

HALF YEARLY EXAMINATION-2024-25

Class X

MATHEMATICS

TIME: 3 hours

MAX. MARKS: 80

General Instructions:

1. This Question Paper has 5 Sections A, B, C, D and E.
2. Section A has 20 MCQs carrying 1 mark each
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 case based integrated units of assessment (04 marks each) with subparts of the values of 1, 1 and 2 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 2 Qs 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 2marks questions of Section E
8. Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.

SECTION A

Section A consists of 20 questions of 1 mark each.

1. A quadratic polynomial, the sum of whose zeroes is 0 and one zero is 4, is
(a) $x^2 - 16$ (b) $x^2 + 16$ (c) $x^2 + 4$ (d) $x^2 - 4$
2. Graphically, the pair of equations $6x - 3y + 10 = 0$ and $2x - y + 9 = 0$ represents two lines which are
(a) Intersecting at exactly one point (b) intersecting at exactly two points
(c) coincident (d) parallel
3. Two APs have the same common difference. The first term of one of these is -1 and that of the other is -8 . Then the difference between their 4th terms is
(a) -1 (b) -8 (c) 7 (d) -9
4. For what values of k will the following pair of linear equations have infinitely many solutions?
(i) $kx + 3y - (k - 3) = 0$ (ii) $12x + ky - k = 0$
(a) -6 (b) 0 (c) 6 (d) All of these

5. What is the common difference of following AP :

$$3, 3 + \sqrt{2}, 3 + 2\sqrt{2}, 3 + 3\sqrt{2} \dots$$

- (a) 3 (b) 2 (c) $\sqrt{2}$ (d) $2\sqrt{2}$

6. The ratio of LCM and HCF of the least composite and the least prime numbers is:

- (a) 1 : 2 (b) 2 : 1 (c) 1 : 1 (d) 1 : 3

7. If one zero of the quadratic polynomial $x^2 + 3x + k$ is 2, then the value of k is

- (a) 10 (b) -10 (c) 5 (d) -5

8. The perimeter of a triangle with vertices (0, 4), (0, 0) and (3, 0) is :

- (a) 5 units (b) 12 units (c) 11 units (d) $(7 + \sqrt{5})$ units

9. If the quadratic equation $x^2 - 8x + k = 0$ has real roots, then

- (a) $k < 16$ (b) $k \leq 16$ (c) $k > 16$ (d) $k \geq 16$

10. The midpoint of a line segment joining two points A (2, 4) and B (-2, -4) is

- (a) (-2, 4) (b) (2, -4) (c) (0, 0) (d) (-2, -4)

11. The LCM of two numbers is 182 and their HCF is 13. If one of the numbers is 26, the other number is

- (a) 31 (b) 71 (c) 61 (d) 91

12. If the zeroes of the quadratic polynomial $ax^2 + bx + c$, $c \neq 0$ are equal, then

- (a) c and b have opposite signs (b) c and a have opposite signs
(c) c and b have same signs (d) c and a have same signs

13. If one root of equation $4x^2 - 2x + (k-4) = 0$ is reciprocal of the other. The value of k is:

- (a) -8 (b) 8 (c) -4 (d) 4

14. The next (4th) term of the A.P. $\sqrt{18}, \sqrt{50}, \sqrt{98}, \dots$ is:

- (a) $\sqrt{128}$ (b) $\sqrt{140}$ (c) $\sqrt{162}$ (d) $\sqrt{200}$

15. If $ax + by = a^2 - b^2$ and $bx + ay = 0$, then the value of $x + y$ is:

- (a) $a^2 - b^2$ (b) $a + b$ (c) $a - b$ (d) $a^2 + b^2$

16. If a polynomial $p(x)$ is given by $p(x) = x^2 - 5x + 6$, then the value of

$p(1) + p(4)$ is:

(a) 0

(b) 4

(c) 2

(d) -4

17. Two lines are given to be parallel. The equation of one of these lines is

$5x - 3y = 2$. The equation of the second line can be:

(a) $-15x - 9y = 5$

(b) $15x + 9y = 5$

(c) $9x - 15y = 6$

(d) $-15x + 9y = 5$

18. A card is selected at random from a well shuffled deck of 52 playing cards. The probability of its being a face card is

(a) $3/13$

(b) $4/13$

(c) $6/13$

(d) $9/13$

ASSERTION REASON BASED QUESTIONS: In question number 19 and 20, a statement of Assertion(A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices

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

(b) Both A and (R) are true and (R) is not the correct explanation of (A).

