Chapter 9 Practice Test

Multiple Choice

For #1 to #5, choose the best answer.

1. An inequality that is equivalent to $3x - 6y < 12$ is

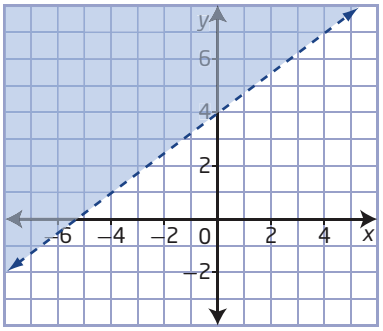
A $y < \frac{1}{2}x - 2$

B $y > \frac{1}{2}x - 2$

C $y < 2x - 2$

D $y > 2x - 2$

2. What linear inequality does the graph show?



A $y > \frac{3}{4}x + 4$

B $y \geq \frac{3}{4}x + 4$

C $y < \frac{4}{3}x + 4$

D $y \leq \frac{4}{3}x + 4$

3. What is the solution set for the quadratic inequality $6x^2 - 7x - 20 < 0$?

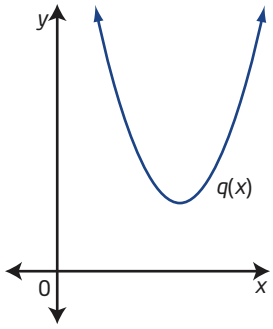
A $\left\{x \mid x \leq -\frac{4}{3} \text{ or } x \geq \frac{5}{2}, x \in \mathrm{R}\right\}$

B $\left\{x \mid -\frac{4}{3} \leq x \leq \frac{5}{2}, x \in \mathrm{R}\right\}$

C $\left\{x \mid -\frac{4}{3} < x < \frac{5}{2}, x \in \mathrm{R}\right\}$

D $\left\{x \mid x < -\frac{4}{3} \text{ or } x > \frac{5}{2}, x \in \mathrm{R}\right\}$

4. For the quadratic function $q(x)$ shown in the graph, which of the following is true?



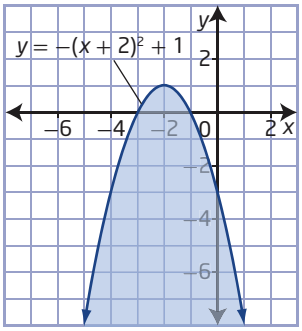
A There are no solutions to $q(x) > 0$.

B All real numbers are solutions to $q(x) \geq 0$.

C All real numbers are solutions to $q(x) \leq 0$.

D All positive real numbers are solutions to $q(x) < 0$.

5. What quadratic inequality does the graph show?



A $y < -(x + 2)^2 + 1$

B $y \geq -(x + 2)^2 + 1$

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

D $y > -(x + 2)^2 + 1$

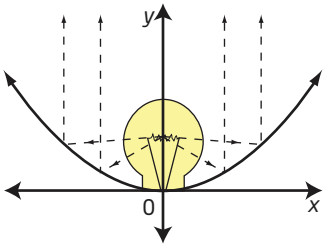
Short Answer

6. Graph $8x \geq 2(y - 5)$.

7. Solve $12x^2 < 7x + 10$.

8. Graph $y > (x - 5)^2 + 4$.

9. Stage lights often have parabolic reflectors to make it possible to focus the beam of light, as indicated by the diagram.



Suppose the reflector in a stage light is represented by the function $y = 0.02x^2$. What inequality can you use to model the region illuminated by the light?

10. While on vacation, Ben has $300 to spend on recreation. Scuba diving costs $25/h and sea kayaking costs $20/h. What are all the possible ways that Ben can budget his recreation money?

Extended Response

11. Malik sells his artwork for different prices depending on the type of work. Pen and ink sketches sell for $50, and watercolours sell for $80.

a) Malik needs an income of at least $1200 per month. Write an inequality to model this situation.

b) Graph the inequality. List three different ordered pairs in the solution.

c) Suppose Malik now needs at least $2400 per month. Write an inequality to represent this new situation. Predict how the answer to this inequality will be related to your answer in part b).

d) Solve the new inequality from part c) to check your prediction.

12. Let $f(x)$ represent a quadratic function.

a) State a quadratic function for which the solution set to $f(x) \leq 0$ is $\{x \mid -3 \leq x \leq 5, x \in \mathrm{R}\}$. Justify your answer.

b) Describe all quadratics for which solutions to $f(x) \leq 0$ are of the form $m \leq x \leq n$ for some real numbers m and n.

c) For your answer in part b), explain whether it is more convenient to express quadratic functions in the form $f(x) = ax^2 + bx + c$ or $f(x) = a(x - p)^2 + q$, and why.

