SSC PUBLIC EXAMINATIONS - 2025-26 (15E&16E)

MATHEMATICS MODEL PAPER - I

ENGLISH VERSION

Time : 3 Hrs. 15 Min. **Max. Marks : 100**

Instruction :

1) In the duration of 3 hours 15 minutes, 15 minutes of time is alloted to read the question paper.
2) All answers should be written in the answer booklet only.
3) Question paper consists of 4 sections and 38 questions.
4) Internal choice is available on section IV only.
5) Answer shall be written neatly and legibly

SECTION - I **12x1= 12**

Note : Answer all the questions in one word or a pharase. Each question carries 1 mark.

State fundamental theorem of Arithemetic ?

If α, β are the roots of P (x) : ax^2+bx+c, then $\frac{1}{\alpha}+\frac{1}{\beta}=$

A) $-\frac{b}{a}$ B) $\frac{c}{a}$ C) $-\frac{b}{c}$ D) $-\frac{c}{b}$

The coefficient of x^2 in $P(x) = 7x^3-6x^2+5x+8$

A) 7 B) −6 C) 5 D) −5

Illustrate a pair of linear eqaution which are inconsistent

Which of the following forms an A.P.

A) 2, 4, 8, 16, ...

B) 0.2, 0.22, 0.222, 0.2222 .....

C) $\sqrt{2}, \sqrt{8}, \sqrt{18}, \sqrt{32}, ...$

D) $\sqrt{3}, \sqrt{6}, \sqrt{9}, \sqrt{12}, ...$

If $\Delta ABC \sim \Delta PQR$, then which of the following is true.

A) $\angle A = \angle Q$ B) $AB = PQ$

C) $\frac{AB}{PQ} = \frac{AC}{QR}$ D) $\angle C = \angle R$

If Sec A + Tan A = 3 then Tan A − Sec A = __

A) 3 B) $\frac{1}{3}$ C) 1 D) $-\frac{1}{3}$

If a person looks upward from the ground to the top of a building which angle is formed ?

Match the following

i) CSA of cone [ ] p) $2\pi rh$

ii) CSA of cylinder [ ] q) $4\pi r^2$

iii) Suface Area of sphere [ ] r) $\pi r l$

A) i-p, ii-q, iii-r B) i-q, ii-r, iii-p

C) i-r, ii-p, iii-q D) i-r, ii-q, iii-p

10. Choose the correct answer which is true for following statement

A) $0 \le P(E) \le 1$ B) $0 \ge P(E) \ge 1$

C) $0 \le P(E) \ge 1$ D) $0 \ge P(E) \le 1$

11. Draw a rough sketch of circle with two lines such that one is tangent and another one is secant which are parallel to each other.

12. Form a quadratic equation whose roots are reciprocal to each other.

SECTION - II **8x2= 16**

Note: Answer all questions. Each question carries 2 marks.

13. Write a quadratic polynomial whose sum and product of zeroes are -3 and 2 respectively.

14. Check whether the following are quadratic equation are not

i) $(x-1)^2+1=2x-3$ ii) $x(x+1)+8=(x+2)(x-2)$

15. State SAS criterian in similartices of traiangle.

16. If 3 cot A = 4 find Sin A and Sec A.

17. Define angle of depression with a simple rough diagram.

18. What is the length of tangent drawn form a point 15 cm away from the center of a circle of radius 9 cm.

19. Find the volume and surface area of sphere whose radius is 7 cm.

20. Write the formule for the following in coordinate geometery

i) distance formula ii) section formula.

UTF

SECTION - III 8 x 4 = 32

Note: Answer all the questions. Each question carries 4 marks.

21. One card is drawn from a well shuffled deck of 52 words. "Calculate the probability that the drawn card will be an ace".

    Now create 4 such type of questions.

22. Write the formula to find median of grouped data and explain the terms in it.

23. 2 cubes each of volume 64 cm^3 are joined end to end. Find the surface area of the resulting cuboid.

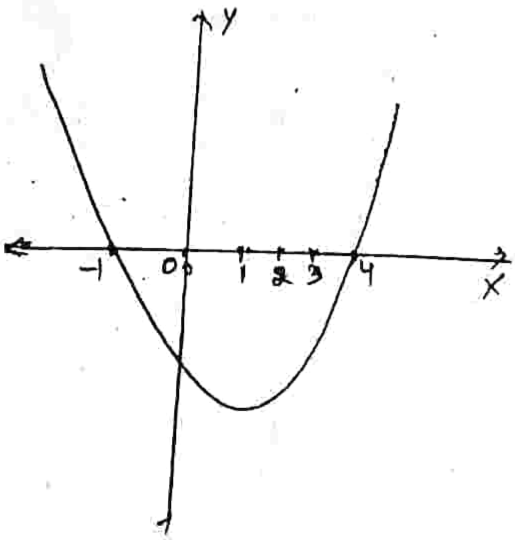
24. Find the two consecutive positive integers, sum of whose squares is 365.

25. Prove that $(\text{Sin } A + \text{Cosec } A)^2 + (\text{Cos } A + \text{Sec } A)^2 = 7 + \tan^2 A + \text{Cot}^2 A$.

26. Write the general from of arithmetic progression and also write formule for general term, and sum of n terms of A.P.

27. Two concentric circles are of radii 5 cm and 3 cm. Find the length of the chord of the larger circle with touches the smaller circle.

28. Observe the graph answer the following questions.



i) What is the shape of the polynomial.

ii) Write the zeroes of the polynomial.

iii) Find the sum of the zeroes of polynomial.

iv) Find the product of the zeroes of the polynomial.

SECTION - IV 5 x 8 =

Note: Answer 5 questions according to the inter choice given. Each question carries 8 Ma

29. Is $\sqrt{3}$ irrational justify your answer.

(OR)

30. Prove that a line drawn parallel to one s of triangle to interscet the other two sides distinct points, the other two sides a divided in the same ratio.

31. Name the type of quadrilateral, formed the points (1, 7), (4, 2), (−1, −1) and (−4, and give reason for your answer.

(OR)

32. A car has two wipers which donot over Each wiper has a blade of length 25 c sweeping through on angle 115^0. Find t total are cleared at each sweep of the blad $(\pi = \frac{22}{7})$

33. Two dice one blue and one grey are throw at the same time write down all the possib out comes. What is the probability that t sum of the two numbers appearing on t top of the dice is

    i) 8 ii) 13 iii) 12 iv) less than

OR

34. From a point on a bridge across a river t angles of depression of the banks o opposite sides of the river are 30^0 and 4 respectively. If the bridge is at a height 3m from the banks, find the width of rive

35. If the median of distribuiton on given belo is 28.5. Find the values of x and y.

Class Internal	0-10	20-Oct	20-30	30-40	40-50	50-6
Frequency	5	x	20	15	y	5

(OR)

36. The sum of the 4^{th} and 8^{th} terms of A.P is and the sum of 6^{th} and 10^{th} terms is 44. Fi the A.P.

37. Check graphically whetcher the pair equations.

    x+3y = 6 and 2x−3y=12 is consistent. If solve them graphically.

(OR)

38. 5 Penicils and 7 Pens together cost ₹50, whe as 7 Pencils and 5 Pens togehter cost ₹46. Fi the cost of one pencil and that of one pen.

MATHS PAPER - 1 - SOLUTIONS

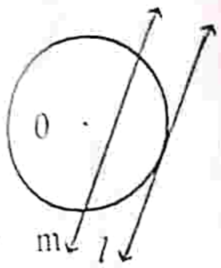
SECTION - I

1. Fundamental theorem on arithemetic : Every composite number can be expressed as product of primes and this fatorisation is unique, apart from the order in which the prime factors occur.

2. C 3. B 4. $2x-3y=8$
$4x-6y=9$

5. C 6. D 7. D

8. Angle of elevation 9. C 10. A

10.


l - tanget
m - secant
$l||m$

12. $x^2-2x+1=0$ (or) $x^2+2x+1=0$

SECTION - II

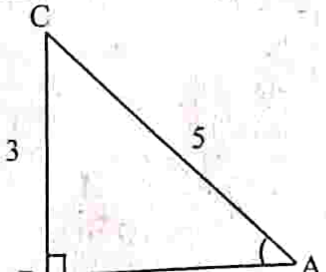
13. Given $a+b=-3$
$ab=2$
Quadratic Polynomial :
$P(x):\ x^2-(a+b)x+ab$
$=x^2-(-3)x+2$
$=x^2+3x+2$

14. (i) Given equation
$(x-1)^2+1=2x-3$
$x^2-2x+1+1=2x-3$
$x^2-4x+5=0$
Is a quadratic equation

ii) Given equation
$x(x+1)+8=(x+2)(x-2)$
$x^2+x+8=x^2-2^2$
$x+8=-4$
$x+12=0$
Is not a quadratic equation

15. S.A.S. **Criterian for similarity :** If one angle of a triangle is equal to one angle of the other triangle and the sides including their angles are proportion then the two triangles are similar.

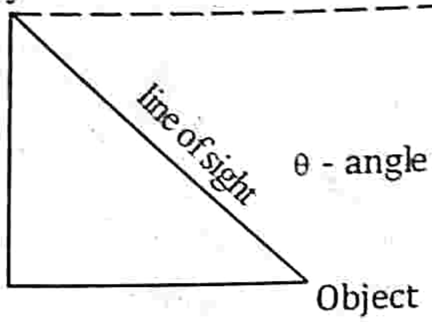
16. Given
$3\cot A=4$
$\cot A=\frac{3}{4}$



AC = $\sqrt{\ldots}$

$$\text{Sin A}=\frac{\text{Opp-side}}{\text{Hypotenuse}}=\frac{3}{5}$$

$$\text{Sec A}=\frac{\text{Hypotenuse}}{\text{Adj. side}}=\frac{5}{4}$$

17. Eye


If the line of sight is below the horizental level then the angle so formed is called angle of depression.

18. Length of tangent

$$(l)=\sqrt{d^2-r^2}$$
$$=\sqrt{15^2-9^2}$$
$$=\sqrt{225-81}$$
$$=\sqrt{144}$$
$$l=12\text{ cm}$$

19. Given radius (r) = 7 cm

$$\text{volume}=\frac{4}{3}\pi r^3$$
$$=\frac{4}{3}\times\frac{22}{7}\times7\times7\times7$$
$$=\frac{4312}{3}=1437\frac{1}{3}\text{ cm}^3$$

Surface area = $4pr^2$

$$=4\times\frac{22}{7}\times7\times7$$
$$=616\text{ cm}^2$$

20. i) The distance between two points

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

ii) The coordinates of a point which divides the line segment (x_1, y_1) and (x_2, y_2) in the ratio $m_1 : m_2$.

$$=\left[\frac{m_1x_2+m_2x_1}{m_1+m_2},\frac{m_1y_2+m_2y_1}{m_1+m_2}\right]$$

SECTION - III $\quad 8 \times 4 = 32$

21.i) What is the probability the card drawn will be a face card ?

ii) What is he probability the card drawn will be a black king ?

iii) What is the robability that the card drawn will be a jack of hearts ?

iv) What is the probability that the card will be a club card ?

22. Median of grouped data

$$= l + \frac{\frac{n}{2} - cf}{f} \times h$$

l = lower boundary of median class

n = Total frequency

cf = Cumulative frequency of before median class

f = frequency of median class

h = size of the class

23. Given

Volume of each cube = 64 cm^3

$a^3 = 64\ cm^3$

$a^3 = 4^3$

$a = 4$

Resulting solid is in the shape of cuboid with $l = 4 + 4 = 8$ cm, $b = 4$ cm, $h = 4$ cm

Surface Area $= 2\ (lb + bh + hl)$

$= 2\ [8 \times 4 + 4 \times 4 + 4 \times 8]$

$= 2\ [32 + 16 + 32]$

$= 2\ [80]$

$= 160\ cm^2$

24. Take the consecutive positive integers

$= x, (x+1)$

According to give

$x^2 + (x + 1)^2 = 365$

$x^2 + x^2 + 2x + 1 = 365$

$2x^2 + 2x + 1 = 365$

$2x^2 + 2x - 364 = 0$

$x^2 + x - 182 = 0$

$x^2 - 13x + 14x - 182 = 0$

$x(x - 13) + 14(x - 13) = 0$

$(x - 13)\ (x + 14) = 0$

$x - 13 = 0$ | $x + 14 = 0$

$x = 13$ R | $x = -14$ X

The two postive integers are 13, 14.

25. LHS = $[\text{Sin } A + \text{Cosec } A]^2 + [\text{Cos } A + \text{Sec } A]^2$

$= \text{Sin}^2 A + \text{Cosec}^2 + 2 \text{ Sin } A.\text{Cosec } A + \text{Cos}^2 A + \text{Sec}^2 A + 2\text{Cos}.\text{Sec}A$

$= \text{Sin}^2 A + \text{Cosec}^2 A + 2 \text{ Sin } A \times \frac{1}{\text{Sin } A} + \text{Cos}^2 A + \text{Sec}^2 A + 2\text{Cos}A \times \frac{1}{\text{Cos } A}$

$= \text{Sin}^2 A + \text{Cosec}^2 A + 2 + \text{Cos}^2 A + \text{Sec}^2 A + 2$

$= 4 + (\text{Sin}^2 A + \text{Cos}^2 A) + \text{Cosec}^2 + \text{Sec}^2 A$

$= 4 + 1 + 1 + \text{Cos}^2 A + 1 + \tan^2 A$

$= 7 + \tan^2 A + \cot^2 A$

= RHS.