(c) (A) is true but (R) is false.

(d) (A) is false but (R) is true.

19. A number q is prime factorized as $3^2 \times 7^2 \times b$, where b is a prime number other than 3 and 7. Then

Assertion (A): q is an odd number.

Reason (R): $3^2 \times 7^2$ is an odd number.

20. Assertion(A): The probability of getting a bad egg in a lot of 400 is 0.035. The number of good eggs in the lot is 386.

Reason(R): If the probability of an event is p , the probability of its complementary event will be $1-p$

SECTION B

Section B consists of 5 questions of 2 marks each.

21. Given that $\sqrt{2}$ is irrational, prove that $5 - 3\sqrt{2}$ is irrational.

22. If α and β are the zeroes of $x^2 - x - 2$, form a quadratic polynomial whose zeroes are $2\alpha + 1$ and $2\beta + 1$.

OR

If α and β are the zeroes of $p(x) = 2x^2 + 5x + k$ such that $\alpha^2 + \beta^2 + \alpha\beta = 21/4$, find the value of k .

23. Find the value of k for which the equation $x^2 + k(2x + k - 1) + 2 = 0$ has real and equal root.

OR

Find the roots of the following quadratic equation: $\sqrt{3}x^2 - 2\sqrt{2}x - 2\sqrt{3} = 0$

24. How many three-digit numbers are divisible by 3?

25. Show that A (6,4), B (5, -2), and C (7, -2) are the vertices of an isosceles triangle.

SECTION C

Section C consists of 6 questions of 3 marks each

26. Solve $2x + 3y = 11$ and $2x - 4y = -24$ and hence find the value of ' m ' for which $y = mx + 3$

OR

Five years ago, Nuri was thrice as old as Sonu. Ten years later, Nuri will be twice as old as Sonu. How old are Nuri and Sonu.

27. Three unbiased coins are tossed simultaneously. Find the probability of getting:

(i) at least one head.

(ii) exactly one tail.

(iii) two heads and one tail.

28. If the equation $(1 + m^2)x^2 + 2mcx + c^2 - a^2 = 0$ has equal roots then show that $c^2 = a^2(1 + m^2)$

29. In an A.P., if the 12th term is -13 and the sum of its first four terms is 24, find the sum of its first ten terms.

30. In what ratio does the x-axis divide the line segment that joins the points $(-4, -6)$ and $(-1, 7)$? Find out the coordinates of the point of division.

31. Find the least number which when divided by 35, 56 and 91 leaves the same remainder 7 in each case.

SECTION D

Section D consists of 4 questions of 5 marks each

32. In a flight of 2800 km, an aircraft was slowed down due to bad weather. Its average speed is reduced by 100 km/h and time increased by 30 minutes. Find the original speed of the flight.

33. The taxi charges in a city consist of a fixed charge together with the charge for the distance covered. For a distance of 10 km, the charge paid is ₹ 105 and for a journey of 15 km, the charge paid

is ₹ 155. What are the fixed charges and the charge per km? How much does a person have to pay for travelling a distance of 25 km?

OR

Draw the graphs of the equations $x - y + 1 = 0$ and $3x + 2y - 12 = 0$. Determine the coordinates of the vertices of the triangle formed by these lines and the x-axis and shade the triangular region.

