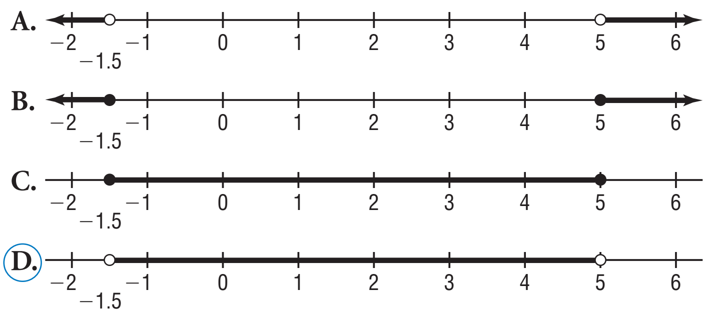
Checkpoint: Assess Your Understanding, pages 383–385

5.1

1. Multiple Choice Two times the square of a number minus 7 times the number is less than 15. Which number line represents the possible numbers?



2. Solve each quadratic inequality. Give the solutions to the nearest tenth when necessary. Choose a different strategy each time.

a) $3x^2 + x - 2 < 0$

Use intervals and test points.
Solve: $3x^2 + x - 2 = 0$
$(3x - 2)(x + 1) = 0$
$x = \frac{2}{3}$ or $x = -1$
When $x < -1$, such as $x = -2$, L.S. = 8; R.S. = 0,
so $x = -2$ does not satisfy the inequality.
When $-1 < x < \frac{2}{3}$, such as $x = 0$, L.S. = −2; R.S. = 0,
so $x = 0$ does satisfy the inequality.
The solution is: $-1 < x < \frac{2}{3}, x \in \mathbb{R}$

b) $2x^2 - 11x \geq -12$

$2x^2 - 11x + 12 \geq 0$ Use intervals and sign analysis.
Solve: $2x^2 - 11x + 12 = 0$
$(2x - 3)(x - 4) = 0$
$x = 1.5$ or $x = 4$

Interval	Value of x	Value of $2x^2 - 11x$
$x \leq 1.5$	$x = 0$	0 – this satisfies the inequality
$1.5 \leq x \leq 4$	$x = 2$	−14
$x \geq 4$	$x = 5$	−5 – this satisfies the inequality

The solution is: $x \leq 1.5$ or $x \geq 4, x \in \mathbb{R}$

3. A farmer needs to enclose a minimum area of 66 m^2 for a rectangular feeding pen for her horses. One dimension of the pen is to be 1 m less than twice the other dimension.

a) Create an inequality to represent this problem.

Let the width be x metres, then the length is $(2x - 1)$ metres.
The area of the pen is: $x(2x - 1)$ square metres
An inequality is: $x(2x - 1) \geq 66$, or $2x^2 - x - 66 \geq 0$

b) Determine 2 possible sets of dimensions of the feeding pen.

Solve the equation: $2x^2 - x - 66 = 0$
$(2x + 11)(x - 6) = 0$
$x = -5.5$ or $x = 6$
Ignore the negative root since a length cannot be negative.
So, when the width is 6 m, the length is: $[2(6) - 1]$ m = 11 m
For the area to be greater than 66 m^2, the length must be greater than 11 m and the width must be greater than 6 m.
Possible dimensions are:
7 m by $[2(7) - 1]$, or 13 m; 8 m by $[(2(8) - 1]$, or 15 m;
10 m by $[2(10) - 1]$, or 19 m

5.2

4. Graph each linear inequality.

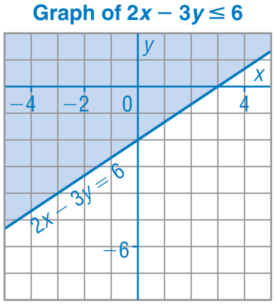
a) $2x - 3y \leq 6$ **b)** $4x + 3y > -15$

Graph the related functions.
Use intercepts.

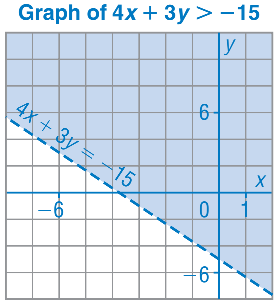
a)
When $x = 0$, $y = -2$
When $y = 0$, $x = 3$
Draw a solid line.
Use (0, 0) as a test point.
L.S. = 0; R.S. = 6
Since $0 < 6$, the origin lies in the shaded region.
Shade the region above the line.

b)
When $x = 0$, $y = -5$
When $y = 3$, $x = -6$
Draw a broken line.
Use (0, 0) as a test point.
L.S. = 0; R.S. = −15
Since $0 > -15$, the origin lies in the shaded region.
Shade the region above the line.

Graph of $2x - 3y \leq 6$



Graph of $4x + 3y > -15$



5. Multiple Choice Which coordinates are solutions of the inequality $3x - 2y < -18$?

A. $(-4, 3)$ **B.** $(-0.5, -9)$ **C.** $(1, -11.5)$ **D.** $(-1, 8)$

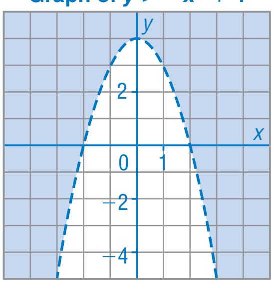
5.3

6. Graph each quadratic inequality.

a) $y > -x^2 + 4$

The graph of the related quadratic function is congruent to $y = -x^2$ and has vertex (0, 4). The curve is broken and the region above is shaded.

Graph of $y > -x^2 + 4$

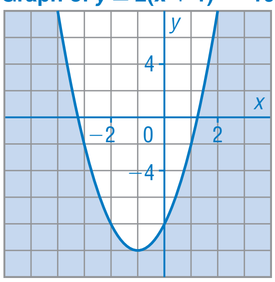


b) $y + 5 \leq 2(x + 1)^2 - 5$

$y \leq 2(x + 1)^2 - 10$

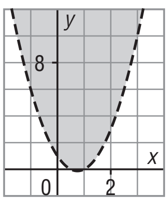
The graph of the related quadratic function is congruent to $y = 2x^2$ and has vertex $(-1, -10)$. The curve is solid and the region below is shaded.

Graph of $y \leq 2(x + 1)^2 - 10$

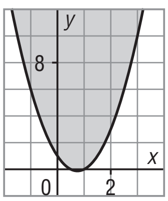


7. Multiple Choice Which graph represents the inequality $y \geq 2x^2 - 3x + 1$?

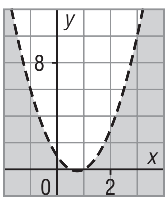
A.



B.



C.



D.