26. The General form of A.P.

$a, a + d, a + 2d, \ldots, a + (n-1)d, \ldots$

a = first term

d = common difference

General Term (or)

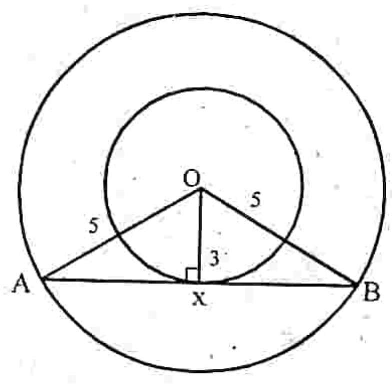
n^{th} term $a_n = a + (n-1)d$

Sum of n terms

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

$$S_n = \frac{n}{2}[a + a_n]$$

27.



AB = length of the chord of larger circle with touches smaller circle

OA = 5 cm (radius of larger circle)

OX = 3 cm (radius of smaller circle)

AB is the tangent of smaller circle.

$\therefore \angle AXO = 90^\circ$ also $AX = XB$

ΔOAX is a right triangle.

Now, $AX = \sqrt{5^2 - 3^2}$

$AX = \sqrt{25-9}$

$AX = \sqrt{16}$

$AX = 4$ cm

$\therefore AB = 4 + 4 = 8$ cm

The length of chord = 8 cm.

3. i) The shape of the polynomial is parabola.

ii) - 1 and 4 are the zeroes of given polynomial

iii) $\alpha + \beta = -1 + 4 = 3$

iv) $\alpha\beta = (-1)(4) = -4$

SECTION - IV

). Let $\sqrt{3}$ is a rational umber

$\sqrt{3} = \frac{a}{b} (b \neq 0)$ (a, b) = 1

$\sqrt{3}\,b = a$

$[\sqrt{3}\,b]^2 = a^2$

$3b^2 = a^2$ --- (1)

3 divides a^2

3 divides a

$a = 3c$

$3b^2 = (3c)^2$ ..... from (1)

$3b^2 = 9c^2$

$b^2 = 3c^2$

3 divides b^2

3 divides b

(a, b) = 3.

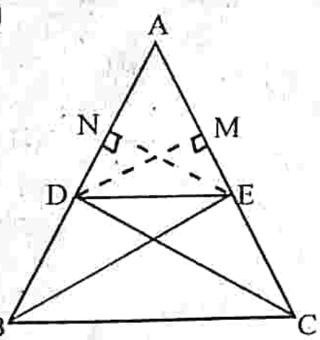
It is a contradiction

our is assumption is wrong

$\therefore \sqrt{3}$ is an irrational

(OR)

).



Given : In $\triangle ABC$,

DE || BC

R.T.P :-

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

Construction : Join BE and CD

draw $DM \perp AC$ and $EN \perp AB$

Proof :

Now, $\frac{Ar(\triangle ADE)}{Ar(\triangle BDE)} = \frac{\frac{1}{2} \times AD \times EN}{\frac{1}{2} \times DB \times EN} = \frac{AD}{DB}$ __ (1)

$\frac{Ar(\triangle ADE)}{Ar(\triangle BDE)} = \frac{\frac{1}{2} \times AE \times DM}{\frac{1}{2} \times EC \times DM} = \frac{AE}{EC}$ __ (2)

But

Ar ($\triangle$BDE) = Ar ($\triangle$CDE) __ (3)

(Triangles have same base and lies between the same parallels)

from (1), (2) and (3)

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

Hence the proof.

31. Given

A (1, 7), B (4, 2), C (−1, −1) and D (−4, 4).

Distance Between two points

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

$AB = \sqrt{(4-1)^2 + (2-7)^2} = \sqrt{3^2 + (-5)^2}$

$= \sqrt{9+25} = \sqrt{34}$

$BC = \sqrt{(-1-4)^2 + (-1-2)^2} = \sqrt{(-5)^2 + (-3)^2}$

$= \sqrt{25+9} = \sqrt{34}$

$CD = \sqrt{(-4+1)^2 + (4+1)^2} = \sqrt{(-3)^2 + 5^2}$

$= \sqrt{9+25} = \sqrt{34}$

$BA = \sqrt{(1+4)^2 + (7-4)^2} = \sqrt{5^2 + 3^2}$

$= \sqrt{25+9} = \sqrt{34}$

$AC = \sqrt{(-1-1)^2 + (-1-7)^2} = \sqrt{(-2)^2 + (-8)^2}$

$= \sqrt{4+64} = \sqrt{68}$

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

$= \sqrt{64+4} = \sqrt{68}$

AB = BC = CD = DA and AC = BD

$\therefore$ ABCD is a squre

(OR)

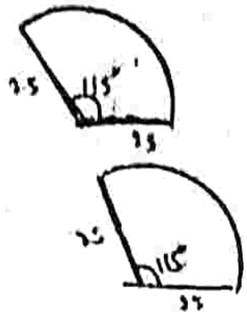
32. Given

$r = 25$ cm, $x^\circ = 115^\circ$

Area of sector =

Total area cleaned by the two wipers

= 2 x Area of sector



$= 2x\frac{x}{360}\times \pi r^2$

$= 2x\frac{115}{360}\times\frac{22}{7}\times 25\times 25$

$= \frac{158125}{126}\text{cm}^2.$

33. Two dice aer thrown at the same time possible out comes :

S = { (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)}

n (S) = 36.

i) Sum is 8

E = {(2, 6) (3, 5) (4, 4), (6, 2)}

n (E) = 5

P (Sum is 8) $= \frac{n(E)}{n(S)} = \frac{5}{36}$

ii) Sum is 13

n (E) = 0

P (Sum is 13) $= \frac{n(E)}{n(S)} = \frac{0}{38} = 0$

Which is impossible event

iii) Sum is 1

n (E) = 1 E = {(6, 6)}

P (Sum is 12) $= \frac{n(E)}{n(S)} = \frac{1}{36}$

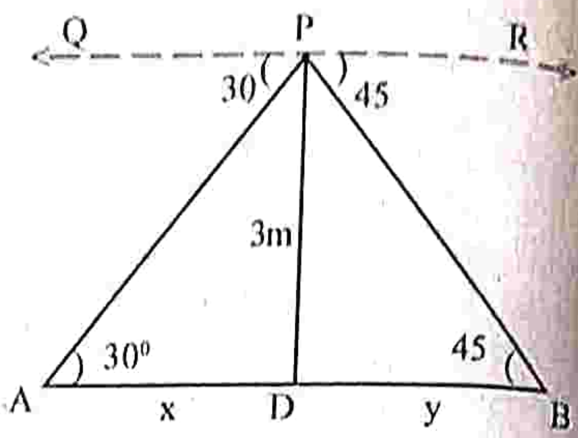
iv) Sum is less then 12

n (E) = 35

P (Sum is less then 12) $= \frac{n(E)}{n(S)} = \frac{35}{36}$

(OR)

34.



AB = width of river = x + y

PD = height of bridge = 3 m

In ΔAPD,

Tan 30° = $\frac{\text{Opp.side}}{\text{Adj.side}}$

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

$x = 3\sqrt{3}$ m

In ΔBPD,

Tan 45° = $\frac{\text{Opp.side}}{\text{Adj.side}}$

$1 = \frac{3}{y}$

y = 3 m

Width of river = $x + y = 3\sqrt{3}+3$

$= 3(\sqrt{3}+1)\,\text{m}.$

35.

a)

Class Internal	Frequency	C.f
0 – 10	5	5
10 – 20	x	5 + x (c.f)
20 – 30	20 (f)	25 + x
30 – 40	15	40 + x
40 – 50	y	40 + x + y
50 – 60	5	45 + x + y (60)
Total frequency = 60		

$\frac{n}{2} = \frac{60}{2} = 30$

Median = 28.5

Median calss = 20 – 30

Median = 28.5

$1+\frac{\frac{n}{2}-cf}{f}\times h = 28.5$

$$20+\frac{30-(5+x)}{20}=28.5$$

$$\frac{30-5-x}{20}=28.5-20$$

$$\frac{25-x}{20}=8.5$$

$25 - x = 8.5 \times 20$

$25 - x = 17.0$

$-x = 17 - 25$

$-x = -8$

$x = 8.$

Now $45 + x + y = 60$

$45 + 8 + y = 60$

$53 + y = 60$

$y = 60 - 53$

$y = 7$

$\therefore x = 8, y = 7.$

(OR)

6. According to given

$a_4 + a_8 = 24$

$(a + 3d) + (a + 7d) = 24$

$2a + 10d = 24$

$a + 5d = 12$ — (1)

Also $a_6 + a_{10} = 44$

$(a + 5d) + (a + 9d) = 44$

$2a + 14d = 44$

$a + 7d = 22$ -- (2)

$a + 7d = 22$

$\underline{a + 5d = 12}$

$2d = 10$

$d = 5$

from (1) $a + 5 \times 5 = 12$

$a + 25 = 12$

$a = 12 - 25$

$a = -13$

$a_1 = a = -13$

$a_2 = a + d = -13 + 5 = -8$

$a_3 = a + 2d = -8 + 5 = -3$

Ap : −13, −8, −3, ...

37. Given pair of linear equations

$x + 3y = 6$ ---- (1)

$2x - 3y = 12$ ---- (2)

$$\frac{a_1}{a_2}=\frac{1}{2},\quad \frac{b_1}{b2}=\frac{3}{-3}=-1$$

$$\frac{b_1}{b_2}\neq\frac{b_1}{b_2}$$

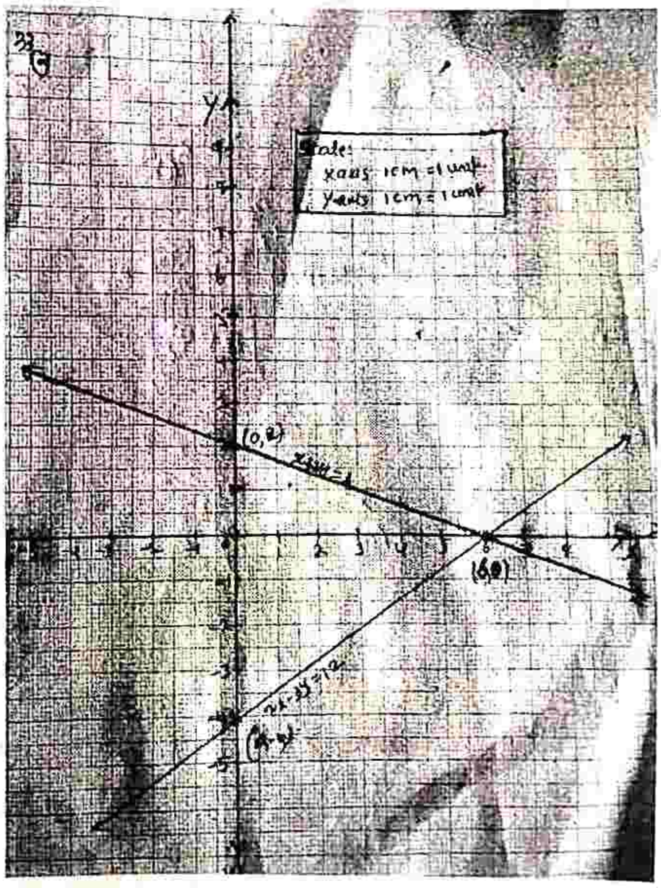
Consistent and unique solutions.

$x + 3y = 6$

x	y	(x, y)
0	4	(0, 2)
6	0	(6, 0)

$2x - 3y = 12$

x	y	(x, −y)
0	−4	(0, −4)
6	0	(6, 0)



From the graph

Solution : (x, y) = (6, 0)

(OR)

38. The cost of a penial = ₹ x

The cost of a pen = ₹ y

According to given

$5x + 7y = 50$ ___ (1)

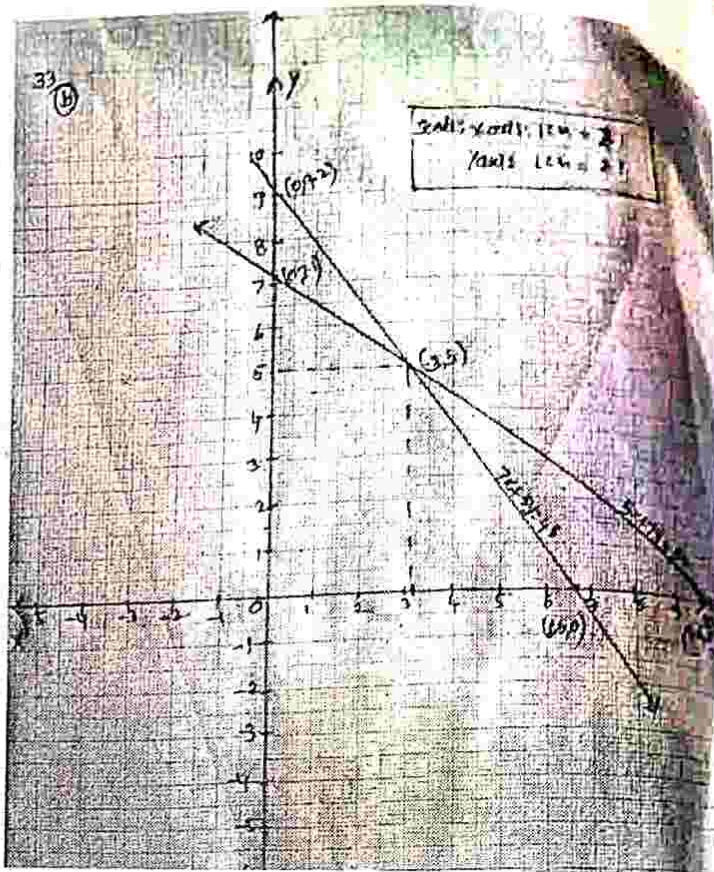
$7x + 5y = 46$ ___ (2)

$5x + 7y = 50$

x	y	(x, y)
0	7.1	(0, 7.1)
10	0	(10, 0)

$7x + 5y = 46$

x	y	(x, y)
0	9.2	(0, 9.2)
6.6	0	(6.6, 0)



From the graph solution (x, y) = (3, 5)

∴ The cost of a pencil = ₹ 3

The cost of a pen = ₹ 5

SSC PUBLIC EXAMINATIONS - 2025-26 (15E&16E)

MATHEMATICS MODEL PAPER - II

ENGLISH VERSION

(T)ime : 3 Hrs. 15 Min. | Max. Marks : 100

(Inst)ruction :

1. In the duration of 3 hours 15 minutes, 15 minutes of time is alloted to read the question paper.
2. All answers should be written in the answer booklet only.
3. Question paper consists of 4 sections and 38 questions.
4. Internal choice is available on section IV only.
5. Answer shall be written neatly and legibly

SECTION - I **12x1= 12**

(No)te : Answer all the questions in one word or a pharase. Each question carries 1 mark.

