# Two-variable inequalities and shaded regions

6 questions | 15 marks

Equivalent correct methods earn the corresponding marks.

**1.** Decide whether $(3, 2)$ satisfies $2x + y \leq 9$. [2 marks]

$2(3) + 2 = 8 \leq 9$.

**Answer:** Yes.

**2.** Is the boundary of $y > 3x - 2$ solid or dashed? Which side is allowed? [2 marks]

Equality is excluded and larger $y$ values are required.

**Answer:** Dashed; above the line.

**3.** Find the intercepts of the boundary $2x + y = 8$. [2 marks]

Set each variable to zero in turn.

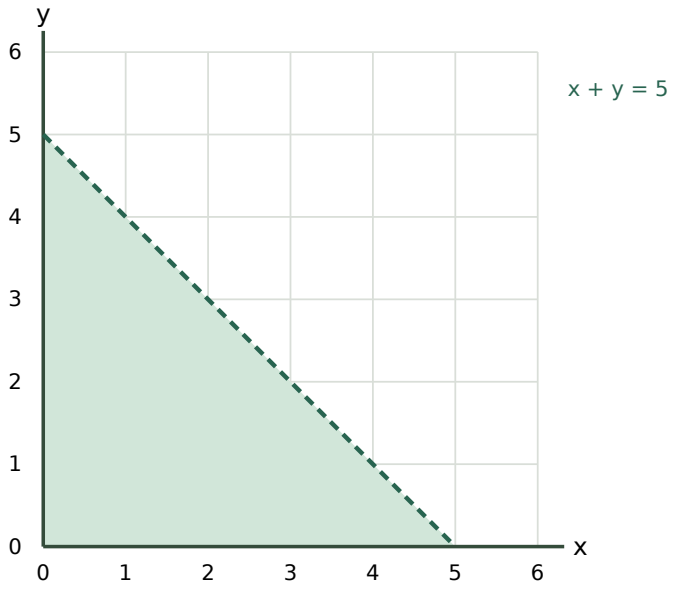
**Answer:** $(4, 0)$ and $(0, 8)$

**4.** Give the vertices of the feasible region $x \geq 0$, $y \geq 0$, $2x + y \leq 8$. [3 marks]

The boundary intercepts and origin form the triangle.

**Answer:** $(0, 0), (4, 0), (0, 8)$

**5.** On the supplied grid, shade the region $x \geq 0$, $y \geq 0$, $x + y < 5$. [3 marks]




The origin passes the inequality test.

**Answer:** The first-quadrant triangle below the dashed line from $(0, 5)$ to $(5, 0)$; the sloping boundary is excluded.

**6.** A stall sells necklaces for 5 dollars and bracelets for 3 dollars. Write inequalities for buying at least 4 items using no more than 24 dollars. Define the variables. [3 marks]

Let $x$ count necklaces and $y$ count bracelets; total items and total cost give the two conditions.

**Answer:** $x + y \geq 4$, $5x + 3y \leq 24$, with $x, y$ nonnegative integers.