PRACTICE TEST, pages 415–418

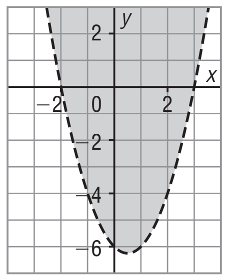
1. Multiple Choice Which inequality is not represented by this graph?

A. $y > x^2 - x - 6$

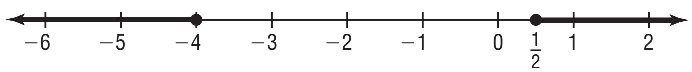
B. $y > \left(x - \frac{1}{2}\right)^2 - \frac{25}{4}$

C. $y > (x + 2)(x - 3)$

D. $y > (x + 3)(x - 2)$



2. Multiple Choice Which inequality below is represented by this number line?



A. $2x^2 + 7x - 4 \geq 0$ **B.** $2x^2 + 7x - 4 \leq 0$

C. $-2x^2 - 7x + 4 \geq 0$ **D.** $2x^2 - 7x + 4 \leq 0$

3. Graph each inequality. Give 2 possible solutions in each case.

a) $2x^2 - 5x < -2$

Solve: $2x^2 - 5x + 2 = 0$

$(2x - 1)(x - 2) = 0$

$x = 0.5$ or $x = 2$

When $x < 0.5$, such as $x = 0$, L.S. $= 0$; R.S. $= -2$;

so $x = 0$ does not satisfy the inequality.

When $0.5 < x < 2$, such as $x = 1$, L.S. $= -3$; R.S. $= -2$;

so $x = 1$ does satisfy the inequality.

The solution is: $0.5 < x < 2, x \in \mathbb{R}$

Two possible solutions are: $x = 1$ and $x = 1.5$

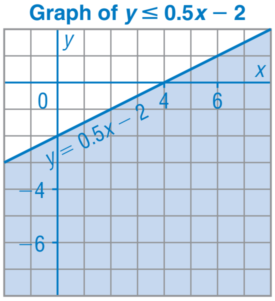
b) $-2 \geq -0.5(x - 6)^2$

Solve: $-2 = -0.5(x - 6)^2$
$(x - 6)^2 = 4$
$x - 6 = \pm 2$
$x = 4$ or $x = 8$
When $x \leq 4$, such as $x = 0$, L.S. $= -2$; R.S. $= -18$;
so $x = 0$ does satisfy the inequality.
When $x \geq 8$, such as $x = 10$, L.S. $= -2$; R.S. $= -8$;
so $x = 10$ does satisfy the inequality.
The solution is: $x \leq 4$ or $x \geq 8$, $x \in \mathbb{R}$
Two possible solutions are: $x = 1$ and $x = 20$

c) $y \leq 0.5x - 2$

Graph the related functions.
The line has slope 0.5 and
y-intercept -2.
Draw a solid line. Shade
the region below the line.

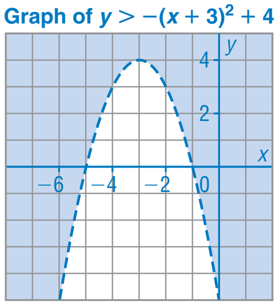
Graph of $y \leq 0.5x - 2$



d) $y > -(x + 3)^2 + 4$

The parabola is congruent to
$y = -x^2$ and has vertex $(-3, 4)$.
Draw a broken curve. Shade
the region above the curve.

Graph of $y > -(x + 3)^2 + 4$



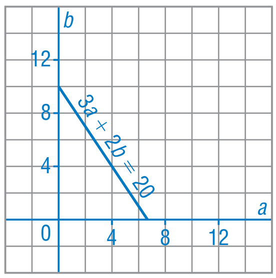
4. At a school cafeteria, an apple costs 75¢ and a banana costs 50¢. Ava has up to \$5 to spend on fruit for herself and her friends.

a) Write an inequality to represent this situation. What are the restrictions on the variables?

Let a represent the number of apples and b represent the number of bananas.
An inequality is: $75a + 50b \leq 500$, or
$3a + 2b \leq 20$
Both a and b are whole numbers.

b) Determine 2 possible ways that Ava can spend up to \$5.

Determine the coordinates of 2 points that satisfy the related function.
When $a = 0$, $b = 10$
When $a = 6$, $b = 1$
Join the points with a solid line.
The solution is the points, with whole-number coordinates, on and below the line.
Two ways are: 4 apples, 2 bananas; 2 apples, 6 bananas



5. Solve each system of equations. Use algebra for one system and graphing technology for the other. How did you decide which strategy to use?

a) $y = 2x^2 + x - 1$ ①

$x + y = 12$ ②

Rearrange equation ②.
$y = 12 - x$
Substitute $y = 12 - x$ in equation ①.
$$12 - x = 2x^2 + x - 1$$
$2x^2 + 2x - 13 = 0$
This equation does not factor, so I use graphing technology. I use algebra when the equation does factor.
Input the equations. To the nearest tenth, the graphs intersect at these points: $(-3.1, 15.1)$ and $(2.1, 9.9)$

b) $y = (x - 2)^2$ ①

$y = -x^2 + 4x - 4$ ②

From equation ①, substitute $y = (x - 2)^2$ in equation ②.

$$(x - 2)^2 = -x^2 + 4x - 4$$
$$x^2 - 4x + 4 = -x^2 + 4x - 4$$
$$2x^2 - 8x + 8 = 0$$
$$x^2 - 4x + 4 = 0$$
$$(x - 2)^2 = 0$$

So, $x = 2$

Substitute $x = 2$ in equation ①.

$y = (2 - 2)^2$

$y = 0$

The solution is: (2, 0)

6. The cross section of a pedestrian tunnel under a road is parabolic and is modelled by the equation $y = -0.3x^2 + 1.8x$, where y metres is the height of the tunnel at a distance of x metres measured horizontally from one edge of the path under the tunnel. In 2010, the tallest living person was about 2.56 m tall. Could he walk through the tunnel without having to bend over? How could you use an inequality to solve this problem?

Determine the values of x for which $y \geq 2.56$.

Solve: $-0.3x^2 + 1.8x \geq 2.56$, or $-0.3x^2 + 1.8x - 2.56 \geq 0$

Use graphing technology. Input: $y = -0.3x^2 + 1.8x - 2.56$

Determine if there are any values of x for which $y \geq 0$; these values are approximately $2.3 \leq x \leq 3.7$.

So, the tallest living person could walk through the tunnel.