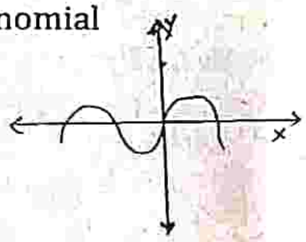
1. HCF of (96, 404) is 4 then their LCM = ____

A) 96 B) 404 C) 9696 D) 4

2. The degree of the polynomial $5x^3 - 2x^2 + 3$

A) 3 B) 2 C) 5 D) 1

3. From the given figure, find the number of zeroes of given polynomial



A) 1

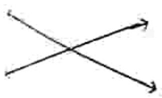
B) 2

C) 3

D) 4

4. Which of the following

[ ] p) inconsistent



[ ] q) consistent and dependent

[ ]r) unique solution

A) 1→p, 2→q, 3→r

B) 1→q, 2→r, 3→p

C) 1→p, 2→r, 3→q

D) 1→r, 2→p, 3→q

5. Assertion (A) : Sum 1+2+3+---+100=5050

Reason : Sum of n terms of AP was given by

$$S = \frac{n}{2}[a + a_n]$$

Now choose the correct answer

Now choose the correct answer from the following.

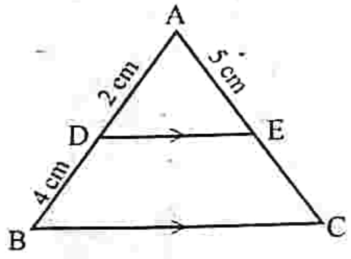
A) Both Assertational Reason are true and Reason is correct explanation of A.

B) Both Assertion and Reason are true and Reason is not correct explanation of A.

C) Assertion is true, Reason is false

D) Assertion is false, Reason is true

6. In the adjacet figure find AC ?



A) 7 cm

B) 1 cm

C) 6 cm

D) 15 cm

7. $\frac{1-\tan^2 45°}{1+\tan^2 45} =$ ____

A) Tan 90° B) Sin 90°

C) Cos 90° D) Cos0°

8. If the line of sight is below the horizental level angle so formed is called ______ cone

9. The ratio of volumes of a cone and a cylinder having equal radii of base and equal heights.

A) 1 : 3 B) 3 : 1 B) 1 : 2 D) 1 : 1

10. Which of the following cannot be the probability of an even

A) 2/3 B) −1.5 C) 15% D) 0.7

11. Draw a rough sketch to "Two tangents drawn from external point to the circle".

12. Form a quadratic equation which has equal real roots ?

SECTION - II **8x2= 16**

Note: Answer all the questions. Each question carries 2 marks.

13. Create a quadratic polynomial whose sum and product of zeroes are equal to each other.

14. Find the roots the quadratic equation with suitable method $3x^2 - 2x + 1/3 = 0$.

15. State the following
i) Two circles are always _______ (similar / congrucence) to each other.
ii) A square and a rhombus are _ (similar / not similar).

16. If $\tan(A+B)=\sqrt{3}$ and $\tan(A-B)=\frac{1}{\sqrt{3}}$, $0 < A+B \le 90^\circ$ and $A > B$. Find A.

17. Rinky observes a car on the ground from the balcony of the first floor of a building at the angle of depression β^0, then height of the fist floor of the building is 'x' meters. Draw the diagram for this data.

18. Prove that the parllelogram circumscribing a circle is a rhomubs.

19. Find the surface area of cubod of dimensions 15 cm, 10 cm and 3.5 cm.

20. Find the midipoint of the line joining the points ($\sin 0^\circ$, $\cos 90^\circ$) and ($\sin 90^\circ$, $\cos 0^\circ$).

SECTION - III $8 \times 4 = 32$

Note: Answer all the questions. Each question carries 4 marks.

21. A dice is thrown once. Find the probability of getting a prime number. Now create 4 such types of questions.

22. Write the formula to find the mode of grouped data and explain the terms in it.

23. A solid is in the shape of a cone standing on a hemisphere with both their radius being equal to 1 cm and the height of the cone is equal the its radius. Find the volume of the solid interms of p.

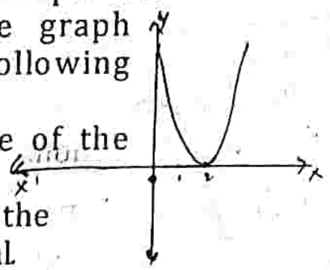
24. Write the discriminant of the quadratic equation $ax^2+bx+c=0$ $(a \neq 0)$ and describe the importance of discriminant.

25. State three identities that used in trignometry.

26. Find the sum of first 24 terms of the list of numbers whose n^{th} term is given by $a_n=3+2n$.

27. Prove that the tangents drawn at the ends of diameter of a circle are parallel.

28. By observing the graph Answer the following questions.



i) What is the shape of the graph ?
ii) Write the nature of the quadratic polynomial.
iii) Write the polynomial of given graph.
iv) If α, β are the zerores find $\alpha^2-\beta^2$?

SECTION - IV $5 \times 8 = 40$

Note: Answer 5 questions according to the internal choice given. Each question carries 8 Marks.

29. Is $\sqrt{5}$ irrational justify your answer.

(OR)

30. If CM and RN are respectively medians of ΔABC and ΔPQR if $\Delta ABC \sim \Delta OPQR$ prove that
i) $\Delta AMC \sim \Delta PNR$ ii) $\Delta CMB \sim \Delta RNQ$

31. If (1, 2), (4, y), (x, 6) and (3, 5) are the verticies of parallelogram taken in order find *x* and *y*.

(OR)

32. A chord of a circle of radius 21 cm subtend an angle of 120° at the centre. Find the area of the corresponding segment of the circle. (use p = 22/7)

33. One card is drawn from a well–shuffled deck of 52 cards. Find the probability of getting.
i) a king of red colour ii) a face card
iii) a number card iv) an ace card v) a spade card vi) a queen of diamond vii) a spade card

OR

34. A 1.5m tall boy is standing at some distance from a 30 m tall building. The angle of elevation from his eyes to the top of the building increases from 30° to 60° as he walks towards the building Find the distance he walked towards the building.

35. The table shows the daily experditure of food of 25 house holds in a locality.

Daily expenditure	100-150	150-200	200-250	250-300	300-350
Number of house holds	4	5	12	2	2

Find the mean daily expenditure on food by suitable method.

(OR)

36. A sum of Rs. 700 is to be used to give seven cash prizes to students of a school for their overall academic performace. If each prize is Rs. 20 less than its preceding prize find the value of each of the prizes.

37. Show the following pair of linear equations by graphically also check the given pair of linear equations are consistent / inconsistent

$$x - y + 1 = 0$$
$$3x + 2y - 12 = 0$$

(OR)

38. Half the perimeter of a rectanglular garden whose length is 4 m more than its width is 36 m. Find the dimensions of the garden.

MATHS PAPER - 2 - SOLUTIONS

SECTION - I

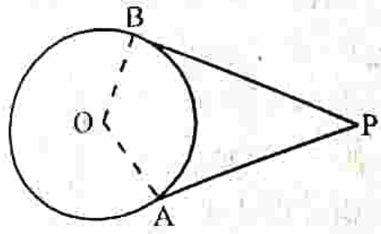
1. C 2. A 3. D 4. C

5. A 6. D 7. C

8. Angle of depression

9. A 10. B

11.



12. $x^2 - 2x + 1 = 0$

SECTION - II

13. Take $a + b = ab = k$

(a real number / not zero)

$P(x) = x^2 - (a + b)x + ab$

$= x^2 - kx + k \ (k \neq 0)$

14. Given equation

$3x^2 - 2x + 1/3 = 0$

$a = 3 \quad b = -2 \quad c = 1/3$

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

$$= \frac{-(-2) \pm \sqrt{(2)^2 - 4.3 \ 1/3}}{2.3}$$

$$= \frac{2 \pm \sqrt{4-4}}{6}$$

$$= \frac{2 \pm 0}{6}$$

$$= \frac{2}{6}$$

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

Roots of the quadriatic equations are $\frac{1}{3}, \frac{1}{3}$

15. i) Similar ii) Not similar

16. $\text{Tan}(A+B) = \sqrt{3} \Rightarrow A + B = 60^0$ --- (1)

$\text{Tan}(A-B) = \frac{1}{\sqrt{3}} \Rightarrow A - B = 30^0$

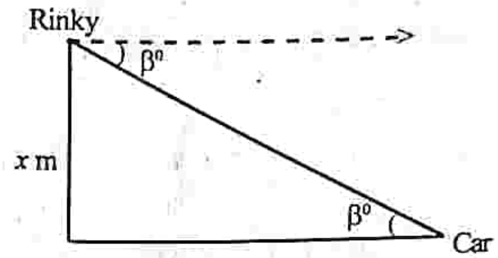
$A + B = 60$

$\underline{A - B = 30}$

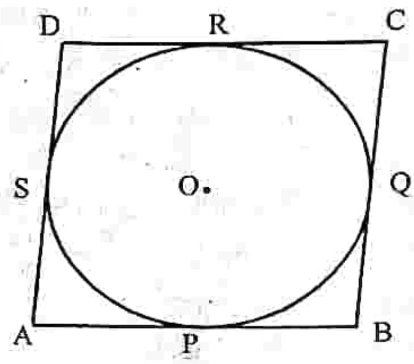
$2A = 90^0$

$A = 45^0$

17.



18.



ABCD is a parallelogram

(AB = CD and BC = AD)

The lengths of tangents drawn from an external point to a circle are equal.

BP = BQ

CR = CQ

DR = DS

AP = AS

BP + CR + DR + AP = BQ + CQ + DS + AS

(BP + AP) + (CR + DR) = (BQ + CQ) + (DS + AS)

AB + CD = BC + AD

AB + AB = BC + BC

2AB = 2BC

AB = BC

∴ AB = BC = CD = DA

ABCD is a rhombus.

19. Given $l = 15$ cm b = 10 cm h = 3.5 cm

Surface area of cuboid

$= 2[lb + bh + hl]$

$= 2[15 \times 10 + 10 \times 3.5 + 3.5 \times 15]$.

$= 2\ [150 + 35 + 52.5]$

$= 2\ [237.5]$

$= 475\ cm^2$

20. Given point

A (sin 0^0, cos 90^0), B (sin 90^0, cos 0^0)

A (0, 0), B (1, 1)

midpoint formula $= \left[\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right]$

Midpoint of AB $= \left[\frac{0+1}{2}, \frac{0+1}{2}\right]$

$= \left[\frac{1}{2}, \frac{1}{2}\right]$

SECTION - III

21. Four such type of questions are :

i) Find the probability of getting even number.

ii) Find the probability of getting a number greater than 6.

iii) Find the probability of getting odd number.

iv) Find the probability of getting a number lessthan or equal to 6.

22. Mode of grouped data

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

l = lower boundary of model class

f_1 = frequency of model class

f_0 = frequency of before model class

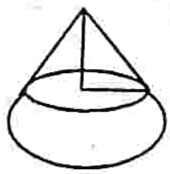
f_2 = frequency of after model class

h = size of the class

23. Hemisphere : r = 1 cm

Cone : r = 1 cm

h = 1 cm



Volume of solid

= Volume of hemisphere and cone

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

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

$$= \frac{2}{3}\pi + \frac{1}{3}\pi$$

$= \pi\ cm^3$

24. In a quadratic equation

$ax^2 + bx + c = 0$

$\Delta = b^2 - 4ac$ is called discriminant

If $\Delta > 0 \Rightarrow$ two distinct real roots

$\Delta = 0 \Rightarrow$ two equal real roots

$\Delta < 0 \Rightarrow$ no real roots

25. The three trignometric identities are

I : $\sin^2\theta + \cos^2\theta = 1$

II : $\sec^2\theta - \tan^2\theta = 1$

III : $\text{cosec}^2\theta - \cot^2\theta = 1$

26. Given

$a_n = 3 + 2n$

$a_1 = 3 + 2(1) = 3 + 2 = 5 \quad \Rightarrow a = 5$

$a_2 = 3 + 2(2) = 3 + 4 = 7$

$d = a_2 - a_1 = 7 - 5 = 2 \quad \Rightarrow d = 2$

Now, n = 24

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

$$S_{24} = \frac{24}{2}\ [2(5) + (24-1)2]$$

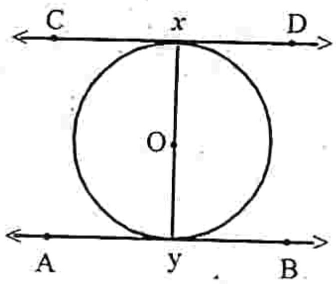
$= 12\ [10 + 23 \times 2]$

$= 12\ [10 + 46]$

$= 12 \times 56$

$= 672$

27.



AB and CD are the tangents drawn at the ends of diameter XY of circle with centre 'O'.

To prove AB||CD

Now, The tangent is perpendicular to radius at point of contact of circle.

