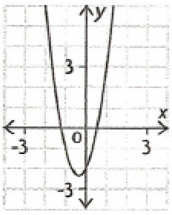
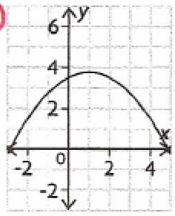
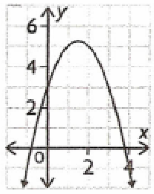
SOLUTIONS ⇒ CHAPTER 6 – CHAPTER TEST

MULTIPLE CHOICE

1. Which parabola corresponds to the greatest value of c, the constant coefficient in the function $y = ax^2 + bx + c$?

A.


B.


C.


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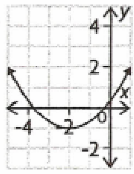
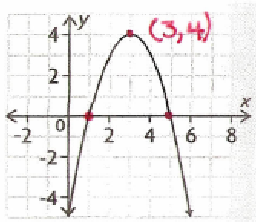


2. Which of these equations represents the parabola shown?



A. $y = -x(x - 5) + 1$

B. $y = -x^2 - 6x + 5$

C. $y = -x^2 + 6x - 5$

D. $y = -(x - 5)^2 + 1$

$y = a(x-r)(x-s)$

$y = -(x-1)(x-5)$

$y = -(x^2-5x-1x+5)$

$y = -(x^2-6x+5)$

$y = -x^2+6x-5$

3. What is the vertex of $f(x) = -0.5(x + 4)^2 - 2$? Vertex $(^-4, ^-2)$

A. $(4, -2)$ **B.** $(-2, -4)$ **C.** $(2, -4)$ **D.** $(-4, -2)$

4. What is the equation of the axis of symmetry of $f(x) = -5x(x - 7) + 21$? *(partially factored)

↳ 2 points with a y-coordinate of 21.

$$\frac{-\cancel{5}x}{-\cancel{5}} = \frac{0}{-5} \quad \text{or} \quad x - 7 = 0$$

$$x = 0 \qquad\qquad x = 7$$

$$(0, 21) \qquad\qquad (7, 21)$$

Axis of Symmetry is midway between these points. $x = \frac{0+7}{2}$

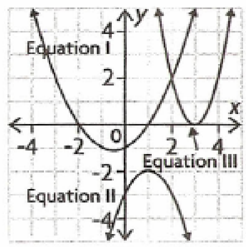
$$x = 3.5$$

A. $x = 7$ **B.** $x = 0$ **C.** $x = 3.5$ **D.** $x = -7$

5. Which equation is a quadratic equation in standard form?

A. $-3x^3 + 2x - 5 = 0$ **B.** $2x^2 - 5x = 15$ **C.** $f(x) = 2x^2 + 3x - 5$ **D.** $4x^2 - 6x + 5 = 0$

6. Select the one correct statement about the quadratic equations corresponding to these graphs.



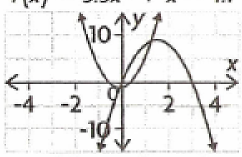
A. Equation I has no solution.

B. Equations I and III each have at least one real solution.

C. Each equation has at least one real solution.

D. Equation II has two solutions.

7. The graphs of $f(x) = 5.5x^2 + x - 1.1$ and $g(x) = 4x(3 - x)$ are shown. Estimate the roots of $5.5x^2 + x - 1.1 = 4x(3 - x)$.



A. $x = -0.1$ and $x = -1.2$ **C.** $x = -0.1$ and $x = 1.3$

B. $x = 1.3$ and $x = 8.8$ **D.** $x = -1.2$ and $x = 8.8$

8. Which of the following are roots of $x^2 - 9x - 52 = 0$?

A M

$\hookrightarrow x^2 - 9x - 52 = 0$

$(x-13)(x+4) = 0$

$x - 13 = 0$ or $x + 4 = 0$

$x = 13$ $x = -4$

A. $x = -4$ and $x = -13$

B. $x = 4$ and $x = -13$

C. $x = -4$ and $x = 13$

D. $x = 4$ and $x = 13$

10. Which parabola corresponds to the quadratic function $y = 2x^2 + 4x - 16$?

$\hookrightarrow y = x^2 + 2x - 8$

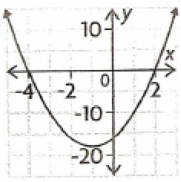
$0 = x^2 + 2x - 8$

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

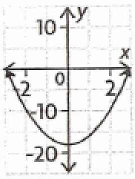
$x + 4 = 0$ or $x - 2 = 0$

$x = -4$ $x = 2$

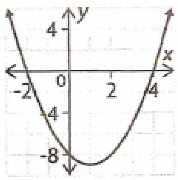
A.



