6.1	**Using Properties of Exponents**
Objectives	1. Use properties of exponents to evaluate and simplify expressions involving powers. 2. Use exponents and scientific notation to solve real life problems.
	Properties of Exponents Product of Powers Property $a^m \cdot a^n =$ ________ Power of Power Property $(a^m)^n =$ _________ Power of a Product Property $(ab)^m =$ _________ Negative Exponent Property $a^{-n} =$ _________ Zero Exponent Property $a^0 =$ __________ Quotient of Powers Property $\frac{a^m}{a^n} =$ __________ Power of a Quotient Property $\left(\frac{a}{b}\right)^m =$ _________
Evaluate. State which property you used.	$\frac{7^6}{7^4}$ 3^{-2} $(3^2)^8$ $9^6(9^2)^{-3}$ $\left(\frac{3}{2^{-2}}\right)\left(\frac{1}{2}\right)^4$

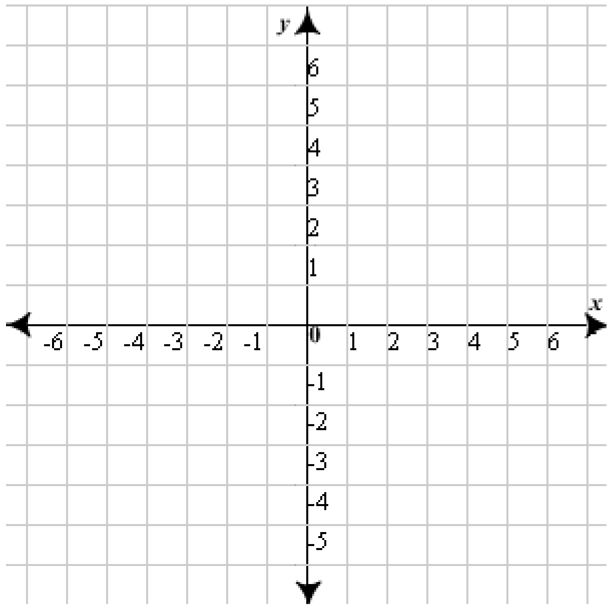
Simplify the algebraic expression.	$\left(\frac{x^{-3}}{y^{2}}\right)^{4}$ $(-3a)^{4}a^{9}(-a^{2})$ $yz^{-4}(x^{2}y)^{3}z$ $-(4x^{3})^{-2}$ $\frac{(c^{4}d)^{2}}{c^{9}d^{2}}$
	Scientific Notation A number in the form $c \times 10^{n}$ where, $1 \leq c < 10$ and n is an integer.
An average adult has about 528,000,000 feet of blood vessels in their body. How many times greater is this than the circumference of the Earth, which is about 25,000 miles?	

6.2	**Evaluating and Graphing Polynomial Functions**
Objectives	1. Evaluate a polynomial function. 2. Graph a polynomial function.
Key Terms	Polynomial function Leading Coefficient Constant Term Degree
Standard Form of a Polynomial	(see table below)
Decide whether the function is a polynomial. If it is, write the function in standard form and state its degree, type and leading coefficient.	$f(x) = 2x^{1.2} + 2x^3 - 4x^2$ $f(x) = 0.32x - x^3 + 71$

Degree	Type	Standard Form
0		
1		
2		
3		
4		

	Synthetic Substitution An alternate method for evaluation polynomials.
Evaluate the function using direct substitution, then synthetic substitution.	$\boldsymbol{f(x) = 2x^4 - 4x^3 + x^2 + 3x - 1 \; when \; x = 2}$ Direct Synthetic $\boldsymbol{f(x) = 3x^5 - x^4 - 5x + 10 \; when \; x = -2}$ Direct Synthetic $\boldsymbol{f(x) = 3x^5 - 2x^2 + x \quad when \; x = 3}$ Direct Synthetic

	End Behavior of a Polynomial Functions The graph of $f(x) = a_n x^n + a_{n-1}x^{n-1} + \ldots + a_1 x^1 + a_0$ For $a_n > 0$ and n even, ______________ as $x \to -\infty$ ______________ as $x \to +\infty$ For $a_n > 0$ and n odd, ______________ as $x \to -\infty$ ______________ as $x \to +\infty$ For $a_n < 0$ and n even, ______________ as $x \to -\infty$ ______________ as $x \to +\infty$ For $a_n < 0$ and n odd, ______________ as $x \to -\infty$ ______________ as $x \to +\infty$
Common Graphs	$f(x) = 3x$ $f(x) = -3x$ $f(x) = x^2$ $f(x) = -x^2$

