Set-A

Roll No. ....18.........

PRE BOARD-I, 2023-24

MG-220

MATHEMATICS

Time : 3 hrs.]

Class X

[M.M. : 80

## General Instructions—

(i) This question paper contains five sections A, B, C, D and E.

(ii) Section A has 18 MCQs and 02 Assertion-Reason based questions of 1 mark each.

(iii) Section B has 5 Very Short Answer (VSA) type questions of 2 marks each.

(iv) Section C has 6 Short Answer (SA) type questions of 3 marks each.

(v) Section D has 4 Long Answer (LA) type questions of 5 marks each.

(vi) Section E has 3 case based integrated units of assessment (4 marks each) with sub parts of the values of 1, 1 and 2 marks each respectively.

(vii) All questions are compulsory. However, an internal choice in 2 questions of 5 marks, 2 Qs of 3 marks and 2 questions of 2 marks has been provided. An internal choice has been provided in the 2 marks questions of Section E.
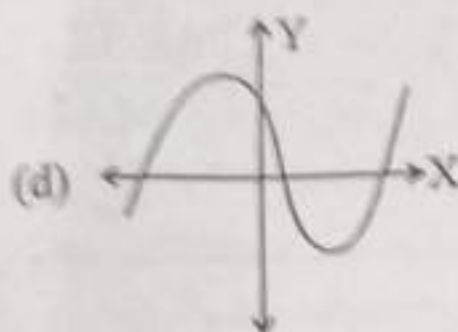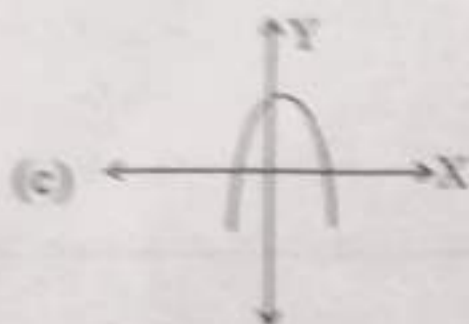
## SECTION-A

Section A consists of 20 questions of 1 mark each—

1. If 3 is the least prime factor of number a and 7 is the least prime factor of b then the least prime factor of (a+b) is :

(a) 2

(b) 3

(c) 5

(d) 10

2. Which of the following is not the graph of a quadratic polynomial ?

(a)

(b)

(c)

(d)
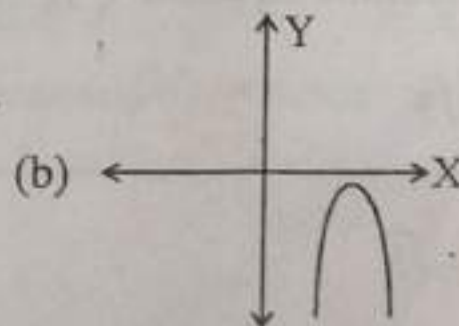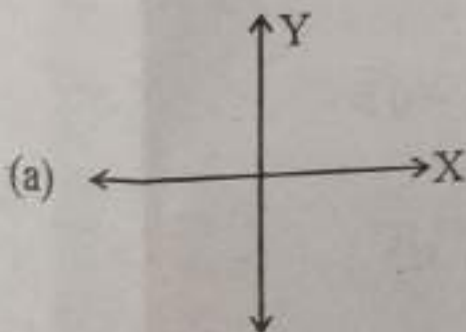
3. The lines representing the given pair of linear equation are non intersecting which of the following statement is true—
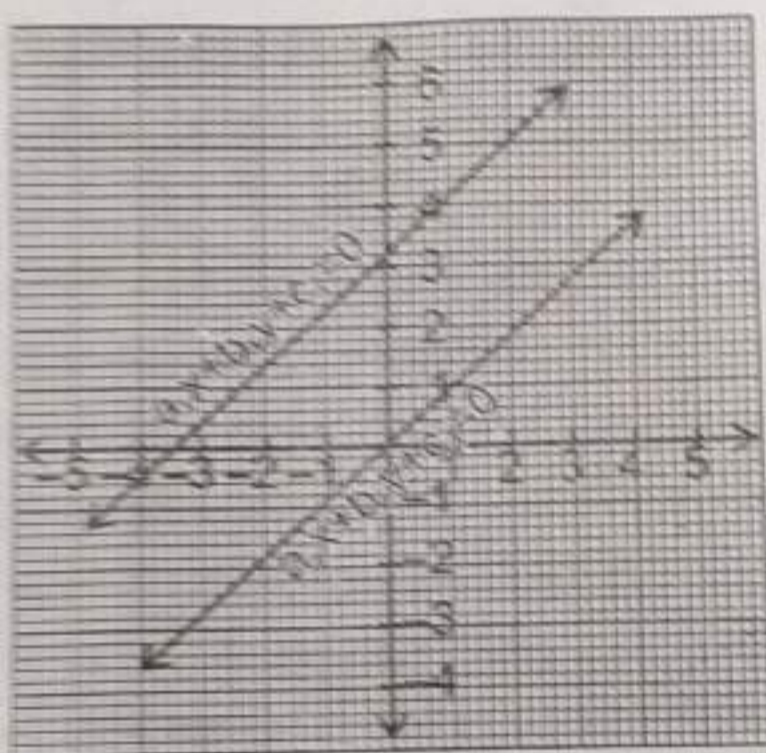
(a) $\dfrac{a_1}{a_2} = \dfrac{b_1}{b_2} = \dfrac{c_1}{c_2}$

