# Linear Programming

Standard difficulty · 20 questions · 40 marks · Time: 46 minutes

Name: _____ Date: _____ Score: ____ / 40

Show your working for Sections B and C. Answers are on the last page — try every question first!

## Section A — Choose the correct answer — 8 × 1 = 8 marks

**1.** The corner points of a feasible region are (0, 0), (3, 0), (2, 6), (0, 8). The maximum of Z = 4x + 9y is:
**(a)** 72 **(b)** 0 **(c)** 12 **(d)** 62

**2.** The corner points of a bounded feasible region are (0, 12), (6, 4), (10, 0), (10, 12). The minimum of Z = 7x + 9y is:
**(a)** 178 **(b)** 108 **(c)** 78 **(d)** 70

**3.** Which point lies in the feasible region of $x + y \le 13$, $x + 2y \le 20$, $x \ge 0$, $y \ge 0$?
**(a)** (7, 8) **(b)** (0, 11) **(c)** (5, 6) **(d)** (14, 0)

**4.** The corner points of the region $3x + 4y \le 36$, $3x + 2y \le 24$, $x \ge 0$, $y \ge 0$ are:
**(a)** (0, 0), (8, 0), (4, 6), (0, 9) **(b)** (0, 0), (12, 0), (4, 6), (0, 12)
**(c)** (0, 0), (8, 0), (6, 4), (0, 9) **(d)** (0, 0), (8, 0), (0, 9)

**5.** The function to be maximised or minimised in an LPP is called:
**(a)** the feasible region **(b)** the corner point
**(c)** the objective function **(d)** the constraint

**6.** Z = ax + by (a, b > 0) has the same maximum at the corner points (7, 0) and (4, 3). Then:
**(a)** a = b **(b)** a = (4/3) b **(c)** b = a **(d)** a = (7/3) b

**7.** The minimum of Z = 6x + 6y subject to $x + y \ge 13$, $2x + y \ge 20$, $x \ge 0$, $y \ge 0$ is:
**(a)** 78 **(b)** 120 **(c)** 77 **(d)** 84

**8.** Assertion (A): The maximum of Z = 5x + 8y on the region with corner points (0, 0), (10, 0), (3, 7), (0, 8) is 71.
Reason (R): Z always has its maximum at the origin.
**(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.

## Section B — Short answer — 8 × 2 = 16 marks

**9.** Maximise Z = 8x + 4y subject to $x + 4y \le 20$, $x + y \le 11$, $x \ge 0$, $y \ge 0$.

**10.** Minimise $Z = 3x + 2y$ subject to $x + 2y \geq 22$, $x + y \geq 14$, $x \geq 0$, $y \geq 0$.

**11.** Find the corner points of the feasible region $x + y \leq 10$, $2x + y \leq 12$, $x \geq 0$, $y \geq 0$.

**12.** A dealer has Rs 85,000 to buy fans at Rs 500 each and sewing machines at Rs 400 each, and room for at most 17 items. Each fan earns a profit of Rs 90 and each sewing machine Rs 20. Formulate this as an LPP.

**13.** The corner points of a feasible region are (12, 0), (8, 8), (0, 16). Find the maximum and minimum of $Z = 2x + 3y$.

**14.** Minimise $Z = 2x - 9y$ subject to $x + y \leq 10$, $5x + y \leq 30$, $x \geq 0$, $y \geq 0$.

**15.** For the constraints $3x + 2y \leq 24$, $3x + y \leq 18$, $x \geq 0$, $y \geq 0$, say whether each point is feasible: (3, 1), (6, 3), (2, 12).

**16.** The feasible region has corner points (0, 0), (9, 0), (3, 4), (0, 5). Find the relation between a and b ($a, b > 0$) for which $Z = ax + by$ has the same maximum at (9, 0) and (3, 4).

## Section C — Word problems — 4 × 4 = 16 marks

**17.** A workshop makes tables and chairs. A table needs 1 hour of cutting and 4 hours of finishing; a chair needs 1 hour and 3 hours. There are 10 cutting hours and 36 finishing hours a week. The profit is Rs 10 on a table and Rs 20 on a chair. How many of each give the most profit, and what is it?

**18.** Food P has 1 unit of vitamin A and 4 units of vitamin B per kg; food Q has 2 and 1. A diet needs at least 14 units of A and 28 units of B. Food P costs Rs 45 per kg and food Q Rs 35 per kg. How many kg of each give the cheapest diet, and what does it cost?

**19.** A bakery makes cakes of type A and type B. A type A cake uses 4 units of flour and 1 unit of fat; type B uses 1 and 1. There are 16 units of flour and 10 units of fat. The profit is Rs 60 on type A and Rs 20 on type B. How many of each give the most profit, and what is it?