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

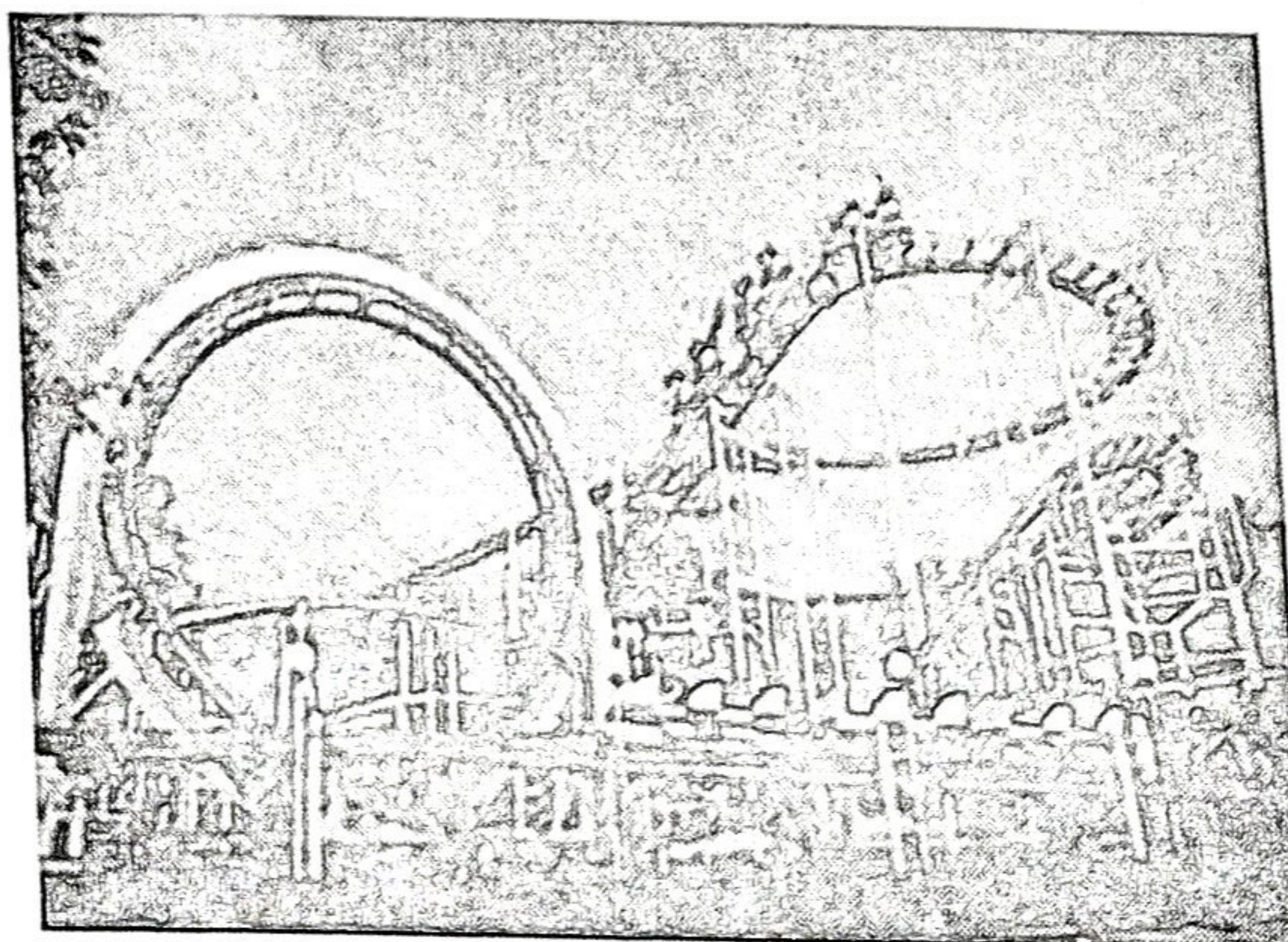
35. Prove that if a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio.

SECTION E

Section E consists of 3 Case Studies of 4 marks each

Case Study - 1

36. Essel World is one of India's largest amusement parks that offers a diverse range of thrilling rides, water attractions and entertainment options for visitors of all ages. The park is known for its iconic "Water Kingdom" section, making it a popular destination for family outings and fun-filled adventure. The ticket charges for the park are ₹ 150 per child and ₹ 250 per adult.



On a day, the cashier of the park found that 300 tickets were sold and an amount of ₹ 55,000 was collected.

Based on the above, answer the following questions:

(i) If the number of children visited be x and the number of adults

visited be y , then write the given situation algebraically.

(ii) (a) How many children visited the amusement park that day?

OR

(b) How many adults visited the amusement park that day?

(iii) How much amount will be collected if 250 children and 100 adults visit the amusement park?