(b) $\dfrac{a_1}{a_2} = \dfrac{b_1}{b_2} \neq \dfrac{c_1}{c_2}$

(c) $\dfrac{a_1}{a_2} \neq \dfrac{b_1}{b_2} = \dfrac{c_1}{c_2}$

(d) None

4. Roots of quadratic equation $\sqrt{3}x^2 + 10x + 7\sqrt{3} = 0$:

(a) $\dfrac{7}{\sqrt{3}}, \sqrt{3}$

(b) $-\dfrac{7}{\sqrt{3}}, -\sqrt{3}$

(c) $\dfrac{7}{\sqrt{3}}, -\sqrt{3}$

(d) $-\dfrac{7}{\sqrt{3}}, \sqrt{3}$

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(c

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7.

8.

9.

5. The nth term of an AP is $(7-4n)$, then what is the common difference :

(a) 3

(b) −4

(c) −1

(d) None

6. The value of discriminant for $x^2 - (\sqrt{2}+1)x + \sqrt{2} = 0$:

(a) $\sqrt{2}+1$

(b) $2\sqrt{2}$

(c) $3+\sqrt{2}$

(d) $3-2\sqrt{2}$

7. The end points of diameter of circle are $(2, 4)$ and $(-3, -1)$. The radius of circle is:

(a) $\dfrac{5\sqrt{2}}{2}$ units

(b) $5\sqrt{2}$ units

(c) $3\sqrt{2}$ units

(d) $\pm\dfrac{5\sqrt{2}}{2}$ units

8. Shown below are 3 triangles. The measures of two adjacent sides and included angle are given for each triangle. Which of these triangles are similar ?
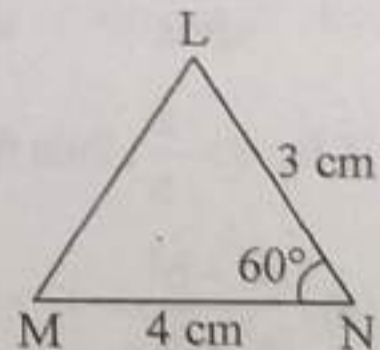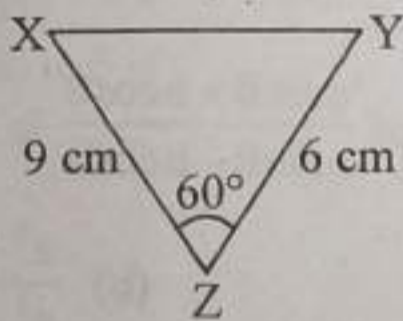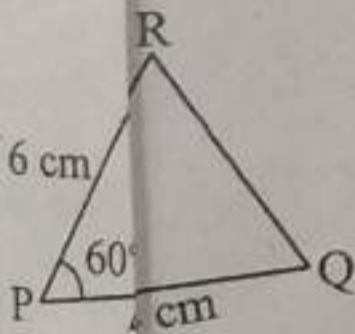
(a) $\triangle R?Q$ and $\triangle XZY$

