} \times \frac{1}{\cancel{2}} \times \frac{1}{\cancel{2}} \times \cancelto{0.2}{1.4}$$

$$= \frac{4.4}{3} = \underline{\underline{1.467\,cm^3}}$$

(ii) Volume of wood in the entire stand

$= $ Volume of cuboid $-$ volume of 4 cones

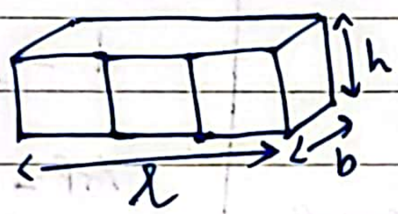
$= LBH - 1.467$

$= 15 \times 10 \times 3.5 - 1.467$

$= 525 - 1.467$

$= \underline{\underline{523.533\,cm^3}}$

OR (ii)



$l = 3 \times 15 = 45\,cm$

$b = 15\,cm$

$h = 15\,cm$

T.S. A resulting cuboid $= 2(lb + bh + hl)$

$= 2(675 + 225 + 675)$

$= 2 \times 1575 = \underline{\underline{3150\,cm^2}}$

37) Loan amount $=$ Rs 118000

$a =$ Rs 1000

$d =$ Rs 100

(i) $a_{20} = a + 19d = 1000 + 1900 = \underline{\underline{₹2900}}$

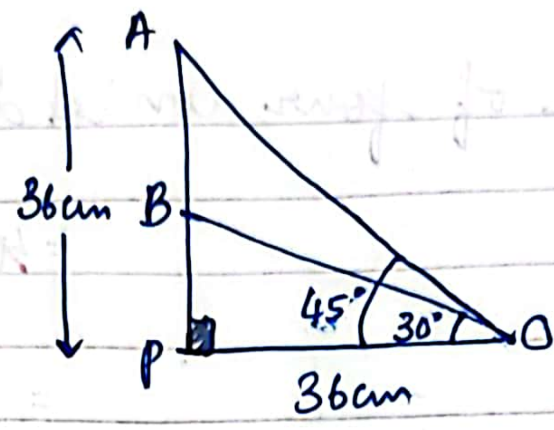
(ii) $a_{30} = a + 29d = 1000 + 2900 = \underline{\underline{₹3900}}$

(iii) $S_{20} = \frac{n}{2}[a + a_{20}] = \frac{20}{2}[1000 + 2900] = 10 \times 3900 = \underline{\underline{₹39000}}$

OR

$S_{30} = \frac{n}{2}[a + a_{30}] = \frac{30}{2}[1000 + 3900] = 15 \times 4900 = \underline{\underline{₹73500}}$

38)



(i) $\cos 30° = \frac{36}{OB}$

$\Rightarrow \frac{\sqrt{3}}{2} = \frac{36}{OB}$

$\therefore OB = \frac{72}{\sqrt{3}} = \frac{72\sqrt{3}}{3} = 24\sqrt{3}\text{cm}$//

(ii) $\tan 30° = \frac{PB}{36}$

$\frac{1}{\sqrt{3}} = \frac{PB}{36}$

$\therefore PB = \frac{36}{\sqrt{3}} = \frac{36\sqrt{3}}{3} = 12\sqrt{3}\text{cm}$//

$\tan 45° = \frac{AP}{36}$

$1 = \frac{AP}{36}$

$AP = 36\text{cm}$//

Thus, $AB = AP - BP = 36 - 12\sqrt{3} = 36 - 12 \times 1.732$

$= 36 - 20.784 = \underline{15.216 \text{ cm}}$ (approx.)

OR

Area$(\triangle OPB) = \frac{1}{2} \times BP \times OP = \frac{1}{\cancel{2}_{1}} \times \cancel{12}^{6}\sqrt{3} \times 36 = 216\sqrt{3}$

$= 216 \times 1.732 = \underline{374.112 \text{ cm}^2}$ (approx.)

(iii) $AP = 36\text{cm}$//