LESSON 4.5 Skills Practice

Name _____ Date _____

Getting to the Root of It All
Rational Root Theorem

Vocabulary

Write a definition for the term in your own words.

1. Rational Root Theorem

Problem Set

Determine the possible rational roots of each polynomial using the Rational Root Theorem.

1. $x^3 - 4x^2 + 6x - 8 = 0$

   $p = \pm 1, \pm 2, \pm 4, \pm 8$

   $q = \pm 1$

   $\frac{p}{q} = \pm 1, \pm 2, \pm 4, \pm 8$

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2. $2x^4 - 4x^2 + 15 = 0$

3. $-2x^3 + 5x + 18 = 0$

4. $x^3 + 12x^2 - 21x + 32 = 0$

5. $5x^4 - 7x^3 + 5x - 30 = 0$

6. $12x^4 - 15x^3 + 24x^2 + 11x - 2 = 0$

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Use the Rational Root Theorem to determine the possible rational roots for each polynomial equation. Then, solve completely. Use the graph, if given, to identify possible zeros.

7. $x^3 + 3x^2 - 18x - 40 = 0$

- Possible rational roots:

  $p = \pm 1, \pm 2, \pm 4, \pm 5, \pm 8, \pm 10, \pm 20, \pm 40$

  $q = \pm 1$

  $\frac{p}{q} = \pm 1, \pm 2, \pm 4, \pm 5, \pm 8, \pm 10, \pm 20, \pm 40$

- Solve completely:

  $$\begin{array}{r|rrrr} 4 & 1 & 3 & -18 & -40 \\ & \downarrow & 4 & 28 & 40 \\ \hline & 1 & 7 & 10 & 0 \end{array}$$

  $x^3 + 3x^2 - 18x - 40 = (x - 4)(x^2 + 7x + 10)$

  $= (x - 4)(x + 2)(x + 5)$

  $x = 4, -2, -5$

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8. $6x^3 + 35x^2 - 52x - 21 = 0$

- Possible rational roots:

- Solve completely:

9. $x^4 + 4x^3 - 21x^2 - 36x + 108 = 0$

- Possible rational roots:

- Solve completely:

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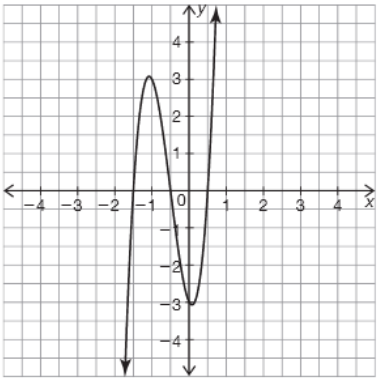
10. $x^2 - 8x + 17 = 0$

- Possible rational roots:

- Solve completely:

11. $8x^3 + 12x^2 - 2x - 3 = 0$

- Possible rational roots:



- Solve completely:

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12. $x^4 - 4x^3 + 5x^2 - 4x + 4 = 0$

- Possible rational roots:

- Solve completely:

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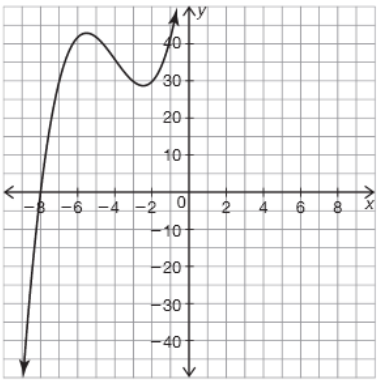
13. $x^3 + 12x^2 + 41x + 72 = 0$

- Possible rational roots:



- Solve completely:

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14. $x^3 - 1.5x^2 - 1.5x + 1 = 0$

- Possible rational roots:

- Solve completely: