NAME Answer Key DATE ______________ PERIOD ________

5.1 Solving Polynomial Equations by Graphing · Form A

All work must be completed on a separate sheet of paper, in a clear and organized manner. Tables of values must be included for all graphs, which need to be completed on the attached graph sheet.

Example 1

Use a graphing calculator to solve each equation by graphing. If necessary, round to the nearest hundredth.

1. $x^3 - 9x^2 + 27x = 20$ **2.** $x^6 - 15 = 5x^4 - x^2$ **3.** $x^8 = -x^7 + 3$

$x = 1.09$

$x = -2.31$
$x = 2.31$

$x = -1.36$
$x = 1.06$

Example 2

4. GARDEN A rectangular garden is 12 feet across and 16 feet long. It is surrounded by a border of mulch that is a uniform width, x. The maximum area for the garden, plus border, is 285 ft^2.

a. Write a polynomial equation to represent the situation. $4x^2 + 56x + 192 = 285$

b. Write and solve a system of equations. $y_1 = 4x^2 + 56x + 192$, $y_2 = 285$ $x = 1.5$

c. What are the dimensions of the garden plus boarder?

15 ft by 19 ft

Mixed Exercises

Solve each equation. If necessary, round to the nearest hundredth.

5. $x^4 + 2x^3 = 7$ **6.** $x^4 - 15x^2 = -24$ **7.** $x^3 - 6x^2 + 4x = -6$ **8.** $x^4 - 15x^2 + x + 65 = 0$

$x = -2.47$
$x = 1.29$

$x = -3.63$ $x = 3.63$
$x = -1.35$ $x = 1.35$

$x = -0.69$ $x = 4.95$
$x = 1.75$

no solutions

9. BALLOON Treyvon is standing 9 yards from the base of a hill that has a slope of $\frac{3}{4}$. He throws a water balloon from a height of 2 yards. Its path is modeled by $h(x) = -0.1x^2 + 0.8x + 2$, where h is the height of the balloon and x is the distance the balloon travels in yards.

a. Write a polynomial equation to represent the situation.

$y_1 = -0.1x^2 + 0.8x + 2$
$y_2 = \frac{3}{4}(x - 9)$

b. How far from Treyvon will the balloon hit the hill?

$x = 9.6$ yards

10. USE TOOLS A company models its revenue in dollars using the function $P(x) = 70{,}000\ (x - x^4)$ on the domain (0, 1) where x is the price at which they sell their product in dollars. Use a graphing calculator to sketch a graph and find the price at which their product should be sold to make a profit of \$20,000. Describe your solution process. $x = 0.29$ $x = 0.88$

where f(x) & 20000 intersect on the graph

11. ROLLER COASTERS On a racing roller coaster, two trains start at the same time and race to see which returns to the station first. On one coaster, the height of a train on the blue track can be modeled by $f(x) = \frac{1}{20}(x^3 - 60x^2 + 900x)$ and the height of a train on the green track can be modeled by

$g(x) = \frac{1}{12{,}000}(x^5 - 144x^4 + 7384x^3 - 158{,}400x^2 + 1{,}210{,}000x)$

where x is time in seconds for the first 35 seconds of the ride.

$\frac{1}{20}(x^3 - 60x^2 + 900x) = \frac{1}{12000}(x^5 - 144x^4 + 7384x^3 - 158400x^2 + 1210000x)$

a. What equation would determine the times when the blue and green trains are at the same height?

b. Use a graphing calculator to sketch a graph of $f(x)$ and $g(x)$ and solve the equation from **part a**. Interpret the solution in the context of the situation. $x = 9.6$, $x = 26.0$. Trains at same height.

c. Write an equation to determine the times for which the blue train modeled by $f(x)$ is at a height of 150 feet. Use a graphing calculator to solve the equation. Interpret the solution in the context of the situation.

$\frac{1}{20}(x^3 - 60x^2 + 900x) = 150$; $x = 16.5$, $x = 4.7$

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17. **WRITE** Use a graph to explain why a function with an even degree can have zero real solutions, but a function with an odd degree must have at least one real solution.