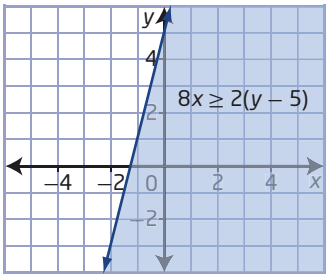
13. The normal systolic blood pressure, p, in millimetres of mercury (mmHg), for a woman a years old is given by $p = 0.01a^2 + 0.05a + 107$.

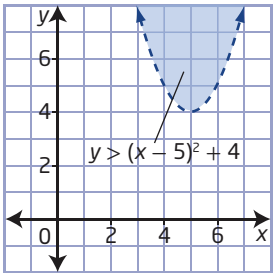
a) Write an inequality that expresses the ages for which you expect systolic blood pressure to be less than 120 mmHg.

b) Solve the inequality you wrote in part a).

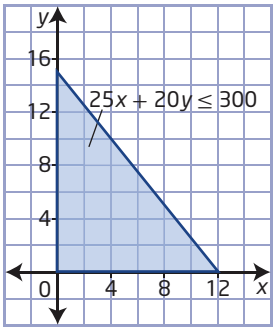
c) Are all of the solutions to your inequality realistic answers for this problem? Explain why or why not.

Chapter 9 Practice Test, pages 504 to 505

1. B
2. A
3. C
4. B
5. C
6. 

7. $\left\{x \mid -\frac{2}{3} < x < \frac{5}{4}, x \in \mathrm{R}\right\}$
8. 

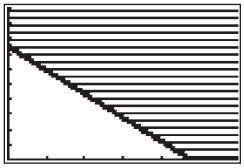
9. $y \geq 0.02x^2$
10. $25x + 20y \leq 300$, where x represents the number of hours scuba diving ($x \geq 0$) and y represents the number of hours sea kayaking ($y \geq 0$).



11. **a)** $50x + 80y \geq 1200$, where x represents the number of ink sketches sold ($x \geq 0$) and y represents the number of watercolours sold ($y \geq 0$).

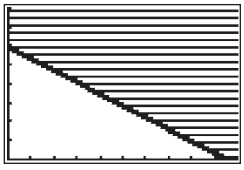
b) $y \geq -\frac{5}{8}x + 15$, $y \geq 0$, $x \geq 0$

Example: (0, 15), (2, 15), (8, 12)



c) $50x + 80y \geq 2400$, where x represents the number of ink sketches sold ($x \geq 0$) and y represents the number of watercolours sold ($y \geq 0$); the related line is parallel to the original with a greater x-intercept and y-intercept.

d) $y \geq -\frac{5}{8}x + 30$, $y \geq 0$, $x \geq 0$



12. **a)** Example: $f(x) = x^2 - 2x - 15$
b) Example: any quadratic function with two real zeros and whose graph opens upward
c) Example: It is easier to express them in vertex form because you can tell if the parabola opens upward and has a vertex below the x-axis, which results in two zeros.
13. **a)** $0.01a^2 + 0.05a + 107 < 120$
b) $\{x \mid -38.642 < x < 33.642, x \in \mathrm{R}\}$
c) The only solutions that make sense are those where x is greater than 0. A person cannot have a negative age.

Cumulative Review, Chapters 8–9, pages 508 to 509

1. **a)** B **b)** D **c)** A **d)** C
2. (−2.2, 10.7), (2.2, −2.7)
3. **a)** (−1, −4), (2, 5)
b) The ordered pairs represent the points where the two functions intersect.
4. **a)** $b > 3.75$ **b)** $b = 3.75$ **c)** $b < 3.75$
5.

<table>
<tr><th colspan="3">Solving Linear-Quadratic Systems</th></tr>
<tr><th>Substitution Method</th><th colspan="2">Elimination Method</th></tr>
<tr><td>Determine which variable to solve for.</td><td>Determine which variable to eliminate.</td><td>Multiply the linear equation as needed.</td></tr>
<tr><td>Solve the linear equation for the chosen variable.</td><td colspan="2" rowspan="2">Add a new linear equation and quadratic equation.</td></tr>
<tr><td>Substitute the expression for the variable into the quadratic equation and simplify.</td></tr>
<tr><td colspan="3">Solve New Quadratic Equation</td></tr>
<tr><td>No Solution</td><td colspan="2">Substitute the value(s) into the original linear equation to determine the corresponding value(s) of the other variable.</td></tr>
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