CHAPTER 9 REVIEW

1a. false; $(x - 3)(x + 8)$ **1b.** false; $2x^2 - 4x + 5$

1c. false; $x^2 + 6x + 9$ **1d.** true

2. Sample response: There is a reflection across the x-axis ($y = -x^2$) and a vertical stretch by a factor of 2 ($y = -2x^2$). Finally, there is a translation left 5 units and up 4 units ($y = -(x + 5)^2 + 4$).

3a. $y = -(x-2)^2 + 3$; vertex form

3b. $y = 0.5(x - 2)(x + 3)$; factored form

4a. $y = -3(x - 1.5)^2 + 18.75$

4b. $y = -1.6(x - 5)^2 + 30$

5a. $2w + 9 = 0$ or $w - 3 = 0$; $w = -4.5$ or $w = 3$

5b. $2x + 5 = 0$ or $x - 7 = 0$; $x = -2.5$ or $x = 7$

6a. $y = (x-1)^2 - 4$

6b. sample answers:

$y = (x + 1.5)\left(x - \frac{1}{3}\right)$,

$y = (2x + 3)(3x - 1)$

7a.
$$x^2 + 6x - 9 = 13$$
$$x^2 + 6x = 22$$
$$x^2 + 6x + 9 = 22 + 9$$
$$(x + 3)^2 = 31$$
$$x + 3 = \pm\sqrt{31}$$
$$x = -3 \pm \sqrt{31}$$

7b.
$$3x^2 - 24x + 27 = 0$$
$$3x^2 - 24x = -27$$
$$x^2 - 8x = -9$$
$$x^2 - 8x + 16 = -9 + 16$$
$$(x - 4)^2 = 7$$
$$x - 4 = \pm\sqrt{7}$$
$$x = 4 \pm \sqrt{7}$$

8a. $x = \frac{13 \pm \sqrt{-191}}{10}$; no real number solutions

8b. $x = \frac{-7 \pm \sqrt{157}}{-6}$

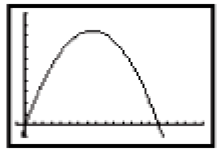
9a. $f(60) = 8.1$; when there are 60 fish in the tank, the population is growing at a rate of about 8 fish per week.

9b. $f(x) = 0$ for $x = 0$ and $x = 150$; when there are no fish, the population does not grow; when there are 150 fish, the number of fish hatched is equal to the number of fish that die, so the total population does not change.

9c. When there are 75 fish, the population is growing fastest.

9d. The population no longer grows once there are 150 fish, so that is the maximum number of fish the tank has to support.

9e.



$[-10, 200, 10, -1, 10, 1]$

10. The roots are at 0 s and 1.6 s, so start with the equation $y = x(x - 1.6)$. Then reflect the graph across the x-axis. When $x = 0.5$, $y = 0.55$. You need the value of y to be 8.8, so apply a vertical stretch with a factor of $\frac{8.8}{0.55}$, or 16. The final equation is $y = -16x(x - 1.6)$.

11a. No x-intercepts means taking the square root of a negative number. So $(-6)^2 - 4(1)(c) < 0$; $-4c < -36$; $c > 9$. Or translate the graph of $y = x^2 - 6x$ vertically to see that for $c > 9$, the parabola does not cross the x-axis.

11b. One x-intercept implies a double root, so $x^2 - 6x + c$ must be a perfect-square trinomial. Make a rectangle diagram to find $\left(\frac{-6}{2}\right)^2 = 9$, so $x^2 - 6x + 9$ is a perfect-square trinomial, and $c = 9$. The graph touches the x-axis once. You can also solve $b^2 - 4ac = 36 - 4c = 0$ to get $c = 9$.

11c. For $c < 9$, $b^2 - 4ac > 0$, so the discriminant gives two real roots. The parabola $y = x^2 - 6x + c$ crosses the x-axis twice for values of c less than 9.

12a. $x = -5 + \sqrt{31}$ and $x = -5 - \sqrt{31}$

12b. $x = 1$ and $x = \frac{5}{3}$

13a. $x = -2$, $x = -1$, $x = 1$, and $x = 3$; $y = 2(x - 3)(x + 2)(x + 1)(x - 1)$

13b. $x = -2$ (double root) and $x = 3$; $y = -3(x + 2)^2(x - 3)$

14a. $(x + 3)(x + 4)$

	x	3
x	x^2	$3x$
4	$4x$	12

14b. $(x - 7)^2$

	x	-7
x	x^2	$-7x$
-7	$-7x$	49

14c. $(x + 7)(x - 4)$

	x	-4
x	x^2	$-4x$
7	$7x$	-28