(b) $\triangle RPQ$ and $\triangle MNL$

(c) $\triangle XZY$ and $\triangle MNL$

(d) None

9. If O is centre of circle and chord PQ makes an angle $50°$ with the tangent PR at the point of contact P, then the angle subtended by the chord at the centre is :
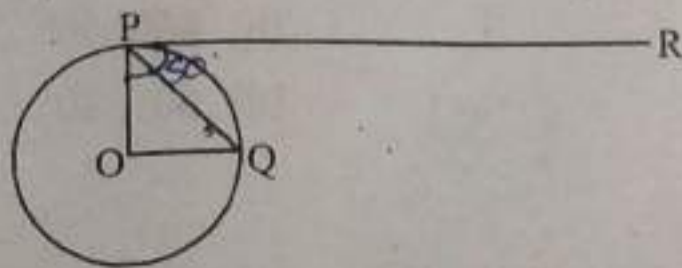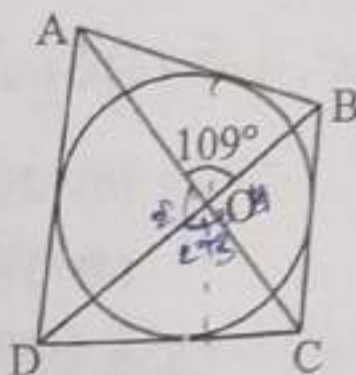
(a) 130°

(b) 100°

(c) 50°

(d) 30°

10. In given figure if $\angle AOB = 109°$ then find $\angle COD$.

(a) 109°

(b) 71°

(c) 153°

(d) None

11. $\dfrac{\sin \theta}{1 + \cos \theta}$ is equal to :

(a) $\dfrac{1 + \cos \theta}{\sin \theta}$

(b) $\dfrac{1 - \cos \theta}{\cos \theta}$

(c) $\dfrac{1 - \cos \theta}{\sin \theta}$

(d) $\dfrac{1 - \sin \theta}{\cos \theta}$

12. If $\tan \theta = \dfrac{a}{b}$, then the value of $\dfrac{a \sin \theta + b \cos \theta}{a \sin \theta - b \cos \theta}$ is :

(a) $\dfrac{a^2 - b^2}{a^2 + b^2}$

(b) $\dfrac{a^2 + b^2}{a^2 - b^2}$

(c) $\dfrac{a}{a^2 + b^2}$
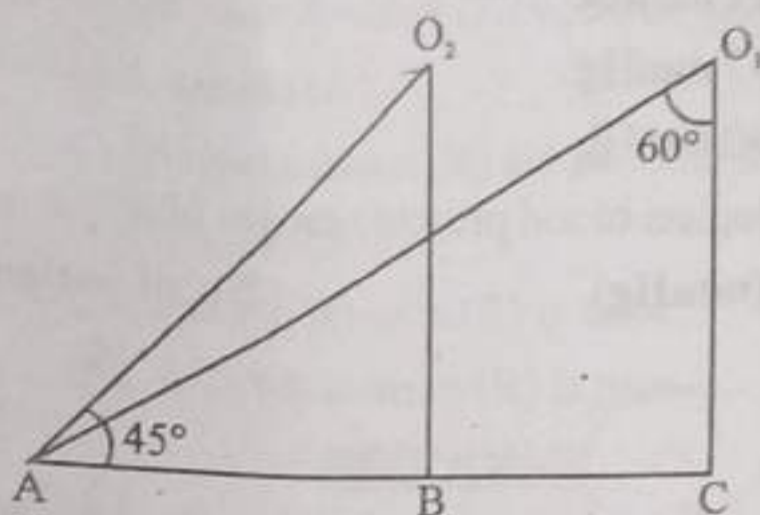
(d) $\dfrac{b}{a^2 + b^2}$

13. In the given figure the angles of depressions from observing positions O_1 and O_2 respectively of the object A are—

(a) 30°, 45°

(b) 45°, 60°

(c) 60°, 75°

(d) 60°, 30°

14. The area of a square that can be inscribed in a circle of radius 8 cm is :

(a) 256 cm²

(b) 128 cm²

(c) $64\sqrt{2}$ cm²

(d) 64 cm²

15. What is the angle subtended at the centre of a circle of radius 5 cm by an arc length 4π cm ?

(a) 108°

(b) 144°

(c) 72°

(d) 100°

16. Two dice are thrown together. The probability of getting difference of numbers on their upper faces equals to 3 is :

(a) $\dfrac{1}{9}$

(b) $\dfrac{2}{9}$

(c) $\dfrac{1}{6}$

(d) $\dfrac{1}{12}$

17. Two coins are tossed simultaneously. Find the probability of getting atleast one head.

(a) $\dfrac{1}{4}$

(b) 0

(c) $\dfrac{1}{2}$

(d) $\dfrac{3}{4}$

18. Sweety, Nitesh and Ashraf visited a hospital for checkup of their blood pressure. The results are as follows :

Sweety : 121 mmHg

Nitesh : 147 mmHg

Ashraf : 160 mmHg

The table below depicts blood pressure ranges of all patients.