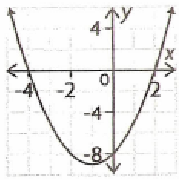
B.



C.



D.



11. Can you solve $x^2 + 14x - 19 = 0$ by factoring? How do you know?

A. No; $14^2 - 4(1)(-19) = 272$, which is not a perfect square.

B. Yes; $14^2 - 4(1)(-19) = 272 > 0$.

C. Yes; because $14^2 - 4(1)(-19) = 272$, which is a perfect square.

D. It is not possible to answer this question.

12. Use the quadratic formula to determine which of the following are roots of the equation $4.4x^2 + 4.3x - 5 = 0$.

$a=4.4,\ b=4.3,\ c=-5$

$$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$

$$x=\frac{-4.3\pm\sqrt{(4.3)^2-4(4.4)(-5)}}{2(4.4)}$$

$$x=\frac{-4.3\pm\sqrt{18.49+88}}{8.8}$$

$$x=\frac{-4.3\pm\sqrt{106.49}}{8.8}$$

$$x=\frac{-4.3\pm10.3}{8.8}$$

$$x=\frac{-4.3+10.3}{8.8} \quad \text{or} \quad x=\frac{-4.3-10.3}{8.8}$$

$$x=0.68 \qquad x=-1.66$$

A. $x = 0.68$ and $x = 1.66$

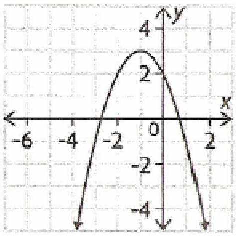
B. $x = -0.68$ and $x = 1.66$

C. $x = 0.68$ and $x = -1.66$

D. $x = -0.68$ and $x = -1.66$

NUMERICAL RESPONSE

13. a) Identify the following information for the parabola shown.



x-intercepts: (-3, 0), (1, 0) y-intercept: (0, 2)

axis of symmetry: x = -1 vertex: (-1,3)

b) What is the range of the function corresponding to this parabola?

range: $\{y \mid y \leq 3, y \in R\}$

14. The roots of $x^2 + 17x - 38 = 0$ are x = -19 and x = 2.

$\hookrightarrow x^2+17x-38=0$

$(x+19)(x-2)=0$

$x+19=0$ or $x-2=0$

$x=-19$ $x=2$

15. The roots of $x^2 - 2x = 323$ are $x =$ 19 and $x =$ -17.

$\hookrightarrow x^2 - 2x - 323 = 0$

$a = 1,\ b = -2,\ c = -323$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{2 \pm \sqrt{(-2)^2 - 4(1)(-323)}}{2(1)}$$

$$x = \frac{2 \pm \sqrt{4 + 1292}}{2}$$

$$x = \frac{2 \pm \sqrt{1296}}{2}$$

$$x = \frac{2 \pm 36}{2}$$

$$x = \frac{2 + 36}{2} \qquad x = \frac{2 - 36}{2}$$

$$x = \frac{38}{2} \qquad x = \frac{-34}{2}$$

$$x = 19 \qquad x = -17$$

16. The quadratic function $y = -5x(x + 4) + 7$ has been partially factored.

↳ 2 points with a y-coordinate of 7

$\frac{-\cancel{5}x}{-\cancel{5}} = \frac{0}{-5}$ or $x+4=0$

$x=-4$

$(-4,7)$

$x=0$

$(0,7)$

↳ Axis of Symmetry: $x = \frac{0-4}{2}$

$x = \frac{-4}{2}$

$x = -2$

a) Determine the equation of the axis of symmetry of the function: $x = \underline{-2}$

To determine vertex:

$y = -5(-2)[-2+4]+7$

$y = 10(2)+7$

$y = 20+7$

$y = 27$

b) Locate the vertex of the function: ($\underline{-2}$, $\underline{27}$)

c) Write the function in vertex form: $y = \underline{-5}(x + \underline{2})^2 + \underline{27}$

17. Suppose you were to use the quadratic formula to solve these equations. What values of a, b, and c would you use in each case?

