MATHEMATICS · GRADES 10-12

Graphing feasible regions

Difficulty level: Advanced

Mathematics: Grades 10-12

This document was made by AI and there may be mistakes. If a question or answer looks wrong, use the Flag a mistake button to let Brett know so he can fix it.

Overview of the concept

This is how you see every option that fits all your limits at once, like all the combinations of two products a factory can make with the materials it has. Each limit cuts away the options that do not work, and what is left on the graph is every combination that is actually possible. A bakery uses this to plan what it can bake with the flour and time it has, a factory uses it to plan production, and anyone planning a budget with two competing costs can use it to see what is really possible.

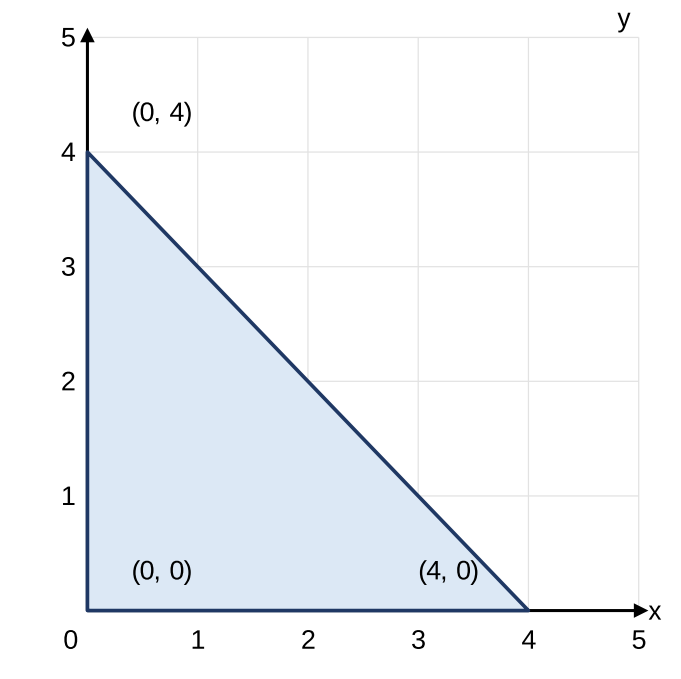


© 2026 Brett Robbins. All Rights Reserved.

Worked examples

EXAMPLE 1

Q Graph x greater than or equal to 0, y greater than or equal to 0, and x + y less than or equal to 4.



SOLUTION

The first two conditions keep you in the first quadrant, including the axes.

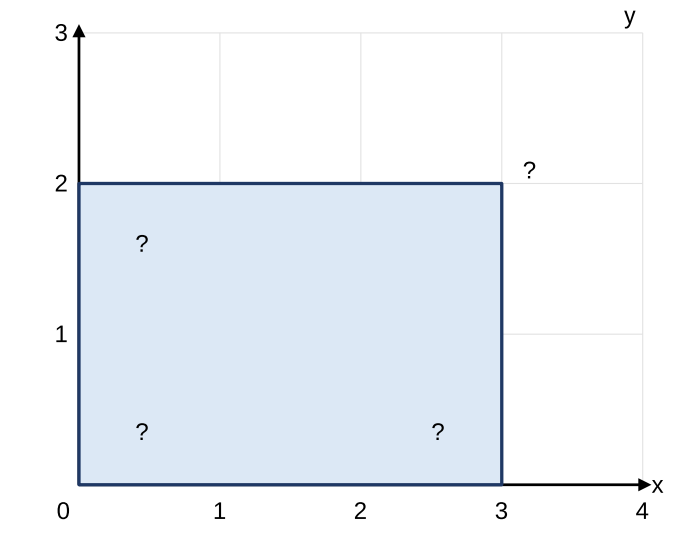
The third condition shades below the line x + y = 4.

The feasible region is the triangle with corners (0, 0), (4, 0), and (0, 4).

© 2026 Brett Robbins. All Rights Reserved.

EXAMPLE 2

Q **Name the corners of the region x less than or equal to 3, y less than or equal to 2, x greater than or equal to 0, y greater than or equal to 0.**



SOLUTION

The boundaries are x = 3, y = 2, and the two axes.

They meet at (0, 0), (3, 0), (3, 2), and (0, 2).

The feasible region is that rectangle, corners as listed.

© 2026 Brett Robbins. All Rights Reserved.

Practice questions

1 Graph the region x greater than or equal to 0, y greater than or equal to 0, and x + y less than or equal to 5

- **A** Triangle with corners (0, 0), (5, 0), (0, 5)
- **B** Triangle with corners (0, 0), (5, 0), (5, 5)
- **C** Rectangle with corners (0, 0), (5, 0), (5, 5), (0, 5)
- **D** Triangle with corners (0, 0), (0, 5), (5, 5)

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

2 What are the corners of the region x less than or equal to 2, y less than or equal to 3, x greater than or equal to 0, y greater than or equal to 0?