$\therefore \angle AXO = \angle CYO = 90^0$

$\angle AXO + \angle CYO = 90 + 90 = 180^0$

$\therefore AB || CD.$

Hence the proof

28. i) The shape of graph is parabola

ii) The polynomial has equal zeroes i.e it has only one zero.

iii) $P(x) = (x-2)^2$ (or) $x^2 - 4x + 4$

iv) $\alpha^2 - \beta^2 = 2^2 - 2^2 = 0$

SECTION - IV

29. Let us assumme that $\sqrt{5}$ is a rational number

$\sqrt{5} = \frac{a}{b}, b \neq 0$, (a,b) = 1

$\sqrt{5} \times b = a$

$\left[\sqrt{5}\, b\right]^2 = a^2$

$5b^2 = a^2$ ---- (1)

5 divides a^2

5 divides a

a = 5c

from (1)

$5b^2 = (5c)^2$

$5b^2 = 25c^2$

$b^2 = 5c^2$

5 divides b^2

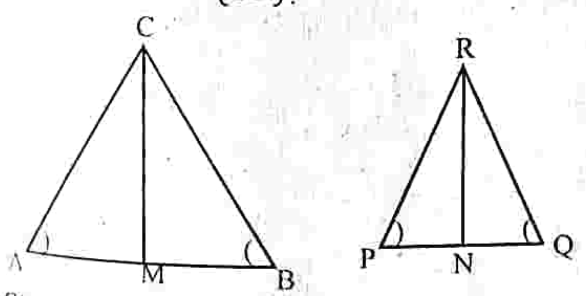
5 divides b

(a, b) = 5 is a contridiction

$\therefore \sqrt{5}$ is an irrational number

(OR).

30.



Given CM and RN are respectively medians of $\triangle ABC$ and $\triangle PQR$ and $\triangle ABC \sim \triangle PQR$

R.T.P. :- $\triangle AMC \sim \triangle PNR$ and $\triangle CMB \sim \triangle RNQ$

Proof : $\triangle ABC \sim \triangle PQR$

$\Rightarrow \frac{AB}{PQ} = \frac{BC}{QR} = \frac{CA}{RP}$ --- (1)

CM is median of $\triangle ABC \Rightarrow AM = BM = \frac{1}{2}AB$

Also in $\triangle PQR$, $PN = QN = \frac{1}{2}PQ$.

i) Now,

$$\frac{AB}{PQ} = \frac{CA}{RP}$$

$$\frac{\frac{1}{2}AB}{\frac{1}{2}PQ} = \frac{CA}{RP}$$

$$\frac{AM}{PN} = \frac{CA}{RP}$$

$\frac{AM}{CA} = \frac{PN}{RP}$ and $\angle A = \angle P$ ($\because \triangle ABC \sim \triangle PQR$)

By SAS similarity

$\triangle AMC \sim \triangle PNR$

i) From (1)

$$\frac{AB}{PQ} = \frac{BC}{QR}$$

$$\frac{\frac{1}{2}AB}{\frac{1}{2}PQ} = \frac{BC}{QR}$$

$$\frac{BM}{QN} = \frac{BC}{QR}$$

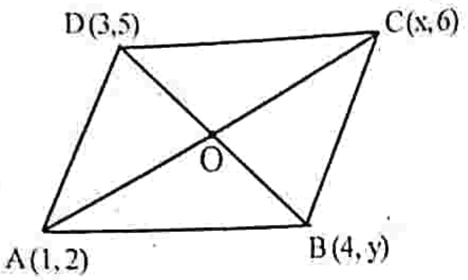
$\frac{BM}{BC} = \frac{QN}{QR}$ and $\angle B = \angle Q$

By SAS similarity

$\triangle CMB \sim \triangle RNQ$

Hence the proof

31.



In a parallelogoram, diagonals are bisect each other

i.e. Midpoint of AC = Midpoint of BD

Midpoint formula = $\left[\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right]$

$\therefore \left[\frac{1+x}{2}, \frac{2+6}{2}\right] = \left[\frac{4+3}{2}, \frac{y+5}{2}\right]$

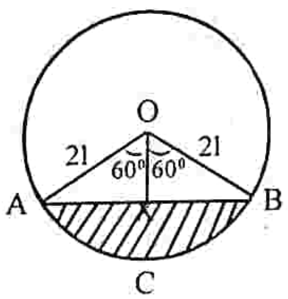
$\left[\frac{1+x}{2}, \frac{8}{2}\right] = \left[\frac{7}{2}, \frac{y+5}{2}\right]$

$\frac{1+x}{2} = \frac{7}{2}$	$\frac{y+5}{2} = \frac{8}{2}$
$1 + x = 7$	$y + 5 = 8$
$x = 7-1$	$y = 8-5$
$x = 6$	$y = 3$

$\therefore$ x = 6, y = 3

(OR)

32.



Given r = 21 cm

x° = 120

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

$= \frac{120}{360} \times \frac{22}{7} \times 21 \times 21$

$= 462$ cm²

Area of ΔOAB :-

In ΔOAX	In ΔOAX
$\sin 60^0 = \frac{\text{Opp side}}{\text{Hypotenuse}}$	$\cos 60^0 = \frac{\text{Adj side}}{\text{Hypotenuse}}$
$\frac{\sqrt{3}}{2} = \frac{AX}{21}$	$\frac{1}{2} = \frac{OX}{21}$
$AX = 21 \times \frac{\sqrt{3}}{2}$	$OX = \frac{21}{2}$
AB = 2 AX	$OX = \frac{21}{2}$ (height)

$= 2 \times 21 \times \frac{\sqrt{3}}{2}$

AB = $21\sqrt{3}$ (base)

Now,

Area of ΔOAB = $\frac{1}{2}$ bh

$= \frac{1}{2} \times 21\sqrt{3} \times \frac{21}{2}$

$= \frac{441}{4}\sqrt{3}$ cm²

Area of segment ABC

= Area of sector – Area of triangle

$= 462 - \frac{441}{4}\sqrt{3}$ cm²

33. One card is drawn from a well shuffled deck of 52 cards

n (s) = 52

i) A king of red colour n (E) = 2

P (red king) = $\frac{n(E)}{n(S)} = \frac{2}{52} = \frac{1}{26}$

ii) a face card, n (E) = 12

P (a face card) = $\frac{n(E)}{n(S)} = \frac{12}{52} = \frac{3}{13}$

iii) a number card, n (E) = 36

P (a number card) = $\frac{n(E)}{n(S)} = \frac{36}{52} = \frac{9}{13}$

an ace, n (E) = 4

$$P(\text{an ace}) = \frac{n(E)}{n(S)} = \frac{4}{52} = \frac{1}{13}$$

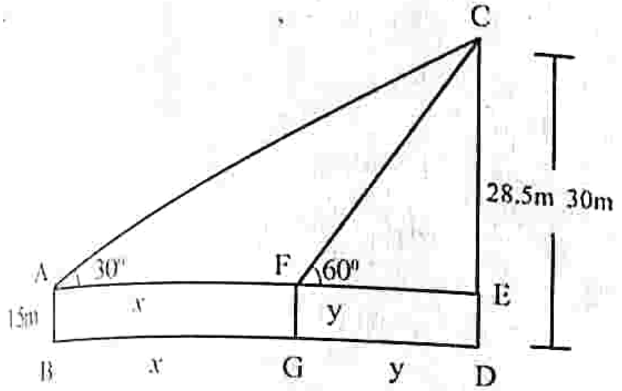
a spade, n (E) = 13

$$P(\text{a spade}) = \frac{n(E)}{n(S)} = \frac{13}{52} = \frac{1}{4}$$

a queen of diamonds, n(E) = 1

$$P(\text{a queen of diamonds}) = \frac{n(E)}{n(S)} = \frac{1}{52}$$

(OR)



AB : height of the boy = 1.5m

CD : height of the building = 30 m

CE = 30.0–1.5 = 28.5 m

In Δ CEF,

$$\tan 60^0 = \frac{\text{opp.side}}{\text{adj.side}}$$

$$\sqrt{3} = \frac{28.5}{y}$$

$$y = \frac{28.5}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$$

$$y = \frac{28.5 \times \sqrt{3}}{3}$$

$y = 9.5\sqrt{3}$ .... (1)

In Δ CEA,

$$\tan 30^0 = \frac{\text{opp.side}}{\text{adj.side}}$$

$$\frac{1}{\sqrt{3}} = \frac{28.5}{x+y}$$

$x+y = 28.5\sqrt{3}$

from eq. ---- (1)

$x + 9.5\sqrt{3} = 28.5\sqrt{3}$

$x = 28.5\sqrt{3} - 9.5\sqrt{3}$

$x = 19\sqrt{3}$

The distance he walked towards building

$= 19\sqrt{3}$ m

35.

C.I.	f_i	x_i	$u_i = \frac{x_i - a}{h}$	$f_i u_i$	
100 - 150	4	125	-2	-8	-13
150 - 200	5	175	-1	-5	
200 - 250	12	225 (a)	0	0	
250 - 300	2	275	1	2	6
300 - 350	2	325	2	4	
$\Sigma f_i =$	25		$\Sigma f_i u_i = -13+6 = -7$		

Mean $\bar{x}$

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

$$= 225 + \frac{-7}{25} \times 50$$

$= 225 - 14$

$= 211$

Mean daily expenditure = Rs. 211.

36. According to given

$S_n = 700$, $n = 7$, $d = -20$

$$\frac{n}{2}[2a + (n-1)d] = 700$$

$$\frac{7}{2}[2a + (7-1)(-20)] = 700$$

$$2a + 6(-20) = 700 \times \frac{2}{7}$$

$2a - 120 = 200$

$2a = 320$

$a = 160$

$a_1 = 160$

$a_2 = 160 - 20 = 140$

$a_3 = 140 - 20 = 120$

$a_4 = 120 - 20 = 100$

$a_5 = 100 - 20 = 80$

$a_6 = 80 - 20 = 60$

$a_7 = 60 - 20 = 40$

The seven cash prizes (in rupees) : 160, 140, 120, 100, 80, 60 and 40.

37.Given pair of linear equations :

$x - y + 1 = 0$

$3x + 2y - 12 = 0$

$\frac{a_1}{a_2} = \frac{1}{3}, \quad \frac{b_1}{b_2} = \frac{-1}{2}$

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

The equations are consistent and unique solutions.

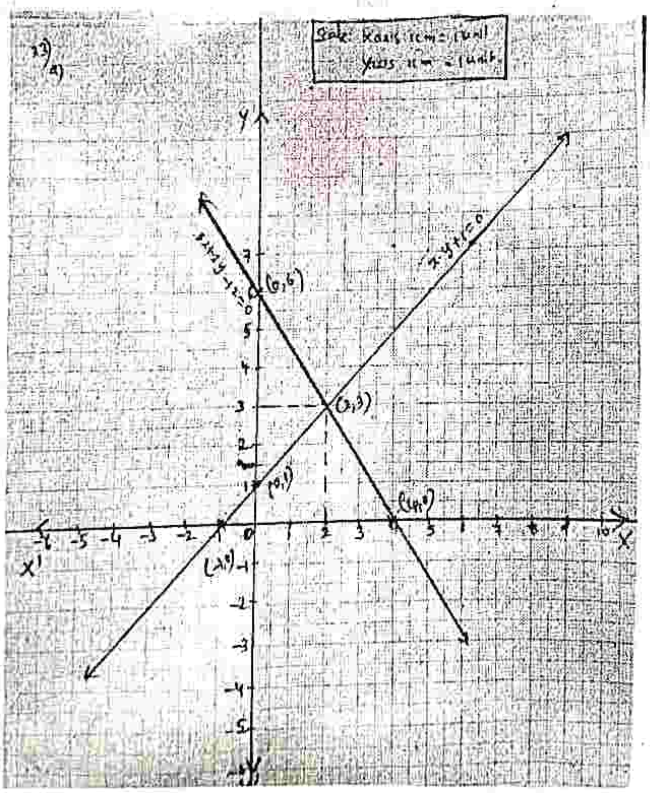
$x - y + 1 = 0 \quad \Rightarrow \quad x - y = -1$

x	y	(x, y)
0	1	(0, 1)
–1	0	(–1, 0)

$3x + 2y - 12 = 0 \Rightarrow 3x + 2y = 12$

x	y	(x, y)
0	6	(0, 6)
4	0	(4, 0)

from the graph solution (x, y) = (2, 3)



(OR)

38. According to given

breadth = 'x' m

length = 'y' m

$l + b = 26$

$y + x = 36 \Rightarrow x + y = 36$

$x + y = 36$

x	y	(x, y)
0	36	(0, 36)
36	0	(36, 0)

also

y = x + y   y = x + 4

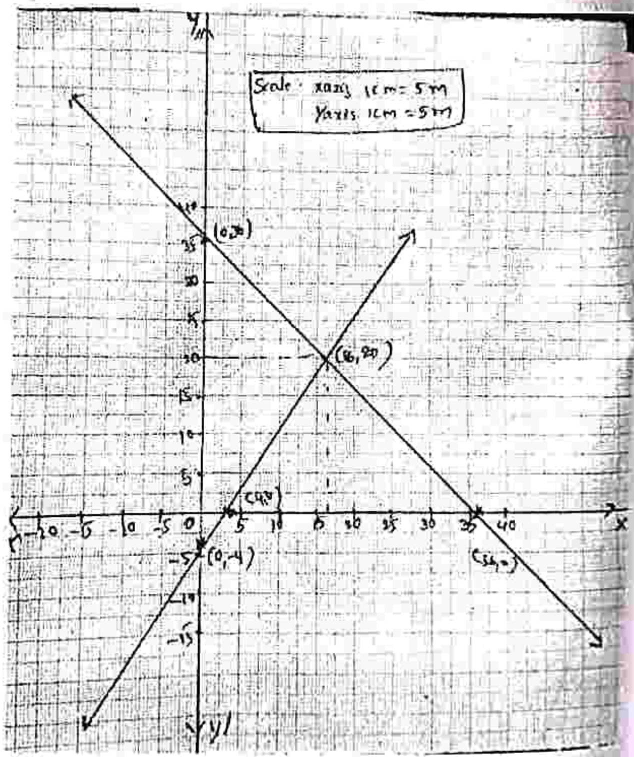
x	y	(x, y)
0	4	(0, 4)
–4	0	(–4, 0)

From the graph

(x, y) = (16, 20)

∴ length = 16 m

breadth = 20 m



SSC PUBLIC EXAMINATIONS - 2025-26 (15E&16E)

MATHEMATICS MODEL PAPER - III

ENGLISH VERSION

ne : 3 Hrs. 15 Min.