Even degrees have end behaviors that either both go up or down, so it is not a guarentee to cross the x-axis. Odd degrees have one up & one down, so it must cross the x-axis.

~~**18.** **CREATE** Write a polynomial equation and solve it by graphing a related function and finding its zeros.~~

19. **ANALYZE** Determine whether the following statement is *sometimes*, *always*, or *never* true. Justify your argument.

If a system of equations has more than one solution, then the positive solution is the only viable solution. Sometimes.

Depends on the context of the problem.

~~**20.** **PERSEVERE** During practice, a player kicks a ball from the ground with an initial velocity of 32 feet per second. The polynomial $f(x) = -16x^2 + 32x$ models the height of the ball, where x represents time in seconds. At the same time, another player heads a ball at some distance c feet off the ground with an initial velocity of 27 feet per second. The polynomial $f(x) = -16x^2 + 27x + 6$ models the height of the ball.~~

~~**a.** If the balls are at the same height after 1.2 seconds, from what height did the second player head the ball?~~

~~**b.** If $c > 0$, is it possible that the soccer balls are never at the same height? Is it reasonable in the context of the situation? Explain your reasoning.~~

21. **WHICH ONE DOESN'T BELONG?** Which polynomial doesn't belong? Justify your conclusion.

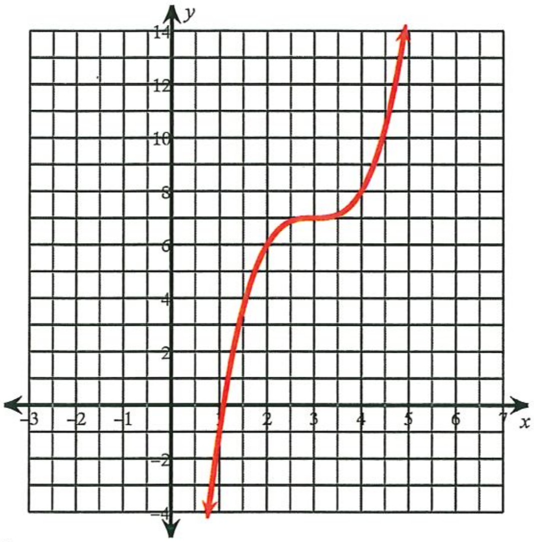
$x - 17 = 18x^3 + 3x^2$	$x^2 = 4x^4 + 3x^2 - 8$	$5x^2 = -2x - 11$	$-4 = 2x^5 - x^2$

$5x^2 = -2x - 11$.

Only one with no real solutions

Algebra 2 - 5.1 Solving Polynomial Equations by Graphing

1)



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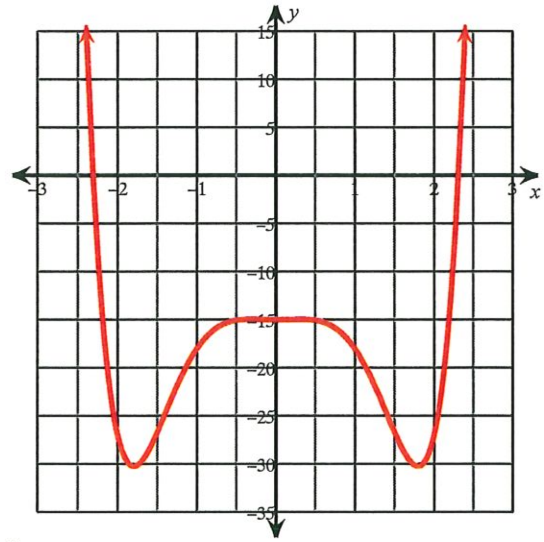

