Simplify. Write in standard form. Then classify by degree and number of terms

1) $(6x^2 – 5x + 3) – (9x^2 – 7)$

2) $3x(2x – 7) + 7x^4 – x$

3) $-x^2 + 7x^3 + x^2$

4) **Write an example of a cubic binomial.**

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Answers for Lesson 6-1 Exercises

1. $10x + 5$; linear binomial
2. $-3x + 5$; linear binomial
3. $2m^2 + 7m - 3$; quadratic trinomial
4. $x^4 - x^3 + x$; quartic trinomial
5. $2p^2 - p$; quadratic binomial
6. $3a^3 + 5a^2 + 1$; cubic trinomial
7. $-x^5$; quintic monomial
8. $12x^4 + 3$; quartic binomial
9. $5x^3$; cubic monomial
10. $-2x^3$; cubic monomial
11. $5x^2 + 4x + 8$; quadratic trinomial

21. $y = -0.03948x^3 + 2.069x^2 - 17.93x + 106.9$; 206.07
22. $y = -0.007990x^3 + 0.4297x^2 - 6.009x + 43.57$; 26.34
23. $y = 0.01002x^3 - 0.3841x^2 + 5.002x + 2.132$; 25.39

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33. $-c^2 + 16$; binomial
34. $-9d^3 - 13$; binomial
35. $16x^2 - x - 5$; trinomial
36. $2x^3 - 6x + 17$; trinomial
37. $a + 4b$; binomial
38. $-12y$; monomial
39. $8x^2 - 6y$; binomial

42. $-4x^4 - 3x^3 + 5x - 54$; polynomial of 4 terms
43. $80x^3 - 109x^2 + 7x - 75$; polynomial of 4 terms
44. $2x^3 - 2x^2 + 8x - 27$; polynomial of 4 terms
45. $6a^2 + 3ab - 8$; trinomial
46. $8x^3 + 2x^2$; binomial
47. $30x^3 - 10x^2$; binomial
48. $2a^3 - 5a^2 - 2a + 5$; polynomial of 4 terms
49. $b^3 - 6b^2 + 9b$; trinomial
50. $x^3 - 6x^2 + 12x - 8$; polynomial of 4 terms
51. $x^4 + 2x^2 + 1$; trinomial
52. $8x^3 + 60x^2 + 150x + 126$; polynomial of 4 terms
53. $a^3 - a^2b - b^2a + b^3$; polynomial of 4 terms
54. $a^4 - 4a^3 + 6a^2 - 4a + 1$; polynomial of 5 terms
57. $8c^3 - 26c + 12$; trinomial

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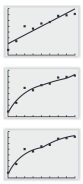
59. a. $y = 0.6877x + 47.97$

$y = 0.0007125x^3 - 0.06366x^2 + 2.1690x + 41.5929$

$y = -0.00005632x^4 + 0.005218x^3 - 0.1757x^2 + 3.0459x + 40.7482$

b.



Answers may vary. Sample: The quartic model fits best.

c. For sample in part (b), 71.68×10^{15} Btu

62. A
63. J
64. C
65. H

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6.2 Polynomials and End Behavior

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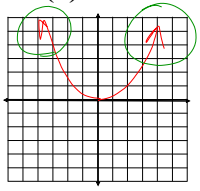
POLYNOMIAL FUNCTIONS

Degree: Even
Leading Coefficient: +
End Behavior:

$f(x) = x^2$



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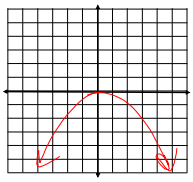
POLYNOMIAL FUNCTIONS

Degree: Even $f(x) = -x^2$

Leading Coefficient: –

End Behavior:



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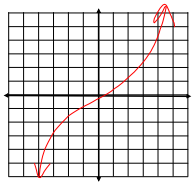
POLYNOMIAL FUNCTIONS

Degree: Odd $f(x) = x^3$

Leading Coefficient: +

End Behavior:



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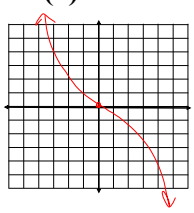
POLYNOMIAL FUNCTIONS

Degree: Odd $f(x) = -x^3$

Leading Coefficient: –

End Behavior:



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6.2 Polynomials and Linear Factors

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Write the polynomial in standard form.

1) (x+1)(x-2)(x+3)

Use foil or box for first two binomials.

Next, use foil or box method again to get final answer.

What is the end behavior?

Last, graph the original problem and your answer on your calculator. What do you notice?

$(x^2-2x+x-2)(x+3)$

$(x^2-x-2)(x+3)$

	x^2	$-x$	-2
x	x^3	$-x^2$	$-2x$
$+3$	$+3x^2$	$-3x$	-6

x^3+2x^2-5x-6

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Write the polynomial in factored form.