Blood pressure (mmHg)	No. of patients
115-125	10
125-135	9
135-145	12
145-155	19 .
155-165	10

Who among the three friends have a blood pressure reaching that falls in the modal class ?

(a) Sweety

(b) Nitesh

(b) Ashraf

(d) None

19. Assertion (A) : Total surface area of cylinder having radius of base 14 cm and height 30 cm is 3872 cm^2.

Reason (R) : Total surface area $= 2\pi rh + 2\pi r^2$ if r and h are radius and height of cylinder.

(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.

20. Assertion (A) : Sum of natural number from 1 to 100 is 5050.

Reason (R) : Sum of n natural number is $\dfrac{n(n+1)}{2}$

(a)

(b)

(c)

(d)

S

21. L

n

22. I

23.

(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.

SECTION-B

Section B consists of 5 questions of 2 marks each—

21. LCM of two numbers is 10 times their HCF. Sum of HCF and LCM is 495. If one number is 90 then find the other number.

22. In the given figure considering $\triangle BEP$ and $\triangle CPD$, prove that—

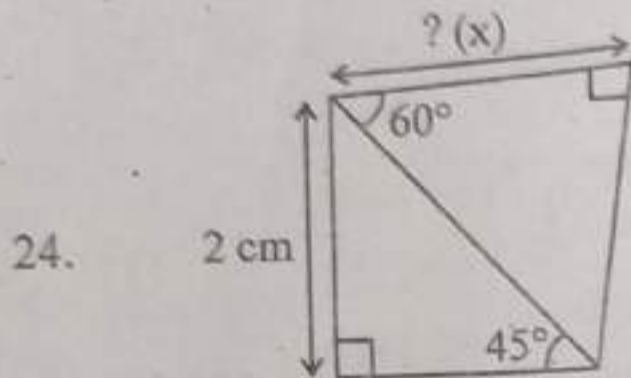$$BP \times PD = EP \times PC$$
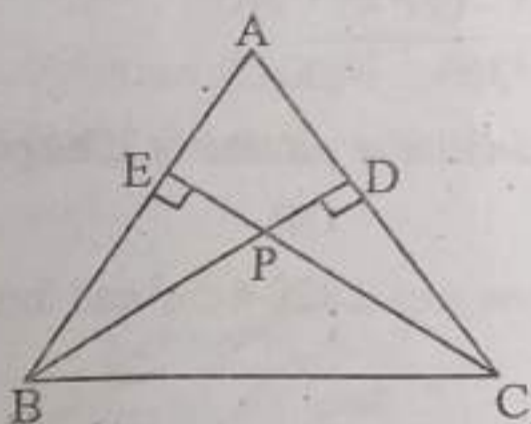
23. Shown below is a circle with centre O and 3 tangents drawn at points A, E and C. AE is a diameter of circle. The tangents intersect at points B and D.
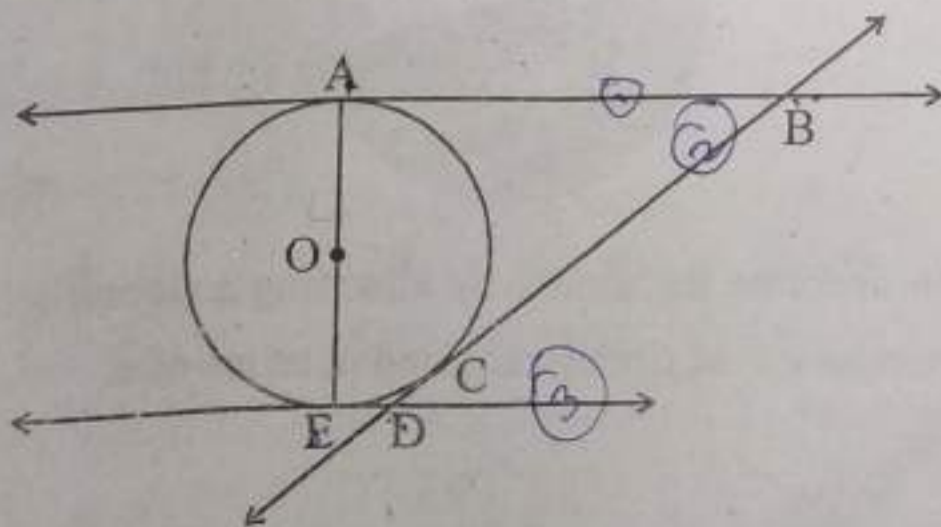
Based on above information evaluate whether the following statement is true or false. Justify your answer.