**20.** A fertiliser mix needs at least 14 units of nitrogen and 10 units of phosphate. Brand X gives 2 units of nitrogen and 1 of phosphate per bag; brand Y gives 1 and 1. A bag of X costs Rs 10 and a bag of Y Rs 30. How many bags of each keep the cost lowest, and what is it?

**Want another sheet on this chapter?** In the Ambiful Worksheets app every sheet is new, with its answer key, and your child never gets the same question twice.
Scan the code to get the free app, or open **worksheets.ambiful.com/get**

# Answer key

Linear Programming · AW-12M-LPP-2026-V1 · For parents — fold back or tear off before handing the sheet to your child.

| Q | Answer | Working |
|---|---|---|
| 1 | **(a) 72** | Z(0, 0) = 0, Z(3, 0) = 12, Z(2, 6) = 62, Z(0, 8) = 72 |
| 2 | **(d) 70** | Z(0, 12) = 108, Z(6, 4) = 78, Z(10, 0) = 70, Z(10, 12) = 178 |
| 3 | **(c) (5, 6)** | (5, 6) satisfies every constraint |
| 4 | **(a) (0, 0), (8, 0), (4, 6), (0, 9)** | the origin, the nearer intercept on each axis, and where the two lines meet |
| 5 | **(c) the objective function** | — |
| 6 | **(a) a = b** | 7a = 4a + 3b ⇒ 3a = 3b |
| 7 | **(a) 78** | Z(0, 20) = 120, Z(7, 6) = 78, Z(13, 0) = 78; the half-plane 6x + 6y < 78 misses the region |
| 8 | **(c) A is true, but R is false.** | A is true: Z(0, 0) = 0, Z(10, 0) = 50, Z(3, 7) = 71, Z(0, 8) = 64. R is false. |
| 9 | **maximum 88 at (11, 0)** | corners (0, 0), (11, 0), (8, 3), (0, 5): Z(0, 0) = 0, Z(11, 0) = 88, Z(8, 3) = 76, Z(0, 5) = 20 |
| 10 | **minimum 28 at (0, 14)** | the region is unbounded; Z(0, 14) = 28, Z(6, 8) = 34, Z(22, 0) = 66; no point has 3x + 2y < 28 |
| 11 | **(0, 0), (6, 0), (2, 8), (0, 10)** | the two lines meet at (2, 8) |
| 12 | **Maximise Z = 90x + 20y subject to 500x + 400y ≤ 85000, x + y ≤ 17, x ≥ 0, y ≥ 0 (x fans, y sewing machines)** | one inequality for money, one for space |
| 13 | **maximum 48 at (0, 16); minimum 24 at (12, 0)** | Z(12, 0) = 24, Z(8, 8) = 40, Z(0, 16) = 48 |
| 14 | **minimum −90 at (0, 10)** | Z(0, 0) = 0, Z(6, 0) = 12, Z(5, 5) = −35, Z(0, 10) = −90 |
| 15 | **(3, 1) feasible; (6, 3) not feasible; (2, 12) not feasible** | substitute each point into every constraint |
| 16 | **a = (2/3) b** | 9a = 3a + 4b |
| 17 | **maximum profit Rs 200 at (0, 10)** | Maximise Z = 10x + 20y subject to x + y ≤ 10, 4x + 3y ≤ 36, x ≥ 0, y ≥ 0; Z(0, 0) = 0, Z(9, 0) = 90, Z(6, 4) = 140, Z(0, 10) = 200 |
| 18 | **minimum cost Rs 410 at (6, 4)** | Minimise Z = 45x + 35y subject to x + 2y ≥ 14, 4x + y ≥ 28, x ≥ 0, y ≥ 0; Z(0, 28) = 980, Z(6, 4) = 410, Z(14, 0) = 630 |
| 19 | **maximum profit Rs 280 at (2, 8)** | Maximise Z = 60x + 20y subject to 4x + y ≤ 16, x + y ≤ 10, x ≥ 0, y ≥ 0; Z(0, 0) = 0, Z(4, 0) = 240, Z(2, 8) = 280, Z(0, 10) = 200 |
| 20 | **minimum cost Rs 100 at (10, 0)** | Minimise Z = 10x + 30y subject to 2x + y ≥ 14, x + y ≥ 10, x ≥ 0, y ≥ 0; Z(0, 14) = 420, Z(4, 6) = 220, Z(10, 0) = 100 |



Ambiful Worksheets · worksheets.ambiful.com · Not affiliated with CBSE / NCERT