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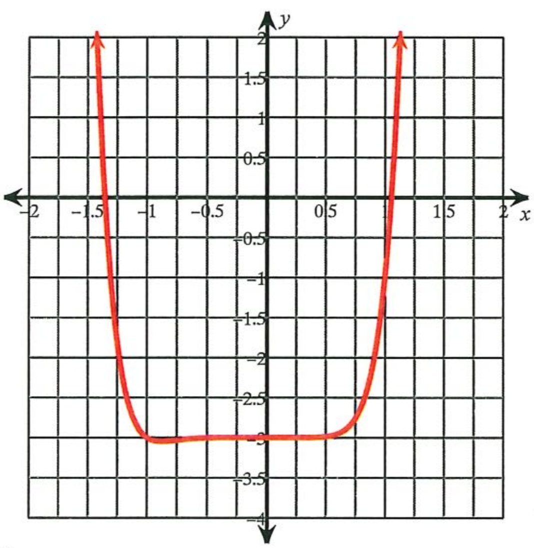

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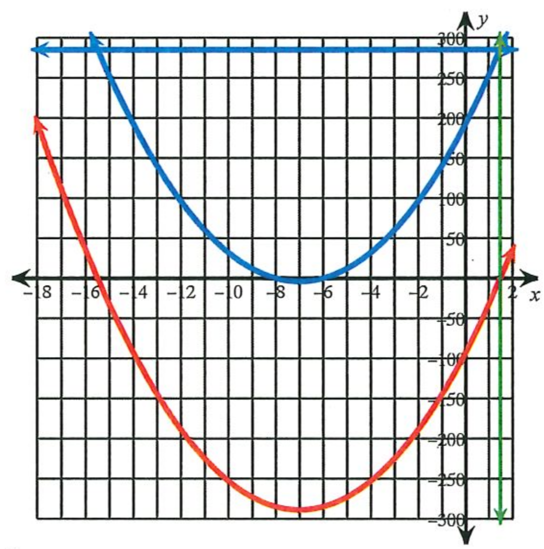

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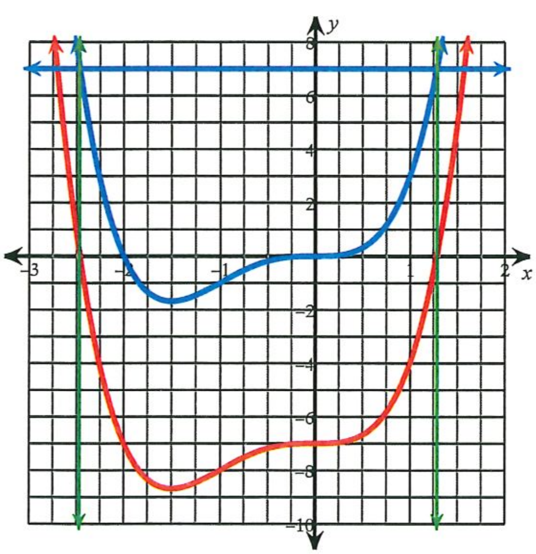

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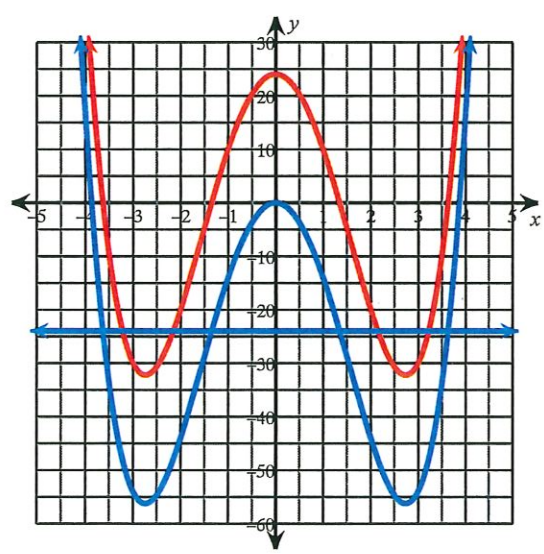