Atleast one pair of opposite sides of AEDB is parallel.

24.

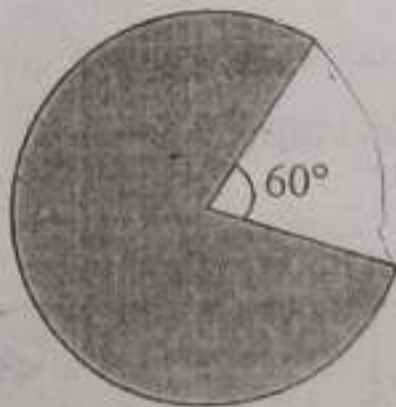
Shown above are 2 right triangles. Find x (unknown side)

OR

Evaluate :

$$\frac{5\cos^2 60° + 4\sec^2 30° - \tan^2 45°}{\sin^2 30° + \cos^2 30°}$$

25. Find the diameter of semi-circular protractor if its perimeter is 36 cm.

OR

Wasim made a model whose area is $120\,\pi\ cm^2$ and forms an angle of 60° at centre of circle.

Wasim wants to decorate the model by attaching a ribbon to entire boundary. What is minimum length of ribbon required in terms of π.

Section C consists of 6 questions of 3 marks each.

26. Prove that $2\sqrt{5} - 3$ is an irrational number.

27. If $\frac{2}{3}$ and -3 are zeroes of zeroes of polynomial $ax^2 + 7x + b$ then find a and b.

28. Points A and B are 70 km apart on a highway. A car starts from A and another car from B. If they travel in same direction they meet in 7 hours but if they travel towards each other they meet in 1 hour. Find speed of two cars.
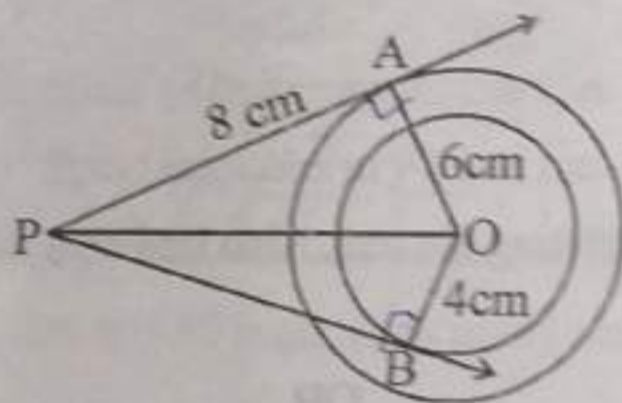
OR

Find solution of $\frac{x}{10} + \frac{y}{5} = 1$, $\frac{x}{8} + \frac{y}{6} = 15$

Hence find m if $y = mx + 5$

29. Two tangents TP and TQ are drawn to a circle with centre O from an external point T. Prove that $\angle PTQ = 2\angle OPQ$.

OR

In figure two concentric circles are of radii 6 cm and 4 cm with centre O. If AP is tangent to the larger circle and BP to the smaller circle and AP = 8 cm. Find length of BP.

30. If $\sin\theta + \csc\theta = 3$, find the value of $\dfrac{\sin^4\theta + 1}{\sin^2\theta}$

31. If mean of the data is 25 find p.

C.I.	0-10	10-20	20-30	30-40	40-50
Frequency	5	18	15	p	6

SECTION-D

Section D consists of 4 questions of 5 marks each—

32. Find the value of K for which quadratic equation $(3K+1)x^2+2(K+1)x+1=0$ has equal roots. Also find the roots.

OR

A person on tour has Rs. 10800 for his expenses. If he extends his tour by 4 days he has to cut down his daily expenses by Rs. 90. Find original duration of tour.

