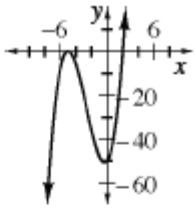
Lesson 8.1.1

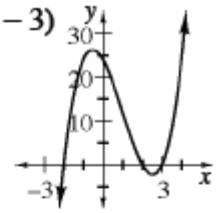
8-1. A reasonable guess would be $y = x(x - 2)^2(x - 3)$.

8-2. See graphs below.

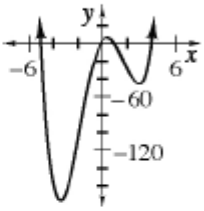
$P_1(x) = (x-2)(x+5)^2$



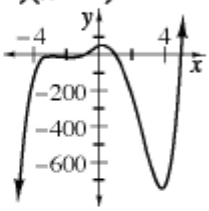
$P_2(x) = 2(x-2)(x+2)(x-3)$



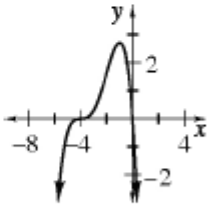
$P_3(x) = x^4 - 21x^2 + 20x$



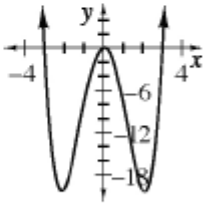
$P_4(x) = (x+3)^2(x+1)(x-1)(x-5)$



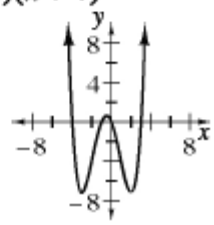
$P_5(x) = -0.1x(x+4)^3$



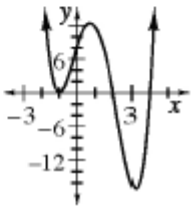
$P_6(x) = x^4 - 9x^2$



$P_7(x) = 0.2x(x+1)(x-3)(x+4)$



$P_8(x) = x^4 - 4x^3 - 3x^2 + 10x + 8$



8-3. See below:

a. Cubics; when the factors are multiplied there is an x^3.

b. Example: "The graph goes upwards toward –5, bounces downward at –5 then turns upward again to go through $x = 2$, then continues upward and is very steep."

8-4. See below:

a. There are three factors; x-intercepts are (–2, 0), (2, 0), and (3, 0); Example: "The shapes are similar, but this graph has three intercepts and the graph in part (a) crosses once and then bounces off the x-axis."

b. No; it affects the stretch and the y-intercept; the negative flips the graph.

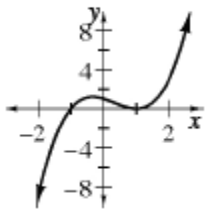
8-5. It is not factored; (0, 0) because you can factor out an x or you can see that when $x = 0$, then $y = 0$; the trace button will give an approximation, choose the closest integer and substitute to check.

Review & Preview

8-8. See graphs and tables below.

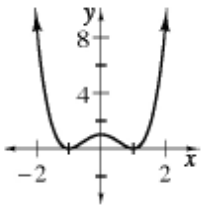
a. Parent function: $y = x^3$

x	y
–2	–9
–1	0
0	1
1	0
2	3



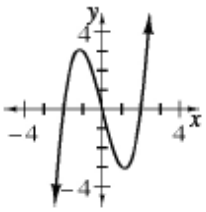
b. Parent function: $y = x^4$

x	y
–2	9
–1	0
0	1
1	0
2	9



c. Parent function: $y = x^3$

x	y
–2	0
–1	3
0	0
1	–3
2	0



8-9. Functions in parts (a), (b), and (e) are polynomial functions; explanations vary.

8-10. Graphs will vary. See below:

a. 0, 1, or ∞

b. 0, 1, or 2

c. 0, 1, 2, 3, or 4

d. 0, 1, 2, 3, or 4 (1 and 3 require the parabola to be tangent to the circle.)

8-11. (–2, –1) and (3, 4)

8-12. See below:

a. See answers in bold in the table below.

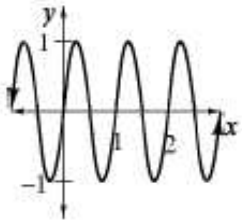
	1st	2nd	3rd	4th
What g does to x:	adds 1	$(\ )^2$	divides by 3	subtracts 2
What g^{-1} does to x:	**adds 2**	**multiplies by 3**	$\sqrt{\ }$	**subtracts 1**

b. $f^{-1}(x)=(\frac{x-3}{2})^2+1$, $g^{-1}(x)=\sqrt{3(x+2)}-1$

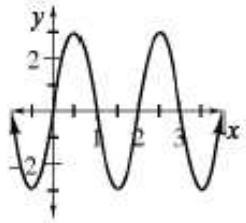
8-13. The second graph is shifted up 5 from the first.

8-14. See graphs below:

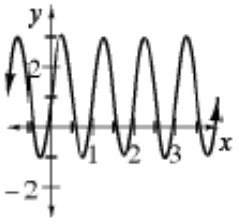
a.



b.



c.



8-15. See below:

a. $4n - 27$

b. At least 2507 times

8-16. See below:

a. 60°, 300°

b. 135°, 315°

c. 60°, 120°

d. 150°, 210°

8-17. The functions in parts (a), (b), (d), (e), (h), (i), and (j) are polynomial functions.

8-18. They are not equivalent. Explanations vary. Students may substitute numbers to check. Also, the second equation can be written $y = -x + 12$, which is a line, not a circle.

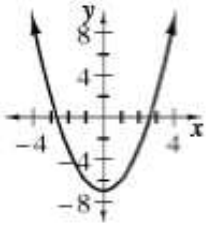
8-19. See below:

a. $x = 2$ or $x = 4$

b. $x = 3$

c. $x = -2$, $x = 0$ or $x = 2$

8-20. See graph below.



a. 2

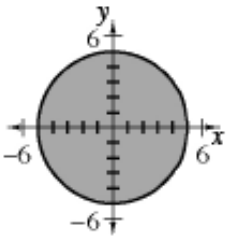
b. $x = \sqrt{7}, -\sqrt{7}$

8-21. $x = -1 \pm \sqrt{6}$

a. 2

b. At $x \approx 1.45$ and $x \approx -3.45$

8-22. See graph below.



8-23. $x = -1$ or 5

8-24. See below:

a. $y = (3^x) - 4$

b. $y = 3^{(x-7)}$

8-25. See answers in bold in the below:

x (angle)	–90°	–45°	0°	45°	90°	135°	180°	....	270°
y (height)	–30'	**–21.2'**	**0'**	**21.2'**	**30'**	**21.2'**	**0'**		**–30'**

a. Repeat the pattern for several cycles

b. 30'

c. $y = 30 \sin x$