Graph the function and describe the end behavior.	$f(x) = x^4 - 4x^2 + x$ 

6.3	Adding, Subtracting, and Multiplying Polynomials
	1. Add, subtract, and multiply polynomials. 2. Use polynomial operations in real life problems.
Addition and Subtraction of Polynomials	Add or subtract the coefficients of like terms (Do NOT change exponents.) $(2x^3 - 4^2 + 5) + (-x^2 - 3x + 1)$ Vertically Horizontally $(x^2 + 1) - (3x^2 - 4x + 3)$ Vertically Horizontally

Multiply the polynomials both vertically and horizontally.	$(x+2)(x^2-x+3)$ Vertically Horizontally
Multiplying Three Polynomials	$(x+2)(x-1)(x-3)$ Vertically Horizontally
Cube of a Binomial	$(a+b)^3 =$ ____________________ $(x+4)^3 =$ ____________________ $(a-b)^3 =$ ____________________ $(x-5)^3 =$ ____________________
Find the product.	$(4x+3)^3$

6.4	**Factoring and Solving Polynomial Equations**
	1. Factor polynomial expressions. 2. Use factoring to solve polynomial equations.
Chapter 5 Factoring	**General Trinomial** **Perfect Square Trinomial** **Difference of Two Squares** **Common Monomial Factor**
Special Factoring Patterns	**Sum of Two Cubes** $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$ Factor: $x^3 + 125$ $54y^4 + 16y$ **Difference of Two Cubes** $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$ Factor: $x^3 - 64$ $125x^3 - 27$

Special Factoring Patterns	**Factor by Grouping** Factor: $4x^3 + 16x^2 + x + 4$ $x^3 - 3x^2 - 4x + 12$ $x^2y^2 - 3x^2 - 4y^2 + 12$ **Factoring into Binomials** Factor: $x^6 + 7x^3 + 10$ $25x^4 - 16$ $4x^8 - 20x^6 + 24x^4$
Solving Polynomial Equations	**To solve a polynomial equation** 1. Set the equation equal to zero. 2. Factor 3. Set all factors equal to zero and solve. Solve: $2x^5 + 24x = 14x^3$

Solving Polynomial Equations. Find the real number solutions of the equation.	Solve: $x^3 - 27 = 0$ $x^3 + 2x^2 - 9x - 18 = 0$ $16x^8 = 81$
The revenue R in thousands of dollars for a small business can be modeled by $\boldsymbol{R = t^3 - 8t^2 + t + 82}$ **Where t is the number of years since 1990. In which year did revenue reach \$90,000?**	

6.5	The Remainder and Factor Theorem
Objectives	1. Divide polynomials and relate the result to the remainder theorem and factor theorem.
Dividing Polynomials Using Long Division	Divide: $(3x^5 - 2x^2 + 2x - 5) \div (x - 2)$
The Remainder Theorem	If a polynomial f(x) is divided by x – k , then the remainder is r = f(k).
Divide Using Synthetic Division	Divide: $(x^3 + x^2 - 5x + 3) \div (x + 2)$

	Divide: $(2x^3 - x^2 + 3x + 4) \div (x + 1)$ Divide: $(x^4 - 16x^2 + x + 4) \div (x + 4)$
The Factor Theorem	A polynomial f(x) has a factor x – k if and only if f(k) = 0.
Factor the polynomial, then find the other zeros of the function.	Factor the polynomial $f(x) = x^3 - 19x - 30$ given that $f(5) = 0$, then find the other zeros of the function. Factor the polynomial $f(x) = 2x^3 - x^2 - 25x - 12$ given that $f(4) = 0$, then find the other zeros of the function.

6.6	**Finding Rational Zeros**
	1. Find the rational zeroes of polynomial function. 2. Use polynomial equations to solve real life problems.
Key Terms	Rational Zeros
	$f(x) = 64x^3 + 12x^2 - 34x - 105$ Zeros are $-\frac{3}{4}, -\frac{5}{4}, and\ \frac{7}{8}$
Rational Zero Theorem	If $f(x) = a_n x^n + \ldots. + a_1 x + a_0$, has integer coefficients, then every rational zero of the function has the following form: $\frac{p}{q} = \frac{\text{factors of the constant term } a_0}{\text{factors of the leading coeffienct } a_n}$
Find the rational zeros of the function.	$f(x) = x^3 + 5x^2 + 2x - 8$ $f(x) = x^3 - 4x^2 - 11x + 30$

Find the rational zeros of the function.	$f(x) = 3x^3 + 12x^2 + 3x - 18$
Suppose you have 18 cubic inches of wax to make a candle in the shape of a pyramid with a square base. If you want the height to be 3 inches greater that the length of each side of the base, what should the dimensions of the candle be?	Volume of a pyramid: $V = \frac{1}{3}Bh$ B is the area of the base.