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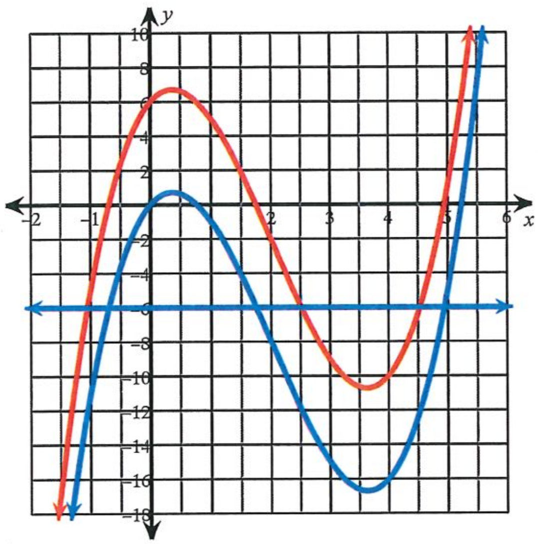

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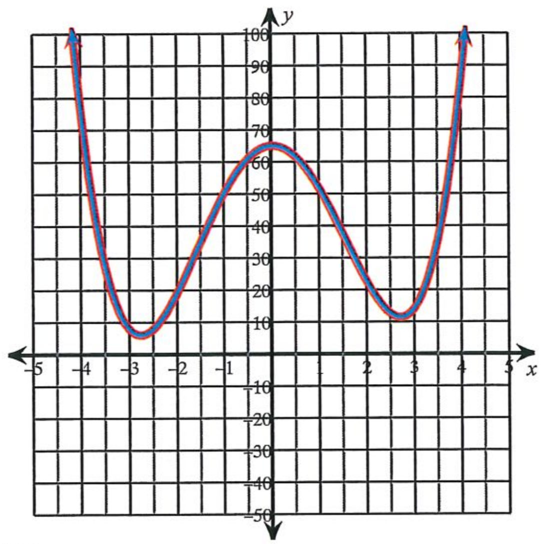

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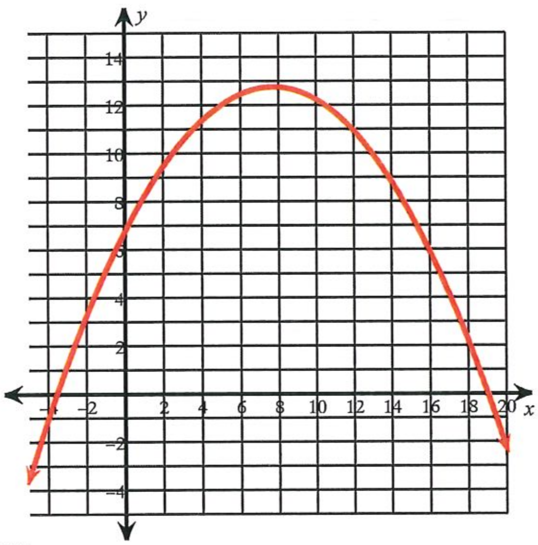

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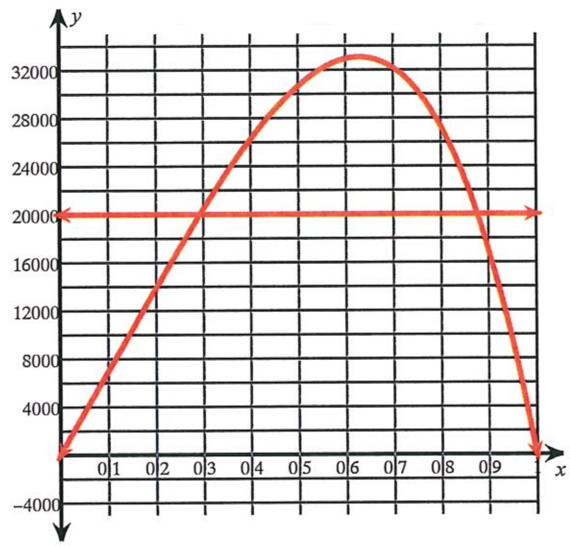

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