33. State and prove basic proportionality theorem.

Using theorem do the following. In figure DE || BC, BD = CE. Prove $\triangle ABC$ is isosceles.
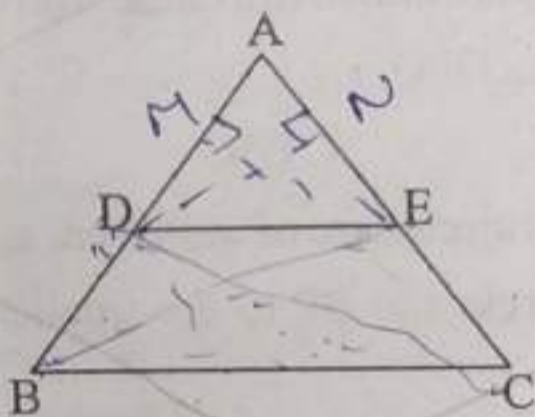
34. A tent is in the shape of cylinder surmounted by a conical top. If height and radius of cylindrical part are 3 m and 14 m and total height of tent is 13.5 m, find area of canvas required for making the tent. Also find cost of canvas to be purchased at rate of Rs. 500/m².

OR

Carpenter made a wooden article by scooping out a hemisphere from each end of a solid cylinder as shown height of cylinder is 20 cm and radius of its base is 3.5 cm. Find total surface area of article.

3.5cm

20cm
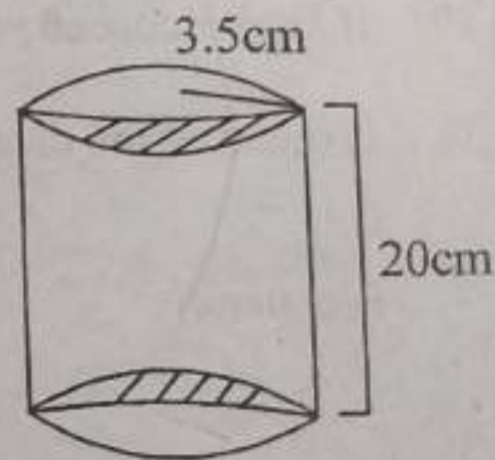
35. If mean of fc

Class Inte

0-30

30-60

60-90

90-12(

120-1

150-1

36. The schoo

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(iii) If t

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35. If mean of following frequency distribution is 91. Find f_1 and f_2.

Class Interval	Frequency
0-30	12
30-60	21
60-90	f_1
90-120	52
120-150	f_2
150-180	11
	$\overline{150}$

SECTION-E

36. The school auditorium was to be constructed to accommodate at least 1500 people. The chairs are to be placed in concentric circular arrangement in such a way that each succeeding circular row has 10 seats more than the previous one. $1+2+1$
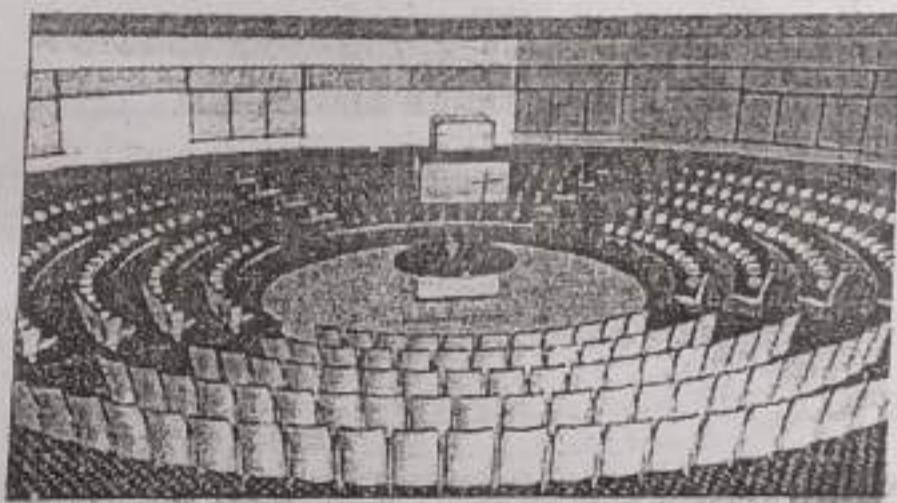

(i) If the first circular row has 30 seats, how many seats will be there in the 10th row?