Max. Marks : 100

ruction :

In the duration of 3 hours 15 minutes, 15 minutes of time is alloted to read the question paper.

All answers should be written in the answer booklet only.

Question paper consists of 4 sections and 38 questions.

Internal choice is available on section IV only.

Answer shall be written neatly and legibly

SECTION - I **12x1= 12**

te: Answer all the questions in one word or a pharase. Each question carries 1 mark.

What is the prime factorisation of 60 ?

A) 2 x 30 B) 2 x 3 x 10

C) 2 x 3 x 5 D) 2^2 x 3 x 5

How many zeroes can a linear polynomial have ?

A) 0 B) 1 C) 2 D) many zeroes

Write a cubic polynomial which is monomial.

The cost of 1 kg potatoes and 2 kg tomatoes was Rs.30 on a certain day. Express into a linear equation in two variable.

Assertion (A): n^{th} term of A.P:2,4,6,8,... is 2n

Reason (R) : n^{th} term of AP : a, a + d, a + 2d,... is a + (n-1) d.

Now choose the **correctr answer.**

A) Both A and R are true and R is correct explanation of A.

B) Both A and R are True and R is not correct explanation of A

C) A is true, R is false D) A false, R is true

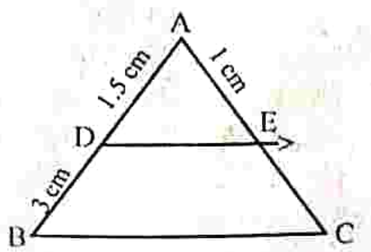
From the figure Find EC. Where DE || BC

A) 2 cm

B) 3 cm

C) 4 cm

D) 1 cm



7. In a right triangle Tan A= $\sqrt{3}$ then $\angle B + \angle C$ =

A) 60^0 B) 90^0 C) 150^0 D) 120^0

8. If the height of the object is equal to the distance between the foot of object to the observer then angle of elevation is equal to ____

A) 45^0 B) 30^0 C) 60^0 D) 90^0

9. A cylindrical pencil sharpened at one edge is the combination of

A) a cone and a cylinder

B) a hemisphere and a cylinder

C) a cylinder and a sphere

D) a hemisphere and a cone

10. In tossing a fair coin the probability of a getting head is

A) 1 B) $\frac{1}{2}$ C) 2 D) 0

11. Draw a rough sketch as a tangent of circle passes through the end point of its radius.

12. Create a quadratic equation which has no real roots.

SECTION - II **8x2= 16**

Note: Answer all questions. Each question carries 2 marks.

13. Create a quadratic polynomial whose sum and product of zeroes are sin 30^0 and cos 60^0

14. Write the nature of the roots of the equation

$3x^2 - 4\sqrt{3}x + 4 = 0$

15. Define similar polygons.

16. Write Sin A and Tan A interms of Sec A.

17. Name two fields where triagnometry is commonly used to calculate heights or distances.

18. Prove that the perpendicular at the point of contact of the tangent to a circle passes through the center.

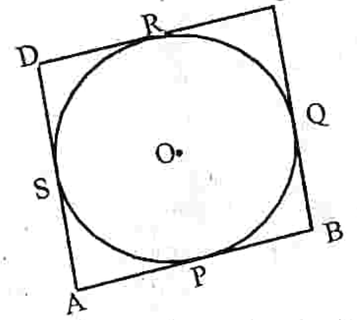
19. Find the volume of largest circular cone that can be cut out of a cube edge 7 cm.

20. Find the co - ordinates of the point which divides the join of (-1, 7) and (4, -3) in the ratio 2 : 3

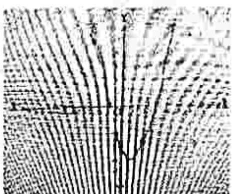
SECTION - III $8 \times 4 = 32$

Note: Answer all the questions. Each question carries 4 marks.

21. If you tosses two different coins simultaneously "what is the probability that you get atleast one head". Now you create 4 such type of questions.
22. Write the formula to find mean of grouped data in three types and explain the terms in it
23. A medicine capsule is in the shape of cylinder with two hemispheres stuck to each of its ends. The length of the entire capsule is 4 mm and the diameter of the capsule is 5 m.m find its surfaces Area.
24. Rohan's Mother is 26 years older than him. The product their ages 3 years from now will be 360. Create a quadratic equation for given information to find their present ages.
25. Prove that $\sqrt{\frac{1+\sin A}{1-\sin A}} = \sec A + \tan A$
26. In an AP, a = 5, d = 3, $a_n = 50$ find n and S_n.
27. A quadrilateral ABCD is drawn to circumscribe a circle. Prove that AB+CD = AD+BC.



28. By observing the graph Answer the following questions.



i) What is the shape of the graph ?
ii) How many zeroes it has ?
iii) What are the zeroes ?
iv) Find the sum of zeroes ?

SECTION - IV $5 \times 8 = 40$

Note: Answer 5 questions according to the internal choice given. Each question carries 8 Marks.

29. Is $3+2\sqrt{3}$ irrational Justify your answer ?

(OR)

30. A girl of height 90 cm is walking away from the base of a lamp post at a speed of 1.2m/s. If the lamp post is 3.6 m above the ground. Find the length of her shadow after 4 seconds.
31. Find the co-ordinate of the points of trisection of the line segment joining (4, −1) and (−2, −3)

(OR)

32. A chord of a circle of radius 10 cm subtends a right angle at the centre. Find the Area of the corresponding (i) Minor segment (ii) Major segment (use p = 3.14)
33. A box contain 90 discs which are num-bered from 1 to 90. If one disc is drawn at random from the box, find the probability that it bears (i) a two digit number (ii) a perfect square (iii) a number divisible by 5 (iv) a multiple of 3.

(OR)

34. The angle of elevation of the top of a building from the foot of tower is 30^0 and the angle of elevation of the top of the tower from the foot of building is 60^0. If the tower is 50 m high find the height of the building.
35. The following distibution shows like daily pocket allowance of children of a locality. The mean allowence is Rs. 18. Find the missing frequency f.

Daily Pocket allowance in (Rs)	11-13	13-15	15-17	17-19	19-21	21-23	23-25
Number of children	7	6	9	13	f	5	4

(OR)

36. A manufacturer of TV sets produced 600 sets in the third year and 700 sets in the seventh year. Assuming that the production increases uniformly by a fixed number every year find
    (i) The product in the 1st year
    (ii) To total production in first 7 years
37. Check whether the given pair of linear equations consistent / inconsistent show them by graphically.

$$2x + 3y = 13$$
$$4x + 5y = 23$$

(OR)

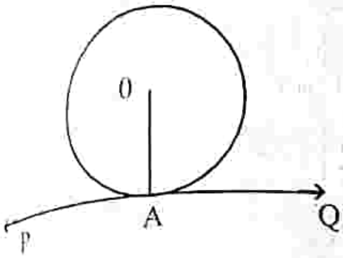
38. Draw the graphs of the equations x-y+1= 0, 3x + 2y - 12 = 0 Determine the co-ordinates of the verticies of the triangle formed by these lines and the x - axis and shade the triangular region.

SECTION - I

2. B 3. $ax^3, a \neq 0$ a is a real number

$x + 2y = 30$ 5. A 6. 2cm 7. D

9. A 10. B



PQ = tanget
OA = radius

$x^2 + x + 4 = 0$

SECTION - II

$\alpha + \beta = \sin 30^0 = \frac{1}{2}$

$\alpha\beta = \cos 60^0 = \frac{1}{2}$

Quadratic Polynomial :

$k[x^2 - (\alpha + \beta)x + \alpha\beta]$

$= k\left[x^2 - \frac{1}{2}x + \frac{1}{2}\right]$

$= k\left[\frac{2x^2 - x + 1}{2}\right]$

$= 2\left[\frac{2x^2 - x + 1}{2}\right]$ (k = 2 say)

$= 2x^2 - x + 1$

Given equation

$3x^2 - 4\sqrt{3}x + 4 = 0$

$a = 3 \quad b = -4\sqrt{3} \quad c = 4$

$b^2 - 4ac = (-4\sqrt{3})^2 - 4.3.4$

$= 48 - 48$

$= 0$

$b^2 - 4ac = 0$

en quadratic equation has equal real roots.

Similar Polygons :

Two polygons of the same number of sides are similar if

i) Their corresponding angles are equal

ii) Their corresponding sides are in the proportion.

16. $\text{Tan } A = \sqrt{\sec^2 A - 1}$ $(\text{Sec}^2 A - \text{Tan}^2 A = 1)$

$\text{Tan } A = \frac{\sin A}{\cos A}$

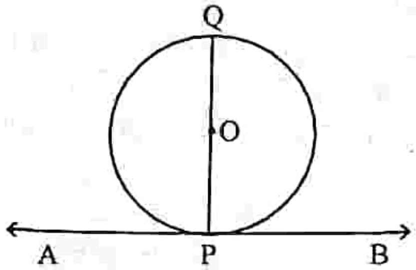
$\text{Tan } A = \sin A . \sec A$

$\text{Sin } A = \frac{\text{Tan } A}{\sec A}$

$\text{Sin } A = \frac{\sqrt{\sec^2 A - 1}}{\sec A}$

17. Trigonometry used in the fields such as engineering and navigation to calculate heights and distances.

18.



AB is the tangent touching the circle at point P.
Draw PQ ⊥ AB such that Q lies on circle.

Now

$\angle OPA = 90^0$ (radius tangent)

$\angle QPA = 90^0$ (given)

i.c $\angle OPA = \angle QPA$

This is possible only when PQ passes through the centre of circle.

∴ Hence the proof.

19. Diameter of cone

= edge of cube

d = 7 cm

$r = \frac{7}{2}$ cm

height of cone = edge of cube = 7 cm

∴ Volume $= \frac{1}{3}\Pi r^2 h$

$= \frac{1}{3} \times \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times 7$

$= \frac{539}{6} = 89.5 \text{ cm}^3$

20. Given A (−1, 7) B (4, 3)

Ratio = 2 : 3

$$\text{formula} = \left[\frac{m_1x_2+m_2x_1}{m_1+m_2}, \frac{m_1y_2+m_2y_1}{m_1+m_2}\right]$$

$$= \left[\frac{2(4)+3(-1)}{2+3}, \frac{2(-3)+3(7)}{2+3}\right]$$

$$= \left[\frac{8-3}{5}, \frac{-6+21}{5}\right] = \left[\frac{5}{5}, \frac{15}{5}\right]$$

= [1, 3]

SECTION - III **8 x 4 = 32**

21. Four questions :
i) What is the probability that you will get atleast one tail ?
ii) What is the probability that you will get two heads?
iii) What is the probability that you will get, two tails?
iv) Write all possible out comes of experiment ?

22. Mean of grouped data

1) Direct method : $\bar{x} = \frac{\Sigma f_i x_i}{\Sigma f_i}$

2) Assummed mean method : $\bar{x} = a + \frac{\Sigma f_i d_i}{\Sigma f_i}$

3) Step deviation method : $\bar{x} = a + \frac{\Sigma f_i u_i}{\Sigma f_i} \times h$

Where :

f_i = Frequency

x_i = Class mark

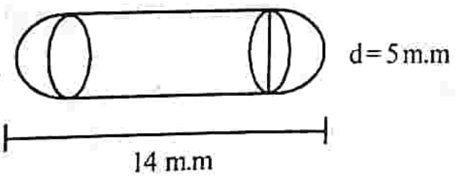
a = assummed mean

d_i = x_i − a, deviation

$u_i \frac{x_i - a}{h}$, step deviation

h = size of the class

23.



hemispheres : d = 5 m.m

$$r = \frac{5}{2} \text{ m.m}$$

Cylinder : $r = \frac{5}{2}$ m.m

$h = 14 - 2 \times \frac{5}{2} = 14 - 5 = 9$ m.m

Surface Area =

= C.S.A. of cylinder + 2 × C.S.A of Hemisphere

= 2prh + 2 × 2 pr²

$$= 2\times\frac{22}{7}\times\frac{5}{2}\times 9 + 2\times 2\times\frac{22}{7}\times\frac{5}{2}\times\frac{5}{2}$$

$$= 2\times\frac{22}{7}\times\frac{5}{2}\left[9 + 2\times\frac{5}{2}\right]$$

$$= 2\times\frac{22}{7}\times\frac{5}{2}\times 14$$

= 220 m.m²

24. Present age of Rohan's = x years

Mother age = (x + 26) year)

According to given

(x + 3) (x + 26 + 3) = 360

(x + 3) (x + 29) = 360

x(x + 29) + 3 (x + 27) = 360

x^2 + 29x + 3x + 87 = 360

x^2 + 32x − 273 = 0

Is required quadratic equation.

