

Unit 3: Arithmetic to Algebra

What you need to know & be able to do	Things to remember	Examples	
1. Identifying Parts of Algebraic Expressions	<ul style="list-style-type: none"> Identify Parts of an expression Variable Constant Term Coefficient Factors 	a. Identify the: $32x^2 - 8x + 4y - 9$ Variables: x, y Constants: -9 Factors: 32 and x^2 -8 and x 4 and y	b. Identify the: $24x^2 - x - 7$ Terms: 3 Coefficients: $24, -1$ Factors: 24 and x^2
2. Evaluating Expressions	<ul style="list-style-type: none"> Replace the variable with the value stated. Use parenthesis each time you substitute a value in for the variable! 	a. Evaluate $-5x - 8y$ when $x = -3$ and $y = 7$ $-5(-3) - 8(7)$ $15 - 56$ -41	b. Evaluate $x^2 - 4x + 7$ when $x = -3$ $(-3)^2 - 4(-3) + 7$ $9 + 12 + 7$ 28
3. Simplify algebraic expressions	<ul style="list-style-type: none"> Distribute first, if possible Then combine like terms 	a. Simplify: $5x^2 - 3x + 4 - 3 + 8x$ $5x^2 + 5x + 1$	b. Simplify: $15x + 5(2x - 4) - 11$ $15x + 10x - 20 - 11$ $25x - 31$
		c. Simplify: $-8x + 4(7x + 2) - 3(5x - 2)$ $-8x + 28x + 8 - 15x + 6$ $5x + 14$	d. Simplify: $\frac{24x - 18}{6} + 4(-2x + 5) - 7x$ $4x - 3 - 8x + 20 - 7x$ $-11x + 17$
4. Creating Algebraic Expressions	<ul style="list-style-type: none"> Remember to look for key words 	a. Create an expression for "four less than three times a number" $3x - 4$	b. Write 2 verbal descriptions of $\frac{n}{5}$ n divided by 5 quotient of n & 5

		<p>c. Leia is selling jewelry at a craft fair. She sells earrings for \$5 and bracelets for \$7 each. Write an expression to represent how much money she makes after selling e earrings and b bracelets.</p>	<p>d. A carpenter charges a \$75 flat fee plus \$50 per hour. Write an expression for the total amount spent after h hours.</p>
		$5e + 7b$	$50h + 75$
		<p>e. Nathan has \$160 to spend on jeans for school. Each pair of jeans costs \$40. Write an expression that represents the amount of money remaining after Nathan has purchased j pairs of jeans.</p>	<p>f. Mia paints and sells ceramic vases for \$35 each. Each month she typically breaks 3 vases, which means she is unable to sell them. Write an expression to represent how much she earns each month selling v vases.</p>
<p>5. Creating Multistep Algebraic Expressions</p>	<p>-Determine who is the starting point -Use the expression that someone else's expression depends on</p>	<p>a. Three waiters at a local restaurant earned different amounts of money the past week. Jennifer earned \$40 less than twice the amount of Trey. Chris earned \$60 more than Tony. Write an expression for what each person earned.</p> <p>Trey: x Jennifer: $2x - 40$ Chris: $x + 60$</p> <p>Create and simplify an expression that represents the total amount earned by the three waiters.</p> $x + 2x - 40 + x + 60$ $\boxed{4x + 20}$	<p>b. Four friends have different number of horses on their farms. Sky has three times as many horses as Caitlin. Eric has half as many as Kaylen. Kaylen has 2 less than 4 times as many horses at Caitlin. Write an expression for the number of horses each person has.</p> <p>Caitlin: x Sky: $3x$ Eric: $\frac{3x}{2}$ or $1.5x$ Kaylen: $4x - 2$</p> <p>Create and simplify an expression that represents the total amount earned by the four friends.</p> $x + 3x + 1.5x + 4x - 2$ $\boxed{9.5x - 2}$