2) $2x^4 + 10x^3 + 12x^2$ $= 2x^2(x^2+5x+6)$

$2x^2(x+3)(x+2)$

First, use the GCF to simplify.

Next, keep on factoring.

What is the end behavior?

Last, graph the original problem and your answer. What do you notice?

What do you think the zeros will be?

$-3, -2$

$2x^2=0$

$x=0$

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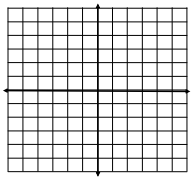
You try!

3) Factor $3x^3 - 3x^2 - 36x$



BEFORE checking on the graphing calculator, where do you think the graph will cross the x-axis?

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Finding zeros, relative maximums and relative minimums from polynomial.

zero - where a graph crosses the x-axis
relative maximum - a high point of a graph
relative minimum - a low point of a graph

Use the zero product property from factored form to find the zeros of a polynomial.

4) Find the zeros of $y = x(x - 2)(x + 3)$

$x = 0$ $x - 2 = 0$ $x + 3 = 0$

$x = 2$ $x = -3$

max $(-1.79, 8.21)$

min $(1.12, -4.06)$

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Now let's graph this on the calculator to find the relative max and relative min.

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Multiplicity

The number of times a zero occurs for a polynomial

Find the zeros and state their multiplicity.

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

6) $y = x(x - 2)^3$

What is the end behavior of each polynomial?

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Writing a polynomial equation.

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

7) x = 0, 5, 5, and -3

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Check your understanding

Click the check mark to go to website review.

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HW 6.2

p. 312 #1-9 odd and
p. 317 #1-35 odd

State the multiplicity (tomorrow)
write the polynomial w/ these zeros (# 21-28)

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Determine by inspection the end behavior of the graph of each function.

1. $y = 3x + 2$
2. $y = 4x^3$
3. $g(t) = -t^2 + t$
4. $f(x) = 2x + x^5$
5. $g(x) = x^6$
6. $y = 3x^5 - 4x^4$
7. $y = -7x^8$
8. $f(x) = \frac{1}{2}x^4 - 2$
9. $y = -\frac{1}{2}x^3 + 4x^2 + x - 1$
10. $g(x) = x - x^3 + 5$

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A Practice by Example

Example 1 (page 313)
Example 2 (page 314)
Example 3 (page 314)
GO for Help

Write each expression as a polynomial in standard form.

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

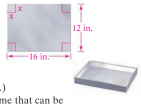
Write each polynomial in factored form. Check by multiplication.

7. $x^3 - 36x$
8. $9x^3 + 6x^2 - 3x$
9. $10x^3 - 10x^2 + 15x$
10. $x^3 + 7x^2 + 10x$
11. $x^3 + 8x^2 + 16x$
12. $x^3 - 7x^2 - 18x$

Find the relative maximum, relative minimum, and zeros of each function.

13. $f(x) = x^3 + 4x^2 - 5x$
14. $f(x) = -x^3 + 16x^2 - 76x + 96$

15. **Metalwork** A metalworker wants to make an open box from a sheet of metal, by cutting equal squares from each corner as shown.
   a. Write an expression for the length, width, and height of the open box.
   b. Use your answer from part (a) to write a function for volume. (*Hint:* Use factored form.)
   c. Graph the function. Find the maximum volume that can be contained by the box and the size of the square cut that produces this volume.



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Example 4 (page 315) **Find the zeros of each function. Then graph the function.**

16. $y = (x - 1)(x + 2)$ **17.** $y = (x - 2)(x + 9)$ **18.** $y = x(x + 5)(x - 8)$

19. $y = (x + 1)(x - 2)(x - 3)$ **20.** $y = (x + 1)(x - 1)(x - 2)$

Example 5 (page 316) **Write a polynomial function in standard form with the given zeros.**

21. $x = 5, 6, 7$ **22.** $x = -2, 0, 1$ **23.** $x = -5, -5, 1$ **24.** $x = 3, 3, 3$

25. $x = 1, -1, -2$ **26.** $x = -1, -2, -3$ **27.** $x = 0, 0, 2$ **28.** $x = -\frac{1}{2}, 0, 4$

Example 6 (page 316) **Find the zeros of each function. State the multiplicity of multiple zeros.**

29. $y = (x + 3)^3$ **30.** $y = x(x - 1)^3$ **31.** $y = 2x^3 + x^2 - x$

32. $y = 3x^3 - 3x$ **33.** $y = (x - 4)^2$ **34.** $y = (x - 2)^2(x - 1)$

35. $y = (2x + 3)(x - 1)^2$ **36.** $y = (x + 1)^2(x - 1)(x - 2)$

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