Case Study - 2

37. While preparing for a competitive examination, Akbar came across a match-stick pattern-based question. The pattern is given below:

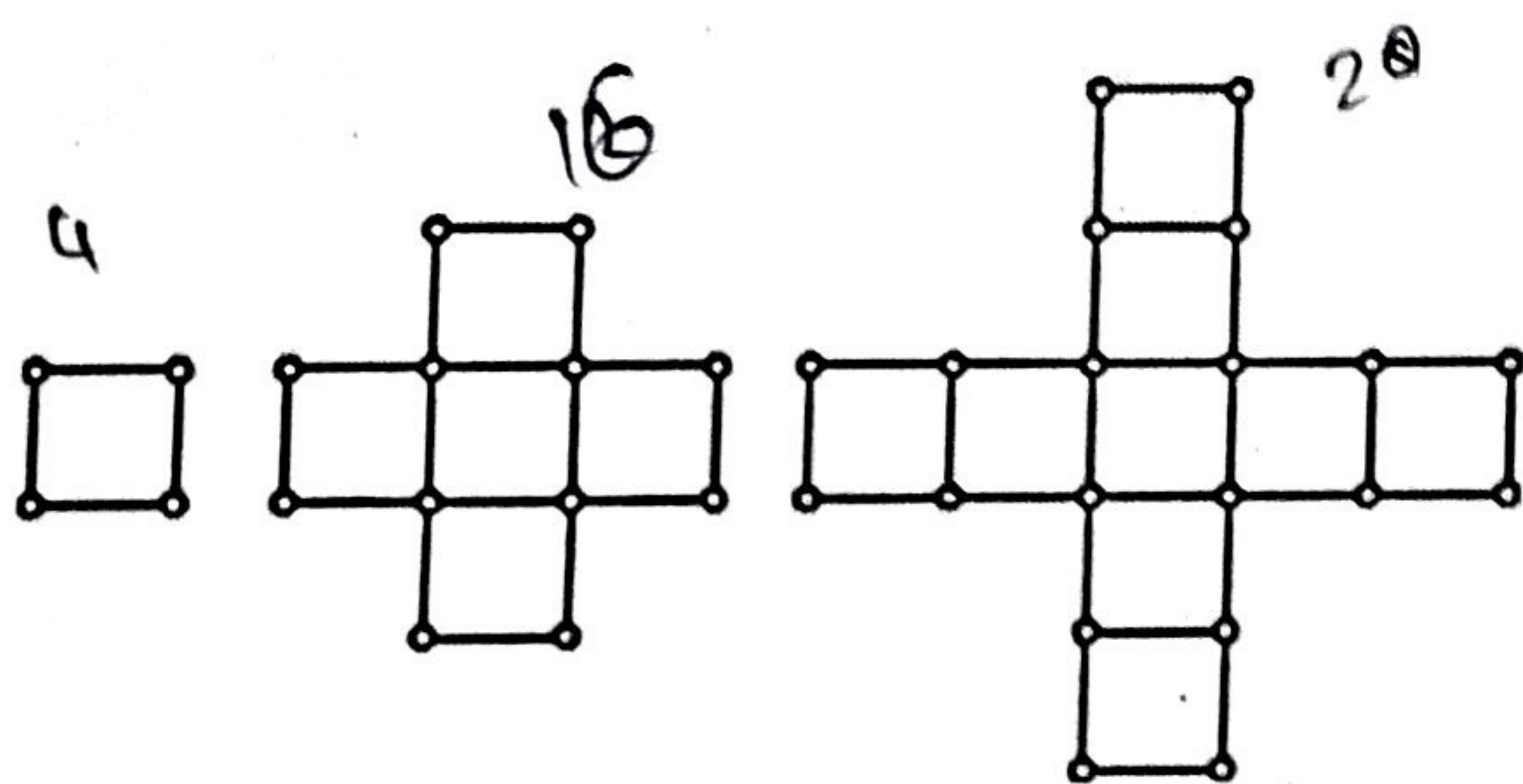


Fig. (1)

Fig. (2)

Fig. (3)

Based on the above information, answer the following questions:

(i) Write first term and common difference of the A.P. formed by number of squares in each figure.

(ii) Write first term and common difference of the A.P. formed by number of sticks used in each figure.

(iii) (a) How many squares are there in Fig. (10)? Also, write the number of sticks used in Fig. (10).

