



B.K. BIRLA CENTRE FOR EDUCATION

SARALA BIRLA GROUP OF SCHOOLS
A CBSE DAY-CUM-BOYS' RESIDENTIAL SCHOOL

PRE MID TERM (2026-27) MATHEMATICS SET-B

Class: X

Duration: 1 Hr

Date: 20.07.26

Max. Marks: 25

Admission No: _____

Roll No.: _____

SECTION A | Multiple Choice Questions (1 mark each)

1. A lamp-lighter lights street lamps each evening. On the 1st evening, she lights 3 lamps. On each subsequent evening she lights 4 more lamps than on the previous evening. After 20 evenings, what is the total number of lamps lit (counting each evening separately)? 1
(a) 820 (b) 840 (c) 800 (d) 780
2. The 5th term of an AP is 23 and the 10th term is 43. A student claims the 20th term is 83. Is this correct? 1
(a) Yes, 20th term = 83 (b) No, 20th term = 81
(c) No, 20th term = 85 (d) No, 20th term = 79
3. On a navigation map, a ship is at S(3, -2) and a lighthouse is at L(-5, 6). A rescue boat R must be stationed at the point that divides SL in the ratio 3 : 1 internally. What are the coordinates of R? 1
(a) (-3, 4) (b) (-4, 3) (c) (1, 0) (d) (-3, 3)
4. A botanist marks two plant beds at M (1, -3) and N (7, 5). She wants to install a water pipe outlet at a point P on the y-axis such that PM = PN. What is the y-coordinate of P? 1
(a) y = 1 (b) y = 2 (c) y = 3 (d) y = -1
5. A civil engineer places three pillars at A (0, 0), B (4, 0) and C (2, $2\sqrt{3}$). She claims these form an equilateral triangle. Another engineer says they form an isosceles triangle. Who is correct and why? 1
(a) First engineer; AB = BC = CA = 4 (b) Second engineer; only two sides are equal
(c) Both wrong; the triangle is scalene (d) Cannot be determined without angles

Directions: Read both statements carefully and choose the correct option.

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

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

(c) A is true but R is false.

(d) A is false but R is true.

6. **Assertion (A):** The sequence 2, 5, 8, 11, ... has its 100th term equal to 299. 1

Reason (R): In an AP with first term a and common difference d , the n th term is given by $a_n = a + (n-1)d$.

SECTION B | Short Answer (2 marks)

7. A printing press produces 200 newspapers in its first hour of operation. Due to increasing efficiency, it produces 25 more newspapers each hour. 2

(i) How many newspapers does it produce in the 8th hour?

(ii) If the press runs for a 10-hour shift, what is the total production for the day?

8. A surveyor needs to find a point G (the centroid) of a triangular plot with vertices at $D(2, -4)$, $E(-6, 2)$ and $F(4, 8)$. Also determine if the centroid lies inside or outside the triangle, justifying briefly. 2

SECTION C | Short Answer (3 marks)

9. Three water supply stations are at $A(5, 1)$, $B(1, 3)$ and $C(3, 9)$. A pipeline inspector claims the stations form a right-angled triangle. Verify this claim using distances. Also find the area of the triangular region covered by the pipeline network. 3

10. In a triangular arrangement of stones, the bottom row has 30 stones, and each row above has 3 fewer stones than the row below. The arrangement continues until a row has exactly 3 stones. 3

(i) How many rows are there in the arrangement?

(ii) Find the total number of stones in the entire arrangement.

(iii) A sculptor removes every stone from the top 4 rows. What fraction of the total stones is removed? Express your answer in its simplest form.

SECTION D | Long Answer (5 marks)

11. A logistics company places its four warehouses at $A(1, 1)$, $B(7, 1)$, $C(7, 7)$ and $D(1, 7)$ on a coordinate map (units in km). 3

(i) Prove that $ABCD$ is a square.

(ii) Find the point E where the diagonals AC and BD intersect.

(iii) A fifth warehouse F is to be built at the point that divides AB in the ratio $2 : 1$. Find the coordinates of F .

(iv) Find the area of triangle AEF .

(v) The company wants a delivery hub H equidistant from A , B and C . Find the coordinates of H (circumcentre of triangle ABC).

SECTION E | Competency-Based Case Study (4 marks)

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SOLAR PANEL INSTALLATION

4



A solar energy company installs panels on rooftops. In Month 1 they install 20 panels. Each subsequent month they install 5 more panels than the previous month. The company has received orders for a total of 1000 panels.

Q.6. (i) How many panels are installed in Month 8?

(ii) After how many complete months will the company first fulfil all 1000 panel orders?

(iii) What is the difference between the panels installed in Month 10 and Month 5?

(iv) If due to a supply shortage, from Month 6 onwards the increment drops from 5 to 3 panels per month, find the revised total installation after 12 months.

*******ALL THE BEST*******