a) $3x^2 - 2x + 1 = 0$

$a = \underline{3}$, $b = \underline{-2}$, $c = \underline{1}$

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

$a = \underline{-2}$, $b = \underline{4}$, $c = \underline{-3}$

$\hookrightarrow -2(x-1)(x-1)-1$

$-2(x^2-1x-1x+1)-1$

$-2(x^2-2x+1)-1$

$-2x^2+4x-2-1$

$-2x^2+4x-3$

18. Use the quadratic formula to determine the exact roots of each quadratic equation.

a) $7x^2 + 3x - 2 = 0$

roots: $x = \frac{-3 \pm \sqrt{65}}{14}$

b) $-4x^2 - 2x + 3 = 0$

roots: $x = \frac{-1 \pm \sqrt{13}}{4}$

a) $a = 7, b = 3, c = -2$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-3 \pm \sqrt{(3)^2 - 4(7)(-2)}}{2(7)}$$

$$x = \frac{-3 \pm \sqrt{9 + 56}}{14}$$

$$x = \frac{-3 \pm \sqrt{65}}{14}$$

b) $a = -4, b = -2, c = 3$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{2 \pm \sqrt{(-2)^2 - 4(-4)(3)}}{2(-4)}$$

$$x = \frac{2 \pm \sqrt{4 + 48}}{-8}$$

$$x = \frac{2 \pm \sqrt{52}}{-8}$$

$$x = \frac{2 \pm \sqrt{4 \times 13}}{-8}$$

$$x = \frac{2 \pm 2\sqrt{13}}{-8}$$

$$x = \frac{-1 \pm \sqrt{13}}{4}$$

WRITTEN RESPONSE

21. Sketch the graph of the quadratic function $f(x) = -x^2 + 10x - 9$.

State its domain and range.

$\hookrightarrow$ $0 = -x^2 + 10x - 9$

$0 = -(x^2 - 10x + 9)$

$0 = -1(x-1)(x-9)$

$\uparrow$ a $\uparrow$ r $\uparrow$ s

x-intercepts:
(1,0) and (9,0)

y-intercept:

$c = a \cdot r \cdot s$

$c = (-1)(-1)(-9)$

$c = -9$

Axis of Symmetry:

$x = \frac{1+9}{2}$

$x = \frac{10}{2}$

$x = 5$

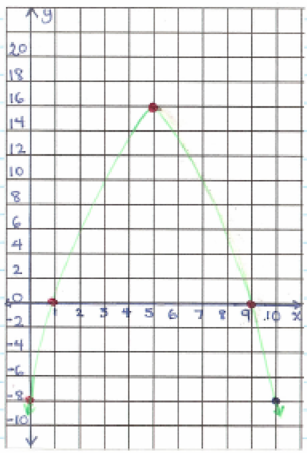
$f(5) = -(5)^2 + 10(5) - 9$

$= -25 + 50 - 9$

$= 16$

* Vertex (5, 16)

GRAPH:



Domain:

$\{x \mid x \in R\}$

Range:

$\{y \mid y \leq 16, y \in R\}$

22. Jill braked to avoid an accident, creating skid marks 60 m long. For Jill's car on a dry road, the equation for stopping distance is $d = 0.0081s^2 + 0.137s$, where d is Jill's stopping distance in metres and s is her speed in kilometres per hour. How fast was Jill driving?

$\hookrightarrow d = 60\text{m}$

$d = 0.0081s^2 + 0.137s$

$60 = 0.0081s^2 + 0.137s$

$0 = 0.0081s^2 + 0.137s - 60$

$a = 0.0081,\ b = 0.137,\ c = -60$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-0.137 \pm \sqrt{(0.137)^2 - 4(0.0081)(-60)}}{2(0.0081)}$$

$$x = \frac{-0.137 \pm \sqrt{0.019 + 1.944}}{0.0162}$$

$$x = \frac{-0.137 \pm \sqrt{1.963}}{0.0162}$$

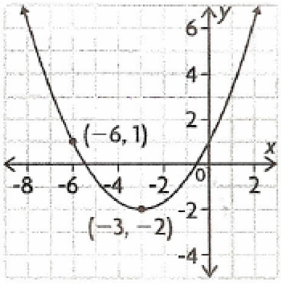
$$x = \frac{-0.137 \pm 1.401}{0.0162}$$

$x = \frac{-0.137 + 1.401}{0.0162}$ or $x = \frac{-0.137 - 1.401}{0.0162}$

$x = 78.0$ Km/h $\quad x = -94.9$ (speed cannot be negative)

Jill was driving 78.0 Km/h.

23. Write the equation in vertex form of the parabola shown.



$y = a(x-h)^2 + K$

$y = a(x+3)^2 - 2$

$\Rightarrow y = \frac{1}{3}(x+3)^2 - 2$

To determine "a":

$1 = a(-6+3)^2 - 2$

$1 = a(-3)^2 - 2$

$1 = a(9) - 2$

$1 = 9a - 2$

$\frac{3}{9} = \frac{\cancel{9}a}{\cancel{9}}$

$\frac{1}{3} = a$