25. $$\text{LHS} = \sqrt{\frac{1+\sin A}{1-\sin A}}$$

$$= \sqrt{\frac{1+\sin A}{1-\sin A}\times\frac{1+\sin A}{1+\sin A}}$$

$$= \sqrt{\frac{(1+\sin A)^2}{1-\sin^2 A}}$$

$$= \sqrt{\frac{(1+\sin A)^2}{\cos^2 A}}$$

$$= \frac{1+\sin A}{\cos A}$$

$$= \frac{1}{\cos A} + \frac{\sin A}{\cos A}$$

= sec A + tan A

= RHS

26. Given

$a = 5,\ d = 3,\ a_n = 50$

$a + (n-1)d = 50$

$5 + (n-1)3 = 50$

$(n-1)3 = 50-5$

$(n-1)3 = 45$

$n-1 = 15$

$n = 16$

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

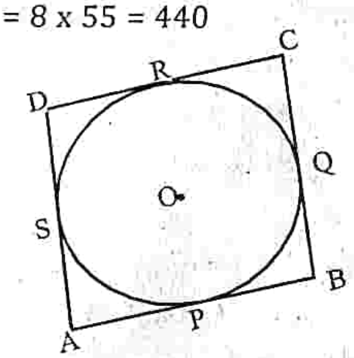
$$S_{16} = \frac{16}{2}[2\times5+(16-1)\times3]$$

$= 8[10+ 15 \times 3]$

$= 8[10 + 45]$

$= 8 \times 55 = 440$

27.



ABCD is a quadrilateral drawn to circucircle a cricle of centre 'O'.

Now, AB, BC, CD and BA are tangents of circle with points of contacts. P, Q, R and S respectively.

"Lengths of tangents drawn from external points are equal "

So, AP = AS

BP = BQ

CQ = CR

DR = DS

Now

AB + CD = AP + BP + CR + DR

= AB + BQ + CQ + DS

= AS + DS + BQ + CQ

AB + CD = AD + BA

3.

i) Parabola

ii) It has 2 zeroes

iii) -1, 3

iv) $\alpha + \beta = -1 + 3 = 2$

SECTION - IV

29. Let $3+2\sqrt{5}$ is a rational umber

$$3 + 2\sqrt{5} = \frac{a}{b},\ b \neq 0$$

$$2\sqrt{5} = \frac{a}{b} - 3$$

$$2\sqrt{5} = \frac{a-3b}{b}$$

$$\sqrt{5} = \frac{a-3b}{2b}$$

$\therefore \sqrt{5}$ is rational number

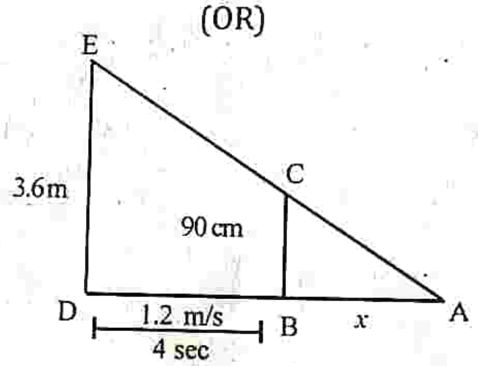
It is a contridiction

our is assumption is wrong

$\therefore$ $3+2\sqrt{5}$ is an irrational

(OR)

30.



DE = The height of lamp post = 3.6 m

BC = The height of girl = 90 cm = 0.9 m

BD = Distance travelled = $1.2 \times 4 = 4.8$ m

AB = Length of her shadow = x

From figure

Δ ABE $\quad \Delta$ ADE

$\angle A = \angle A$ (Common)

$\angle B = \angle D$ (90^0)

By A.A. Similarity

$\Delta ABC \sim \Delta ADE$

Now,

$$\frac{AB}{AD} = \frac{BC}{DE}$$

$$\frac{x}{x+4.8} = \frac{0.9}{3.6}$$

$$\frac{x}{x+4.8}=\frac{9}{36}$$

$$\frac{x}{x+4.8}=\frac{1}{4}$$

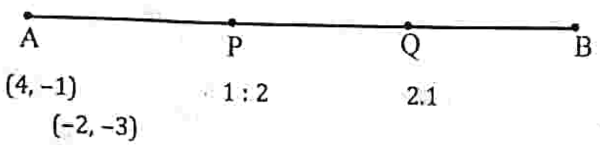
$4x = x + 4.8$

$3x = 4.8$

$x = 1.6$ m

Length of shadow after 4 seconds = 1. 6 m.

31.



Section formula = $\left[\frac{m_1x_2+m_2x_1}{m_1+m_2},\frac{m_1y_2+m_2y_1}{m_1+m_2}\right]$

A (2, –2) B (–7, 4) 1 : 2

Co-ordinates of

$$P=\left[\frac{1(-2)+2(4)}{1+2},\frac{1(-3)+2(-1)}{1+2}\right]$$

$$=\left[\frac{-2+8}{3},\frac{-3+(-2)}{3}\right]=\left[\frac{6}{3},\frac{-5}{3}\right]$$

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

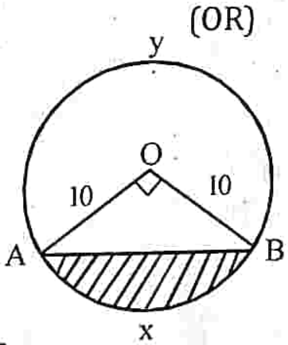
Coordinates of Q = $\left[\frac{2(-2)+1(4)}{2+1},\frac{2(-3)+1(-1)}{2+1}\right]$

$$=\left[\frac{-4+4}{3},\frac{-6-1}{3}\right]=\left(\frac{0}{3},\frac{-7}{3}\right)$$

$$=\left(0,-7/3\right)$$

(OR)

32.



Given

r = 10 cm, x° = 90°

Area of sector $=\frac{x}{360}\times\Pi r^2$

$$=\frac{90}{360}\times3.14\times10\times10$$

$$=\frac{1}{4}\times314$$

$= 78.5\ cm^2$

Area of triangle = $\frac{1}{2}bh$

$$=\frac{1}{2}\times10\times10$$

$= 50\ cm^2$

i) Area of minor legment

= area of sector – Area of triangle

= 78.5 – 50

= $28.5\ cm^2$

ii) Area of circle = Pr^2

= 3.14 x 10 x 10

= $3.14\ cm^2$

Area of Major Segement

= Area of circle – Area of minor segment

= 314 – 28.5

= $285.5\ cm^2$

33. A box contains 90 discs which are numbered 1 to 90.

n (S) = 90

i) a two digit numbers

E = {10, 11, 12, 13, ... 90} n(E) = 81

P (a two digit number) = $\frac{n(E)}{n(S)}=\frac{81}{90}=\frac{9}{10}$

ii) a perfect square number

E = {1, 4, 9, 16, 25, 36, 49, 64, 81}

n (E) = 9

P (a perfect square) $=\frac{n(E)}{n(S)}=\frac{9}{90}=\frac{1}{10}$

iii) A number divisible by 5

E = {5, 10, 15, 20, ... 90} n(E) = 18

P (a number divisible by 5) = $\frac{n(E)}{n(S)}=\frac{18}{90}=\frac{1}{5}$

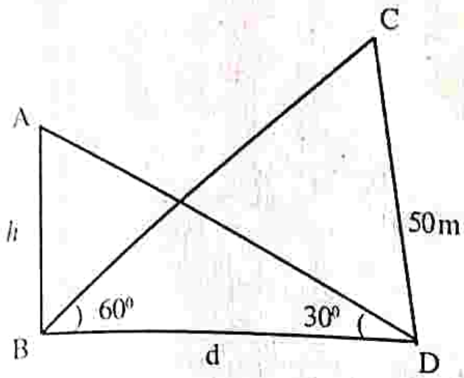
iv) a multiple of 3

$E = \{3, 6, 9, 12, ... 90\}$, $n(E) = 30$

$$P(\text{a multiple of 3}) = \frac{n(E)}{n(S)} = \frac{30}{90} = \frac{1}{3}$$

(OR)

34.



AB = height of building = h

CD = height of tower = 50 m

BD = distance between their foots = d

In ΔABD

$$\text{Tan } 30° = \frac{\text{Opp.side}}{\text{Adj.side}}$$

$$\frac{1}{\sqrt{3}} = \frac{h}{d}$$

$$d = \sqrt{3}\, h$$

In ΔBCD

$$\text{Tan } 60° = \frac{\text{Opp.side}}{\text{Adj.side}}$$

$$\sqrt{3} = \frac{50}{d}$$

$$d = \frac{50}{\sqrt{3}}$$

$$\sqrt{3}\, h = \frac{50}{\sqrt{3}}$$

$$h = \frac{50}{3}$$

$h = 16.6$ m

Width of building = 16.6 m

35.

C.I.	f_i	x_i	$u_i = \frac{x_i - a}{h}$	f_iu_i	
11 - 13	7	12	- 3	-21	
13 - 15	6	14	-2	-12	-42
15 - 17	9	16	-1	-9	
17 - 19	13	a	0	0	
19 - 21	f	20	1	f	
21 - 23	5	22	2	10	22+f
23 - 25	4	24	3	12	
$\Sigma f_i =$	44 + f		$\Sigma f_iu_i = -20 + f$		

Mean = 18

$$= a + \frac{\Sigma f_iu_i}{\Sigma f_i} \times h = 18$$

$$18 + \frac{-20+f}{44+f} \times 2 = 18$$

$$\frac{-20+f}{44+f} \times 2 = 18 - 18$$

$$\frac{-20+f}{44+f} \times 2 = 0$$

$- 20 + f = 0$

$f = 20$

missing frequency = 20

36. According to given

$a_3 = 600 \Rightarrow a + 2d = 600$ ..... (1)

$a_7 = 700 \Rightarrow a + 6d = 700$ ..... (2)

$a + 6d = 700$

$a + 2d = 600$

$4d = 100$

$d = 25$

From (1)

$a + 2(25) = 600$

$a + 50 = 600$

$a = 600 - 50$

$a = 550$

i) Production in 1st year a = 550 T.V. sets

ii) Total production in first 7 years

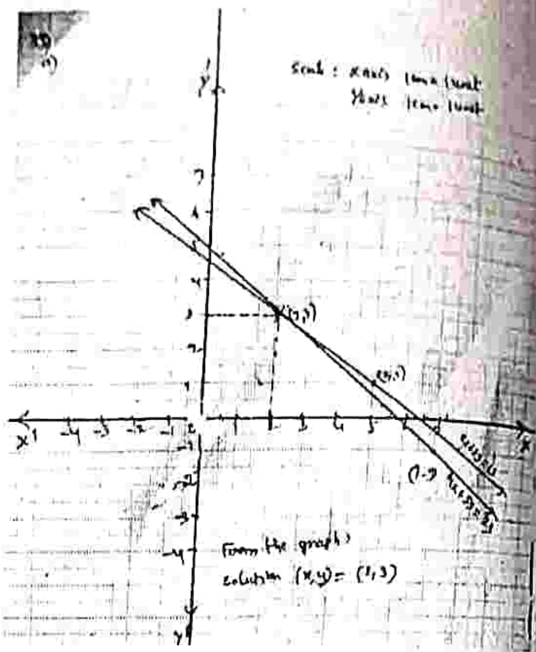
$$Sn = \frac{n}{2}(a+a_n)$$

$$S_7 = \frac{7}{2}(a + a_n)$$

$$S_7 = \frac{7}{2}(550 + 700)$$

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

$$= 4375$$



37. Given pair of linear equations

$2x + 3y = 13$ ---- (1)

$4x - 9y = 23$ ---- (2)

$\frac{a_1}{a_2} = \frac{2}{4} = \frac{1}{2}$ | $\frac{b_1}{b_2} = \frac{3}{-9} = -\frac{1}{3}$

$$\frac{a_1}{a2} \neq \frac{b_1}{b_2}$$

Consistent and unique solutions.

$2x + 3y = 13 \Rightarrow y = \frac{13-2x}{3}$

x	y	(x, y)
2	3	(2, 3)
5	1	(5, 1)

$4x + 5y = 23$ $y = \frac{23-4x}{5}$.

x	y	(x, y)
2	3	(2, 3)
7	-1	(7, -1)

From the graph

Solution : (x, y) = (2, 3)

38. Given pair of equations

$x - y + 1 = 0$ — (1)

$3x + 2y - 12 = 0$ — (2)

$x - y + 1 = 0$

$x - y = -1 \Rightarrow x - y = -1$

x	y	(x, −y)
0	1	(0, 1)
−1	0	(−1, 0)

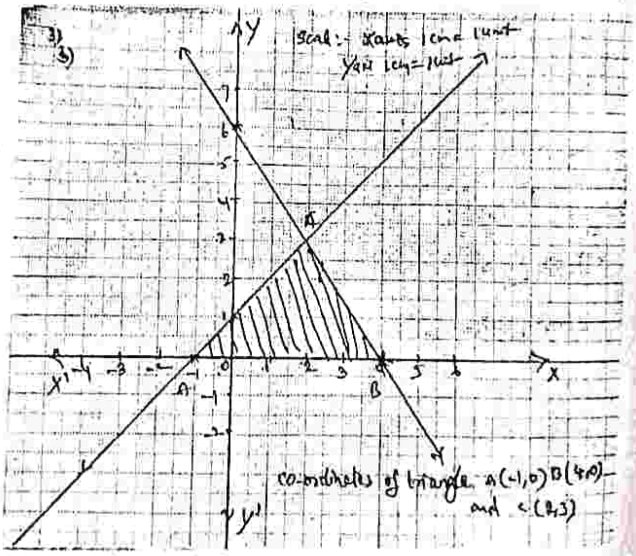
$3x + 2y - 12 = 0$

$3x + 2y = 12$

x	y	(x, y)
0	6	(0, 6)
4	0	(4, 0)

Coordinates of triangle :

(-1, 0), (4, 0) and (2, 3)



UTF

SSC PUBLIC EXAMINATIONS - 2025-26 (15E&16E)
MATHEMATICS MODEL PAPER - IV
ENGLISH VERSION

Time : 3 Hrs. 15 Min. Max. Marks : 100

Instruction :

1) In the duration of 3 hours 15 minutes, 15 minutes of time is alloted to read the question paper.
2) All answers should be written in the answer booklet only.
3) Question paper consists of 4 sections and 38 questions.
4) Internal choice is available on section IV only.
5) Answer shall be written neatly and legibly

SECTION - I **12x1= 12**

Note : Answer all the questions in one word or a pharase. Each question carries 1 mark.

