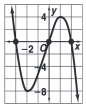
40. a. $h = x + 3$; $w = x$

b. 

0, −3, 2; where the volume is zero

c. $0 < x < 2$

d. about 4.06 ft^3

41. $y = -2x^3 + 9x^2 - x - 12$

42. $y = 5x^4 - 23x^3 - 250x^2 + 1164x + 504$

43. $y = 3x(x - 8)(x - 1)$

44. $y = -2x(x + 5)(x - 4)$

45. $y = x^2(x + 4)(x - 1)$

46. $y = \frac{1}{2}x\left(x - \frac{1}{2}\right)\left(x + \frac{1}{2}\right)$

47. about $10.5, -7.1; \frac{3}{2}, 4, 6$

48. about $0.9, -6.9, -1.4; 0, -3, -1, 1$

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51–53. Answers may vary. Samples are given.

51. $y = x^3 - 3x^2 - 10x$

52. $y = x^3 - 21x^2 + 147x - 343$

53. $y = x^4 - 4x^3 - 7x^2 + 22x + 24$

4. $-4, 5$ (mult. 3) **55.** 0 (mult. 2), −1 (mult. 2) **56.** $0, 6, -6$

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even degree
leading coeff?
positive ↑, ↗
negative ↓, ↘

odd degree
leading coeff?
positive ↓, ↗
negative ↑, ↘

Nov 4-11:47 AM

6.3 Dividing Polynomials

Remember long division?

How do you do the following problem?

582 ÷ 23

$\frac{582}{23}$

$$\begin{array}{r} 25 \\ 23\overline{)582} \\ -46\downarrow \\ \hline 122 \\ -115 \\ \hline 7 \text{ Remainder} \end{array}$$

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Now we'll divide polynomials the same way.

1) Divide $x^2 - 3x + 1$ by $(x - 4)$

$$\begin{array}{r} x + 1 \\ x-4\overline{)x^2-3x+1} \\ -(x^2-4x) \\ \hline x+1 \\ -(x-4) \\ \hline 5 \text{ Remainder} \end{array}$$

2) Di

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Determine whether each divisor is a factor of each dividend.

3) Is (x-8) a factor of $2x^2 - 19x + 24$?

$$\begin{array}{r} 2x-3 \\ x-8\overline{)2x^2-19x+24} \\ -(2x^2-16x) \\ \hline -3x+24 \\ -(-3x+24) \end{array}$$

Remainder $\emptyset$. Yes. $x-8$ is a factor.

4) Is (x +2) a factor of $x^3 - 4x^2 + 3x + 2$?

$$\begin{array}{r} x^2-6x+15 \\ x+2\overline{)x^3-4x^2+3x+2} \\ -(x^3+2x^2) \\ \hline -6x^2+3x \\ -(-6x^2-12x) \\ \hline 15x+2 \\ -(15x+30) \\ \hline -28 \text{ Remainder} \end{array}$$

$R \neq 0$, so $x+2$ is NOT a factor.

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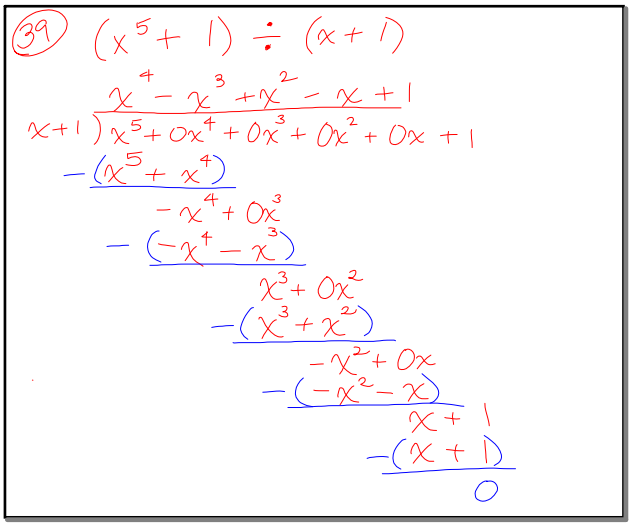

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Dividing when all powers are not in the original polynomial.