OR

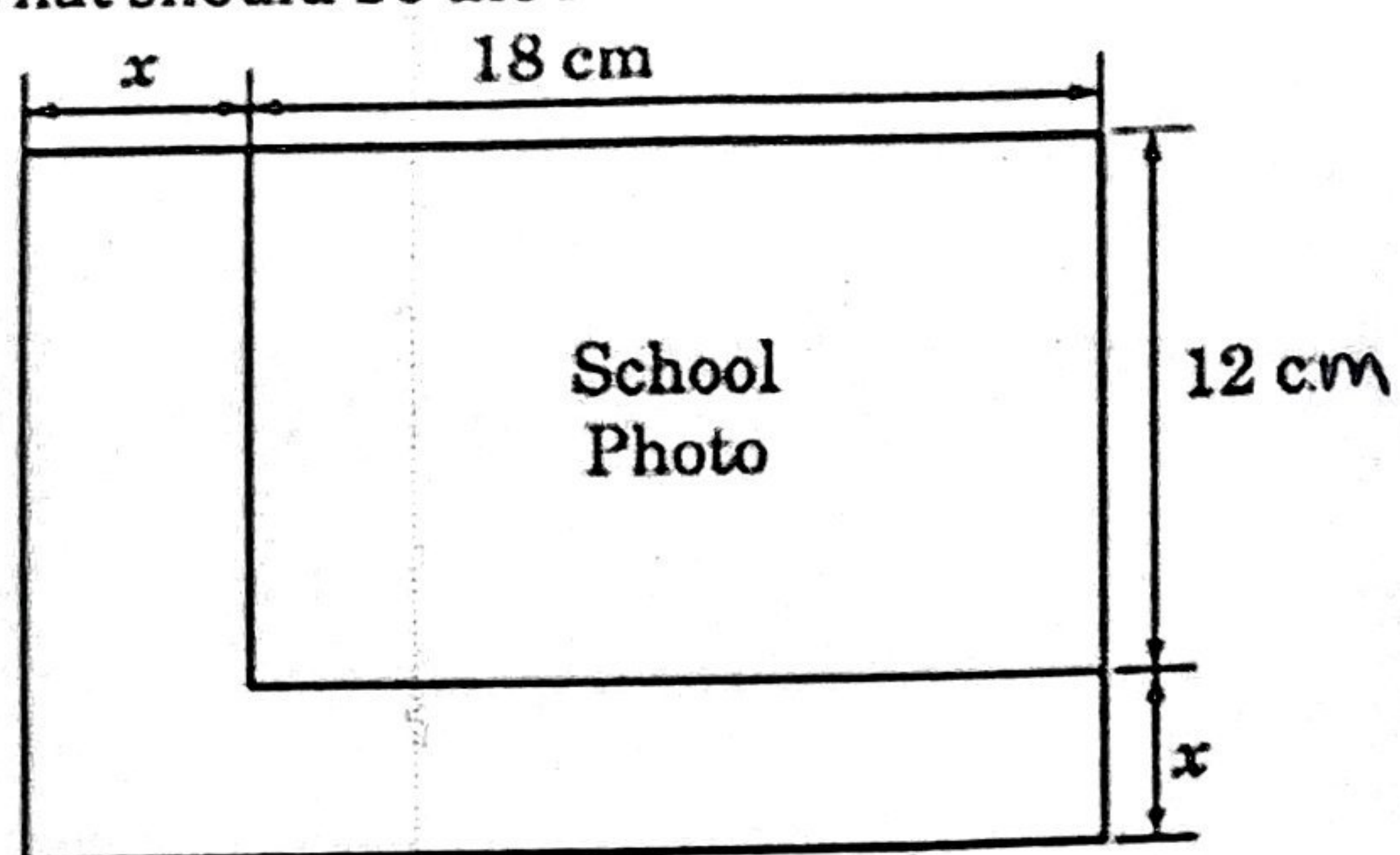
(iii) (b) If 88 sticks are used to make m^{th} figure (Fig. (m)), find the value of m . How many squares are formed in this figure?

Case Study - 3

38. While designing the school yearbook, a teacher asked the student that the length and width of a particular photo is increased by x units each to double the area of the photo. The original photo is 18 cm long and 12 cm wide.

Based on the above information, answer the following questions:

- (i) Write an algebraic depicting the above information.
- (ii) Write the corresponding quadratic equation in standard form.
- (iii) What should be the new dimensions of the enlarged photo?



OR

Can any rational value of x make the new area equal to 220 cm^2 ?