If $a=2^3 \times 3^2$, $b=2^2 x 3^3 x 5$, Find LCM and HCF of (a, b.)

What is the shape of graph of a linear polynomial ?

What is the product of zeroes of $x^3-6x^2+11x - 6$

A) 6 B) 11 C) - 6 D) - 11

Write a linear equation which is coincident to the given line $2x + 3y + 8 = 0$.

Statement (I) : -3, -6, - 9, - 12,..... is an A.P.

Statement (II) : 3, 3, 3,..... is not an A.P.

Now choose the correct answer

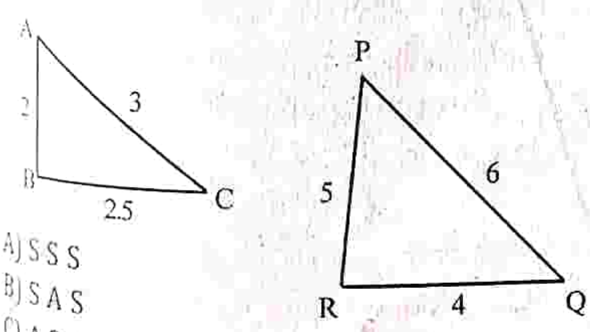
A) Both the statements are True.

B) Statement I is true, statement II is false

C) Statement I is false, statement II is true

D) Both statements are false

Write the similarity criterion used by you for answering the question.



A) S S S

B) S A S

C) A S A

D) Not similar

7. Which trignometric ratio is equal to opposite side of q to its adjacent side
A) sin θ B) cos θ C) cot θ D) tan θ
8. "A tower stands vertically on the ground. From a point on the ground which is 15 m away from the foot of the tower, the angle of elevation of the top of the tower is found to be 60^0. "Draw the suitable diagram for finding the height of the tower ?
9. Total surface area of hemisphere having radius r is
A) πr^2 B) $2\pi r^2$ C) $3\pi r^2$ D) $4\pi r^2$
10. If P (E) = 0.05 what is the probability of 'not E' ?
A) 0.04 B) 0.95 C) - 0.95 D) 0.06
11. Create a geometrical design involving two tangents from an external point to the circle.
12. Form a quadratic equation which has 1 as one of its roots.

SECTION - II **8x2= 16**

Note: Answer all questions. Each question carries 2 marks.

13. Create a quadratic polynomial whose sum and product of zeroes are –3 and 2 respectively.
14. Find the value of k, If both the roots of $2x^2 + kx + 3 = 0$, are equal.
15. State Thales theorem
16. Is Sin (A+B) = Sin A+ Sin B Justify your answer.
17. A circus artist is climbing a 20 m long rope which is tightly stretched and tied from the top of a vertical pole on the ground. Find the height of pole, if the angle made by rope with the ground level is 30^0.
18. A tangent at a point P of a circle of radius 5 cm meets a line through the centre O at a point Q such that OQ = 12 cm Find the Length of PQ ?
19. Find the Total surface area of hemisphere of radius 10 cm. (use = p 3.143)
20. Find the diameter of the circle with centre (2, -3) and on a point lies on circle (1,4).

SECTION - III **8 x 4 = 32**

Note: Answer all the questions. Each question carries 4 marks.

21. A game consists of spinning an arow which comes to rest pointing at one of the number 1, 2, 3, 4, 5, 6, 7, 8 and are equally likely out comes. What is the probability that it will point at 8 ? Now create 4 such type of questions.

22. Find the Mode of the given data.

C.I.	5-15	15-25	25-35	35-45	45-55	55-65
f	6	11	21	23	14	5

23. A cubical block of side 7 cm is surrounded by a hemisphre. What is the greatest diameter the hemisphere can have ? Find the surface area of the solid.

24. Find the roots of the quadratic equation $6x^2-x-2=0$.

25. State whether the following are true or false Justify your answer.

(i) $\text{Sin } \theta = \frac{4}{3}$ for some angle θ

(ii) $\text{Sin } \theta = \text{Cos } q$ for all values of θ.

(iii) The value of cos q increases as θ increases.

(iv) Tan A is not defined for $A = 90^0$

26. How many two digit numbers are divisible by 3.

27. Prove that length of tangents drawn from external point to a circle are equal.

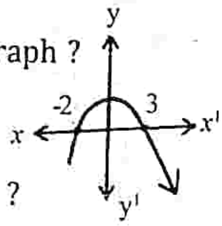
28. By observing the graph Answer the following equations

i) What is the shape of the graph ?

ii) How many zeroes it has ?

iii) Find the sum of zeroes ?

iv) Find the product of zeroes ?



SECTION - IV **5 x 8 = 40**

Note: Answer 5 questions according to the internal choice given. Each question carries 8 Marks.

29. Is $3-2\sqrt{5}$ irrational ? Justify by your answer

(OR)

30. The diagonals of a quadrilateral ABCD intersect each other at the point O, such that $\frac{AO}{BO}=\frac{CO}{DO}$ show that ABCD is a trapezium.

31. Find the area of rhombus of its vertices are (3,0) (4,5) (-1,4) and (-2, -1) taken in order.

(OR)

32. A horse is tied to a peg at one corner of square shaped grass fieled of side 15 m by means of 5 m long rope. Find (i) the area of that part of the field in which horse can graze (ii) The increase in the grazing area if the rope was 10 m long instead of 5m (use p= 3.14)

33. Five cards the ten, Jack, queen, king and ace of diamonds are well stuffled with face downwareds one card is then picked at random

(i) What is the probability that the card is the queen

(ii) If the queen card is drawn and put aside what is the probability that the second card picked up (a) an ace (b) a queen.

(OR)

34. The angle of depression of the top and bottom of an 8 m tall building from the top of a multy stored building are 30^0 and 45^0 respectively. Find the height of the multy stored building and the distance between the two buildings.

35. The following frequency distrubution gives the monthly consumption of electricity of 68 consumers of a locality. Find median monthly consumption.

Monthly consumption (in units)	65-85	85-105	105-125	125-145	145-165	165-185	185-205
Number of consumers	4	5	13	20	14	8	4

(OR)

36. Solve the following

i) For what value of n are the n^{th} terms of AP's : 63, 65, 67,..... and 3, 10, 17,.... equal ?

ii) How many terms of he A.P = 24, 21, 18,..... must taken so that their sum is 78 ?

37. Solve the following pair of linear equations graphically 6x - 3y + 10 = 0 and 2x - y + 9 = 0

(OR)

38. 10 students of class X took part in mathematics quiz. If the number of girls is 4 more than the number of boys. Find the number of boys and girls who took part in the quiz.

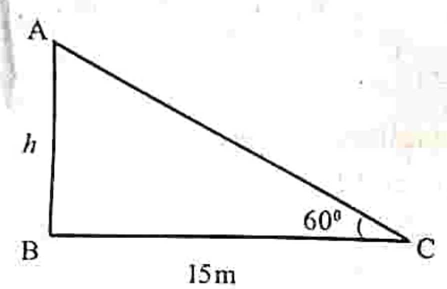
MATHS PAPER - 4 - SOLUTIONS

SECTION - I

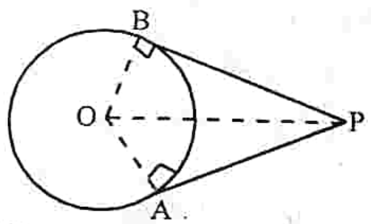
1. LCM = $2^3 \times 3^3 \times 5 = 1080$

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

2. Straight line
3. A
4. $4x + 6y + 16 = 0$
5. B   6. A   7. D
8.



9. C   10. B



PA, PB are two tangents drawn from external point P to the circle.

. $x^2 - 3x + 2 = 0$

SECTION - II

. $\alpha + \beta = -3$

$\alpha\beta = 2$

Quadratic polynomial

$x^2 - (\alpha + \beta)\,x + \alpha\beta$

$= x^2 - (-3)\,x + 2 = x^2 + 3x + 2$

. Given equation

$2x^2 + kx + 3 = 0$

$a = 2 \quad b = k \quad c = 3$

it has equal real roots

$b^2 - 4ac = 0$

$k^2 - 4.2.3. = 0$

$k^2 = 24$

$k = \pm\sqrt{24}$

$k = \pm 2\sqrt{6}$

15. **Thales theorem :**

    If a line drawn parallel to one side of triangle it will divide the other two sides in the same ratio.

16. For $A = 30^0 \quad B = 60^0$

    LHS = $\sin(A+B) = \sin(30^0 + 60^0) = \sin 90^0 = 1$

    RHS = $\sin A + \sin B = \sin 30^0 + \sin 60^0$

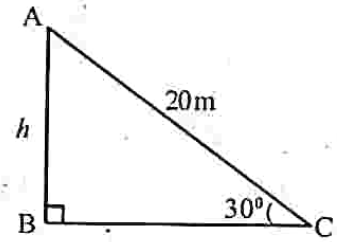
    $= \frac{1}{2} + \frac{\sqrt{3}}{2}$

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

    LHS $\neq$ RHS

    $\sin(A+B) \neq \sin A + \sin B$

17.



AC = length of rope = 20 m

AB = height of pole = h

In ΔABC,

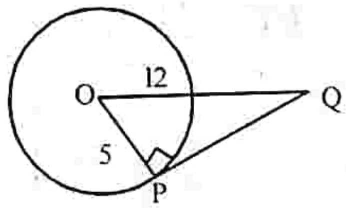
$\sin 30^0 = \frac{\text{Opp.side}}{\text{Hypotenuse}}$

$\frac{1}{2} = \frac{h}{20}$

$2h = 20 \quad \Rightarrow h = 10$ m

$\therefore$ height of pole = 10 m

18.



Length of PQ $= \sqrt{d^2 - r^2}$

$= \sqrt{12^2 - 5^2}$

$= \sqrt{144 - 25}$

$= \sqrt{119}$ cm

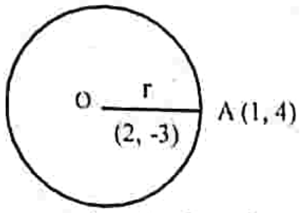
19. Given r = 10 cm

TSA of hemisphere = $3pr^2$

$= 3 \times 3.143 \times 10 \times 10$

$= 942.9\ cm^2$

20.



Given, centre O (2, −3)

and A (1, 4)

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

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

$= \sqrt{(-1)^2 + 7^2}$

$= \sqrt{50}$ unit

diameter = 2r

$= 2\sqrt{50}$ units

SECTION - III

21.i) What is the probability that it will point at an odd number

ii) What is the probability that it will point at prime number

iii) What is the probability that it will not point at 8

iv) What is the probability that it will point at factor of 6.

22. Given

C.I	f
5-15	5
15-25	11
25-35	21 (f_0)
35-45	25 (f_1)
45-55	14 (f_2)
55-65	5

$l = 35$

$h = 10$

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

$$= 35 + \frac{26-21}{2(23)-21-14} \times 10$$

$$= 35 + \frac{2}{46-35} \times 10$$

$$= 35 + \frac{20}{11}$$

$= 35 + 1.8$

$= 36.8$

Mode = 36.8

23. Cube : a = 7 cm

hemisphere : r = 7 cm

$r = \frac{7}{2}$

The greatest diameter of hemisphere = 7 cm

Surface area of solid

$= 6a^2 - \pi r^2 + 2\pi r^2$

$= 6a^2 + \pi r^2$

$$= 6 \times 7 \times 7 + \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2}$$

$$= 294 + \frac{77}{2}$$

$= 294 + 38.5$

$= 332.5\ cm^2$

24. Given quadratic equation

$6x^2 + x - 2 = 0$

$6x^2 - 4x + 3x - 2 = 0$

$2x(3x - 2) + 1(3x - 2) = 0$

$(3x - 2)(2x + 1) = 0$

$3x - 2 = 0$	$2x + 1 = 0$
$3x = 2$	$2x = -1$
$x = \frac{2}{3}$	$x = \frac{-1}{2}$

Roots are $\frac{2}{3}, \frac{-1}{2}$

25.i) False

Reason :

$\text{Sin}\,\theta = \dfrac{\text{Opp.side}}{\text{Hypotenuse}}$ and hypotenuse is the greatest side of triangle

ii) False.

Reason : It is true only for q = 45°

ii) False.

Reason : Cos 0 = 1, cos 90° = 0

as 0° > 90° ⇒ cos 0° < cos 90°

v) True

Reason : Tan 90° = not defined.

6. The 2-digits numbers divisible by 3 are :

12, 15, 18, 21, ... 99

$a = 12,\ d = 3,\ a_n = 99$

$a + (n-1)\,d = 99$

$12 + (n-1)\,3 = 99$

$(n-1)\,3 = 99-12$

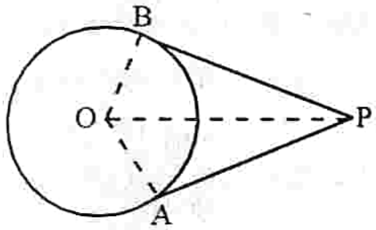
$(n-1)\,3 = 87$

$n-1 = 29$

$n = 29 + 1$

$n = 30$

No.of 2-digit numbers divisible by 3 = 30.



PA, PB are leangth of tangents drawn from external point P to a circle of center O.

To prove that PA = PB

Join OA, OB and OP

In ΔOAP ΔOBP

∠OAP = ∠OBP (90°)

OP = OP (Common)

OA = OB (Radius)

By RHS congruence

ΔOAP ≅ ΔOBP

⇒ PA = PB

Hence the proof.