5) **Divide $-4x^4 + 27x^2 + x^3$ by (x+3)**

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Warm up - Review

1) Write in standard form and classify using degrees and number of terms: $5x - 2x^3 + 9 - 6x^2$

2) Find the zeros, then state the multiplicity of each zero: $y = (x - 3)^2(x + 5)$

3) Factor then find the zeros: $9x^3 + 6x^2 - 3x$

4) Write a polynomial in standard form with the given zeros: 7, 0, and -2

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ASSIGNMENT - Due Monday!

HW 6.3 p. 324 #1-9 odd and #37-41 odd

Optional Review for Quiz

p. 326 #1-7 #5-7, include end behavior and a sketch.

p. 359 #6-12, 13-15, 17, 18

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Checkpoint Quiz 1 — **Lessons 6-1 through 6-3**

1. Write a polynomial function with at least three zeros that are negative, one of which has multiplicity 2.

Write each polynomial in standard form. Then classify it by degree and by number of terms.

2. $-2x^3 + 6 - x^3 + 5x$ 3. $\frac{1}{2}x + x^4 - 3x^2 + 2x$ 4. $3(x - 1)(x + 4)$

For each function, determine the zeros and their multiplicity.

5. $y = (x - 2)^2(x - 1)$ 6. $y = (2x + 1)(x - 4)$ 7. $y = x^3(x - 3)(x + 1)^2$

p. 359 **Write each polynomial in standard form. Then classify it by degree and by number of terms.**

6. $p^3 - 2p + 2p^3$ 7. $3 - 5x^9$ 8. $x - x^3 - x^5$

9. $3x + 2x^2 - x + 4x^3$ 10. $5 + x + x^4 - x^2 + x^7$ 11. s

12. Find both a cubic and a quartic model for the set of values. Graph each model. Compare the two models to determine which is a better fit.

x	1.2	1.4	1.6	1.8	2.0	2.2
y	3.1	−4.2	4.1	7.5	−8.9	10

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Write each polynomial function in factored form. List the zeros of the function, and their multiplicity. Find any relative maximum or relative minimum values. Round to the nearest hundredth if necessary.

13. $f(x) = x^3 - x^2 - 12x$ 14. $g(x) = 4 - x^2$ 15. $y = x^3(x + 2)^4$

Write a polynomial function in standard form with the given zeros.

16. $-3, -2, 0, 2$ 17. $1, 1, 2$ 18. $-3, 0, 0, 1$ 19. $-2, -2, -2$

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Practice by Example

Example 1 (page 321)

for Help

Divide using long division. Check your answers.

1. $(x^2 - 3x - 40) \div (x + 5)$
2. $(3x^2 + 7x - 20) \div (x + 4)$
3. $(x^3 + 3x^2 - x + 2) \div (x - 1)$
4. $(2x^3 - 3x^2 - 18x - 8) \div (x - 4)$
5. $(9x^3 - 18x^2 - x + 2) \div (3x + 1)$
6. $(9x^2 - 21x - 20) \div (x - 1)$
7. $(x^2 - 7x + 10) \div (x + 3)$
8. $(x^3 - 13x - 12) \div (x - 4)$

Example 2 (page 321)

Determine whether each binomial is a factor of $x^3 + 4x^2 + x - 6$.

9. $x + 1$
10. $x + 2$
11. $x + 3$
12. $x - 3$

Divide.

37. $(2x^3 + 9x^2 + 14x + 5) \div (2x + 1)$
38. $(x^4 + 3x^2 + x + 4) \div (x + 3)$
39. $(x^5 + 1) \div (x + 1)$
40. $(x^4 + 4x^3 - x - 4) \div (x^3 - 1)$
41. $(3x^4 - 5x^3 + 2x^2 + 3x - 2) \div (3x - 2)$

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Nov 5-12:23 PM