(ii) For 1500 seats in the auditorium, how many rows need to be there?

OR

If 1500 seats are to be arranged in the auditorium, how many seats are still left to be put after 10th row?

(iii) If there were 17 rows in the auditorium, how many seats will be there in the middle row?

37. Bani has intersecting wall shelves in her living room. The graph of intersecting wall shelves is given on the right.
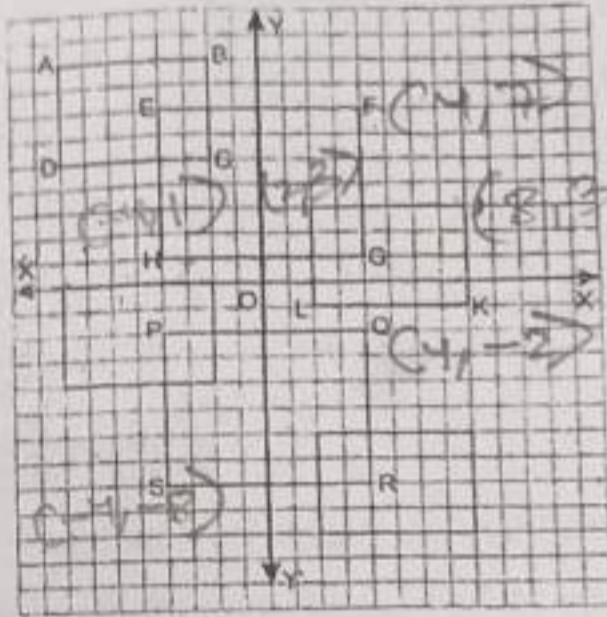
(i) What are the coordinates of the mid-point of line joining I and J ?   2

OR

Find the distance between the points F and H.

(ii) For what value of a, the coordinates of the mid-point of line joining SQ are (0, a).   1

(iii) Find the ratio in which x-axis divides the line-segment joining the points C(–2, 5) and K(8, –1).   1

38. Kite festival is celebrated in many countries at different times of the year. In India, every year 14th January is celebrated as International Kite Day. On this day many people visit. India and participate in the festival by flying various kinds of kites. The picture given below, shows three kites flying together.
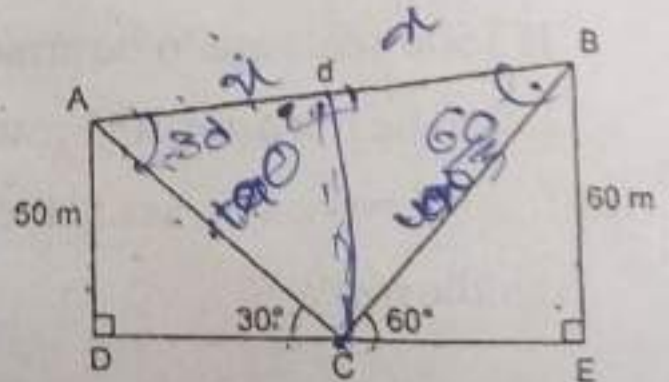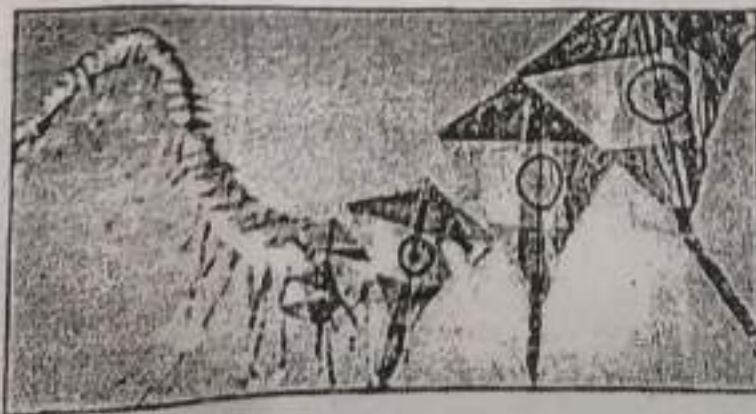
In figure, the angles of elevation of two kites (points A and B) from the hands of a man (point C) are found to be 30° and 60° respectively. Taking AD = 50 m and BE = 60 m.

(i) What is the length of string used for kite A ? 1

(ii) What is the length of string used for kite B? 1

(iii) Find the distance 'd' between these two kites. 2

OR

What is the length of DE?