28. i) Parabola

ii) 2 zeroes

iii) $\alpha = -2,\ \ \beta = 3$

iv) $\alpha\beta = -2 \times 3 = -6.$

SECTION - IV

29. Let $3-2\sqrt{5}$ is a rational number

$$3-2\sqrt{5} = \frac{a}{b}$$

$$-2\sqrt{5} = \frac{a}{b} - 3$$

$$-2\sqrt{5} = \frac{a-3b}{b}$$

$$2\sqrt{5} = \frac{-a+3b}{b}$$

$$\sqrt{5} = \frac{-a+3b}{2b}$$

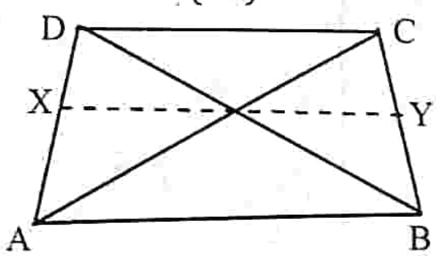
$\sqrt{5}$ is a rational number.

It is a contridiction, our assumption is wrong

$\therefore 3-2\sqrt{5}$ is an irrational number

(OR)

30.



given, In a quadrilateral ABCD, the diagonals intersect at O such that $\dfrac{AO}{BO} = \dfrac{CO}{DO}$

$$\frac{AO}{CO}=\frac{BO}{DO} \quad \text{— (1)}$$

To show that ABCD is a trapezium (i.e AB||DC)

We draw a line XY || AB passes through O

In DABCD,

$$OX||AB \Rightarrow \frac{AX}{XO}=\frac{BO}{DO} \quad \text{— (2)}$$

from (1) and (2)

$$\frac{AO}{CO}=\frac{AX}{XO}$$

$\Rightarrow$ OX || DC

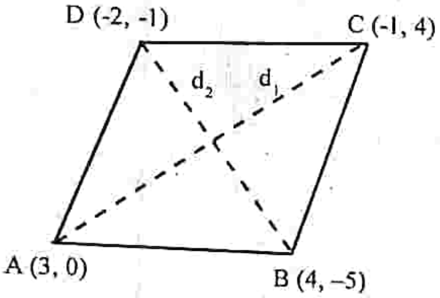
$\Rightarrow$ XY || DC

XY || AB and XY || DC

$\Rightarrow$ AB || DC

$\therefore$ ABCD is a trapezium.

31.



Given

ABCD is a rhombus

AC and BD are diagonals

$$AC\ (d_1)=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$$

$$=\sqrt{[1-3]^2+(0-4)^2}$$

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

$$=\sqrt{16+16}$$

$$=\sqrt{2\times16}$$

$$=4\sqrt{2}$$

$$BD\ (d_2)=\sqrt{(-2-4)^2+(-1-5)^2}$$

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

$$=\sqrt{36+36}$$

$$=\sqrt{2\times36}$$

$$=6\sqrt{2}$$

$$\text{Area of Rhombus}=\frac{1}{2}\,d_1\,d_2$$

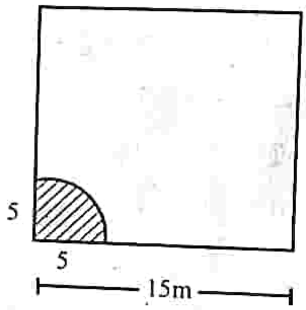
$$=\frac{1}{2}\times4\sqrt{2}\times6\sqrt{2}$$

$$=12\times2$$

$$=24 \text{ squnits}$$

OR

32.



i) Area of grass field in which the horse car graze is the area of sector with measures

$r = 5$ cm and $x = 90^0$

$$\text{Area of sector}=\frac{x}{360}\times\pi r^2$$

$$=\frac{90}{360}\times3\cdot14\times5\times5$$

$$=\frac{1}{4}\times3\cdot14\times5\times5$$

$$=\frac{78\cdot5}{4}$$

$= 19.625$ cm².

ii) If rope increased in length 10 m

$r = 10$ m $x = 90^{0}$

Area filed $= \frac{x}{360} \times \pi r^2$

$= \frac{90}{360} \times 3.14 \times 10 \times 10$

$= 78.5\ m^2$

3. Given well shuffled 5 cards

S = {10, J, Q, K, A}

n (S) = 5.

) The card is queen, n (E) = 1

P (the card is queen) $= \frac{n(E)}{n(S)} = \frac{1}{5}$

The queen card is put a side

S = {10, J, K, A}

n (S) = 4

The card is an ace

n (E) = 1

P (ace card) $= \frac{n(E)}{n(S)} = \frac{1}{4}$

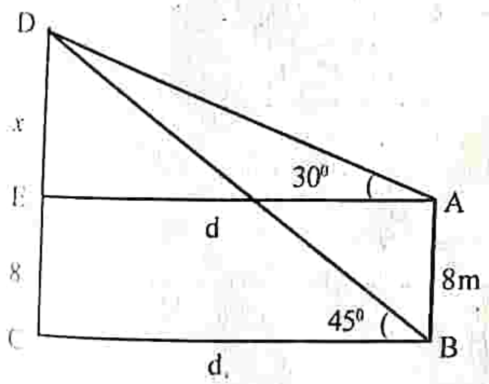
The card is queen

n (E) = 0

P (queen card) $= \frac{n(E)}{n(S)} = \frac{0}{4} = 0$

Which is an impossible event

(OR)



AB = height of building = 8 m

CD = height of multi stored building = $x + 8$

BC = distance = dm

In ΔAED

$\text{Tan}30^{\circ} = \frac{\text{opp.side}}{\text{adjside}}$

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

$d = \sqrt{3}x$ — (1)

In ΔBCD

$\text{Tan}45^{0} = \frac{\text{opp.side}}{\text{adj.side}}$

$= \frac{x+8}{d}$

$x+8 = \sqrt{3}$ — (2)

From (1) & (2)

$\sqrt{3}x - x = 8$

$(\sqrt{3}-1)x = 8$

$x = \frac{8}{\sqrt{3}-1} \times \frac{\sqrt{3}+1}{\sqrt{3}+1}$

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

height of multistored building

$= x + 8$

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

$= 4\sqrt{3}+12$

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

distance between two buildings

$d = \sqrt{3}\,x$

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

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

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

35.

C.I.	f	C.F
65 - 85	4	4
85 - 105	5	9
105 - 125	13	22 (cf)
125 - 145	20 (f)	42
145 - 165	14	56
165 - 185	8	64
185 - 205	4	68 (n)

$$\frac{n}{2} = \frac{68}{2} = 34$$

$$\text{Median} = l + \frac{\frac{n}{2} - cf}{f} \times h$$

$$= 125 + \frac{34 - 22}{20} \times 20$$

$= 125 + 12$

$= 137$

(OR)

36. i) AP : 63, 65, 67, ...

$a = 63$ $d = 65 - 63 = 2$

$a_n = a + (n - 1)d$

$= 63 + (n - 1) \times 2$

$= 63 + 2n - 2$

$= 61 + 2n$

$AP_2 = 3, 10, 17, \ldots.$

$a = 3$ $d = 10 - 3 = 7$

$a_n = a + (n - 1)\, 7$

$= 3\,(n - 1)\, 7$

$= 3 + 7n - 7$

$= 7n - 4$

According to given

$7n - 4 = 61 + 2n$

$7n - 2n = 61 + 4$

$5n = 65$

$n = 13$

$\therefore n = 13.$

ii) Given AP : 24, 1, 18, . . .

$a = 24,\quad d = 21 - 24 = -3$

$S_n = 78$

$$\frac{n}{2}[2a + (n-1)d] = 78$$

$$\frac{n}{2}[2(24) + (n-1)(-3)] = 78$$

$n\,[48 - 3n + 3] = 78 \times 2$

$n\,(51 - 3n) = 156$

$51n - 3n^2 - 156 = 0$

$-3n^2 + 51n + 156 = 0$

$3n^2 - 51n - 156 = 0$

$n^2 - 17n + 52 = 0$

$n^2 - 13n - 4n + 52 = 0$

$n(n - 13) - 4(n - 13) = 0$

$(n - 13)(n - 4) = 0$

$n - 13 = 0$ | $n - 4 = 0$

$n = 13$ | $n = 4$

$\therefore$ n is either 4 or 13.

37. Given pair of equation

$6x - 3y + 10 = 10$

$2x - y + 9 = 0$

$$\frac{a_1}{a_2} = \frac{6}{2} = 3 \;\Big|\; \frac{b_1}{b_2} = \frac{-3}{-1} = 3 \;\Big|\; \frac{c_1}{c_2} = \frac{10}{9}$$

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

In consistent and no solution

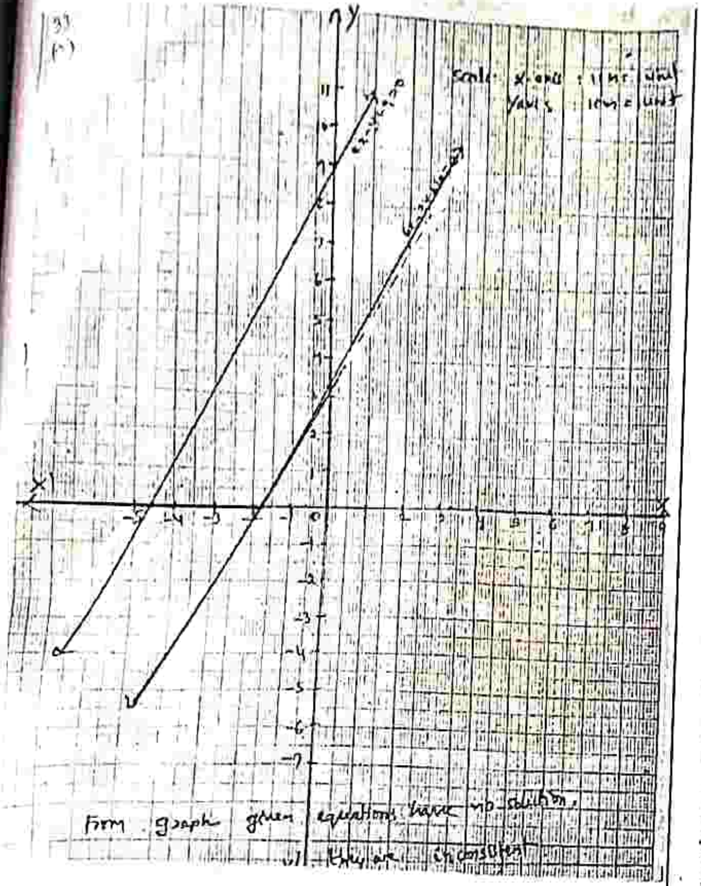
$6x - 3y + 10 = 0$

x	y	(x, y)
0	3.3	(0, 3.3)
– 1.7	0	(– 1, 7, 0)

$2x - y + 9 = 0$

x	y	(x, y)
0	9	(0, 9)
– 4.5	0	(– 4,.5, 0)

From the graph no solution of given equations



(OR)

38. number of boys = x

number of girls = y

according to given

$x + y = 10$ --- (1)

$y = x + 4$ --- (2)

$x + y = 10$

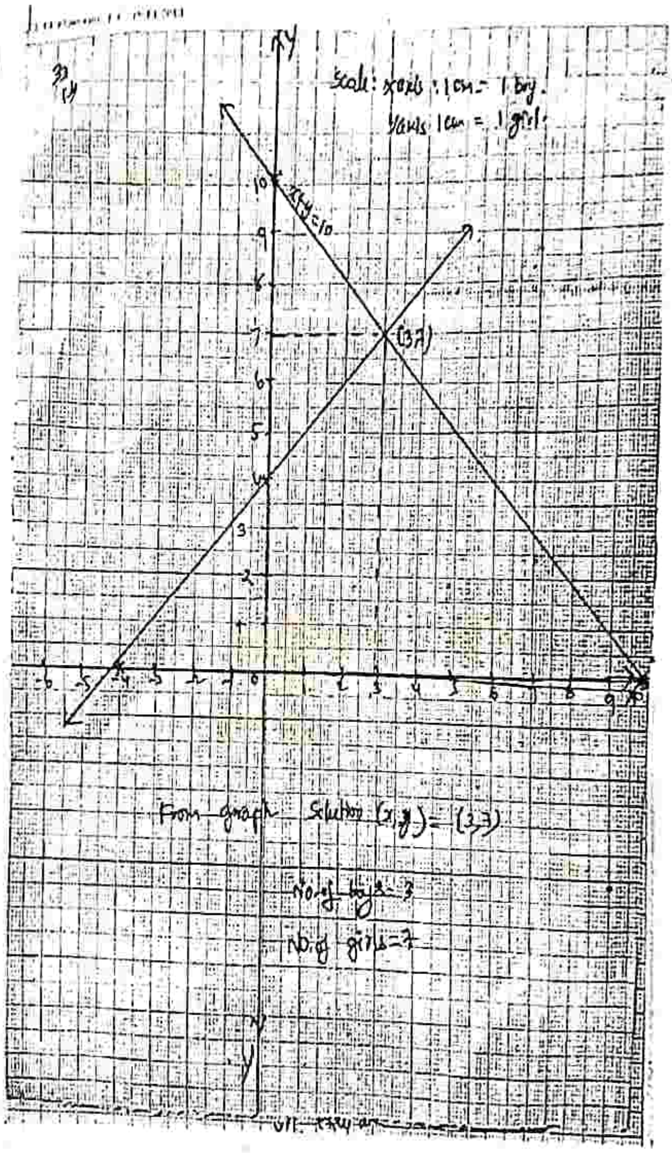
x	y	(x, y)
0	10	(0, 10)
10	0	(10, 0)

$y = x + 4$

x	y	(x, y)
0	4	(0, 4)
– 4	0	(– 4, 0)

From the graph

Solution (x, y) = (3, 7)



□□□

UTF