A (0, 0), (2, 0), (2, 3), (0, 3)

B (0, 0), (3, 0), (3, 2), (0, 2)

C (0, 0), (2, 0), (2, 2), (0, 2)

D (0, 0), (3, 0), (3, 3), (0, 3)

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

3 **Graph the region x less than or equal to 4, y less than or equal to 2, x greater than or equal to 0, y greater than or equal to 0**

- **A** Rectangle with corners (0, 0), (4, 0), (4, 2), (0, 2)
- **B** Rectangle with corners (0, 0), (4, 0), (4, 4), (0, 4)
- **C** Triangle with corners (0, 0), (4, 0), (0, 2)
- **D** Rectangle with corners (0, 0), (2, 0), (2, 4), (0, 4)

Understand It with Pulse | Flag a mistake

4 **Is (1, 1) in the region x + y less than or equal to 4, x greater than or equal to 0, y greater than or equal to 0?**

- **A** Yes
- **B** No

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

5 **Which point is NOT in the region $x + y \leq 4, x \geq 0, y \geq 0$?**

- **A** (1, 1)
- **B** (0, 4)
- **C** (4, 0)
- **D** (3, 2)

Understand It with Pulse | Flag a mistake

6 **Which inequalities describe the rectangle with corners (0, 0), (5, 0), (5, 1), (0, 1)?**

- **A** $x \leq 5, y \leq 1, x \geq 0, y \geq 0$
- **B** $x \leq 1, y \leq 5, x \geq 0, y \geq 0$
- **C** $x + y \leq 6, x \geq 0, y \geq 0$
- **D** $x \leq 5, y \leq 1$

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

7 What is the largest possible value of x in the region $x \geq 0$, $y \geq 0$, $x + y \leq 6$?

A 6

B 3

C 0

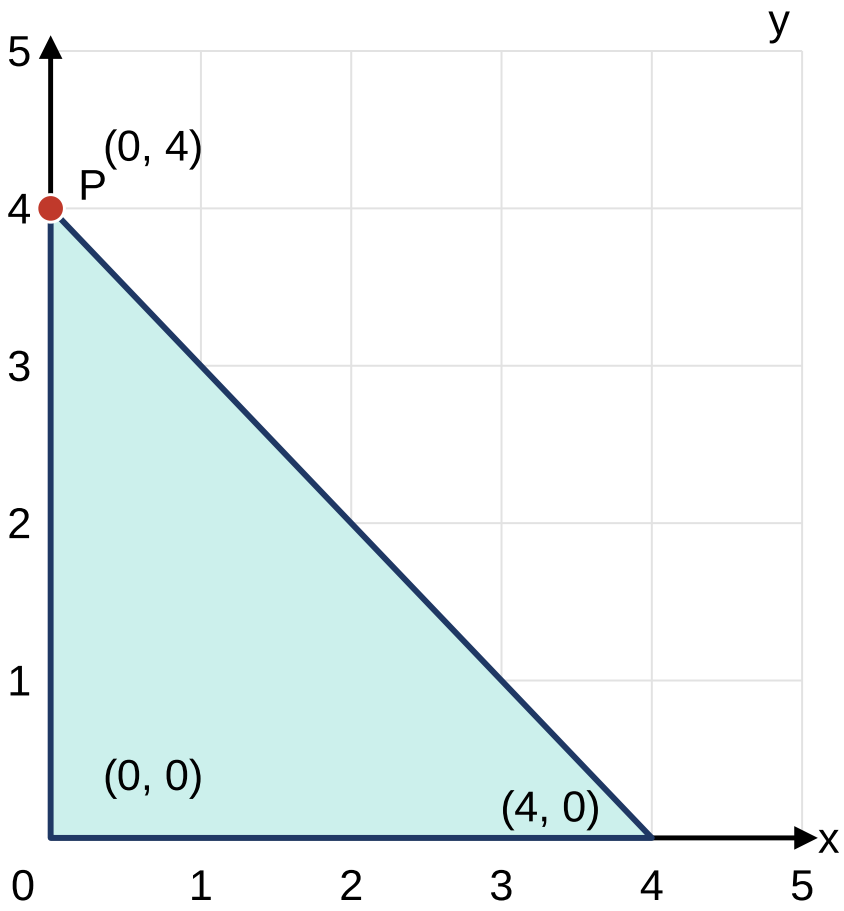
D 12

Understand It with Pulse

Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

8 The shaded region is the graph of $x + y$ less than or equal to 4, x greater than or equal to 0, and y greater than or equal to 0, with point P marked on the boundary. Is P in the region?



A. Yes, it is on the boundary and the boundary is included

B. No, it is outside the region

C. Yes, it is inside the region

D. No, points on the boundary are never included

© 2026 Brett Robbins. All Rights Reserved.

Understand It with Pulse | Flag a mistake

9 Which point is a corner of the region $x \le 4$, $y \le 3$, $x \ge 0$, $y \ge 0$?

A (4, 3)

B (3, 4)

C (4, 4)

D (3, 3)

Understand It with Pulse | Flag a mistake

10 The region $x \ge 0$, $y \ge 0$, $x + y \le 6$ has corners (0, 0), (6, 0), (0, 6). What is its area?

A 18

B 36

C 12

D 6

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

ANSWER KEY

1. Triangle with corners (0, 0), (5, 0), (0, 5)

2. (0, 0), (2, 0), (2, 3), (0, 3)

3. Rectangle with corners (0, 0), (4, 0), (4, 2), (0, 2)

4. Yes

5. (3, 2)

6. $x \leq 5, y \leq 1, x \geq 0, y \geq 0$

7. 6

8. Yes, it is on the boundary and the boundary is included

9. (4, 3)

10. 18

© 2026 Brett Robbins. All Rights Reserved.