6. Interpreting Algebraic Expressions		<p>a. The cost of renting a canoe is a flat fee of \$25 in addition to \$10 per hour. The expression to model this scenario is $10x + 25$. Explain what the following parts represent:</p> <p>x: # of hours</p>	<p>b. Amy wants to lose 30 pounds at rate of 2 pounds per week. An expression to model this situation is $30 - 2x$. Explain what the following parts represent:</p> <p>30: 30 pounds you want</p>
		<p>25: flat fee</p> <p>10x: total cost for x hours</p> <p>10x + 25: total cost</p>	<p>x: # of weeks</p> <p>-2x: total pounds lost at x weeks</p> <p>30 - 2x: pounds remaining</p>
7. Simplify radicals	<p>-Break each number down into its prime factors and circle pairs of the same number (perfect squares)</p> <p>-Keep each factor without a buddy underneath the square root.</p>	<p>a. $\sqrt{20}$</p> $\sqrt{2 \cdot 2 \cdot 5}$ $\boxed{2\sqrt{5}}$	<p>b. $\sqrt{24x^2y^8}$</p> $\sqrt{2 \cdot 2 \cdot 2 \cdot 3 \cdot x^2 \cdot y^4 \cdot y^4}$ $\boxed{2xy^4\sqrt{6}}$
		<p>c. $5\sqrt{12x^6y^5z^4}$</p> $5\sqrt{2 \cdot 2 \cdot 3 \cdot x^4 \cdot y^4 \cdot y \cdot z^4}$ $5 \cdot 2 \cdot x^3 \cdot y^2 \cdot z^2 \sqrt{3y}$ $\boxed{10x^3y^2z^2\sqrt{3y}}$	<p>d. $-2\sqrt{10x^2y^2}$</p> $\boxed{-2x^2y\sqrt{10}}$
8. Multiply radicals	<p>-Multiply the outside numbers and variables</p> <p>-Multiply the inside numbers and variables</p> <p>-Simplify radical</p>	<p>a. $-4\sqrt{15} \cdot \sqrt{3}$</p> $-4\sqrt{45}$ $-4\sqrt{3 \cdot 3 \cdot 5}$ $-4 \cdot 3\sqrt{5}$ $\boxed{-12\sqrt{5}}$	<p>b. $\sqrt{2y^3} \cdot \sqrt{8y^3}$</p> $\sqrt{16y^6}$ $\sqrt{4 \cdot 4 \cdot y \cdot y \cdot y \cdot y \cdot y \cdot y}$ $\boxed{4y^3}$
		<p>c. $\sqrt{18a^2} \cdot 4\sqrt{3a^3}$</p> $4\sqrt{54a^5}$ $4 \cdot \sqrt{2 \cdot 3 \cdot 3 \cdot 3 \cdot a \cdot a \cdot a}$ $4 \cdot 3 \cdot a \cdot a \sqrt{6a}$ $\boxed{12a^2\sqrt{6a}}$	<p>d. $2\sqrt{6x^4} \cdot -7\sqrt{4x^2}$</p> $-14\sqrt{24x^6}$ $-14\sqrt{2 \cdot 2 \cdot 2 \cdot 3 \cdot x \cdot x \cdot x \cdot x \cdot x \cdot x}$ $-14 \cdot 2 \cdot x \cdot x \cdot x \sqrt{6}$ $\boxed{-28x^3\sqrt{6}}$

<p>9. Add and Subtract Radicals</p>	<p>-Distribute if necessary</p> <p>-Simplify each radical</p> <p>-Add or subtract like terms</p>	<p>a. $2\sqrt{6} - 2\sqrt{54}$</p> $2\sqrt{6} - 2\sqrt{2 \cdot 3 \cdot 3 \cdot 3}$ $2\sqrt{6} - 2 \cdot 3\sqrt{6}$ $2\sqrt{6} - 6\sqrt{6}$ $\boxed{-4\sqrt{6}}$	<p>b. $3\sqrt{12} + 3\sqrt{3}$</p> $3\sqrt{2 \cdot 2 \cdot 3} + 3\sqrt{3}$ $3 \cdot 2\sqrt{3} + 3\sqrt{3}$ $6\sqrt{3} + 3\sqrt{3}$ $\boxed{9\sqrt{3}}$
		<p>c. $\sqrt{5}(8\sqrt{12} + 1)$</p> $8\sqrt{60} + \sqrt{5}$ $8\sqrt{2 \cdot 2 \cdot 3 \cdot 5} + \sqrt{5}$ $8 \cdot 2\sqrt{15} + \sqrt{5}$ $\boxed{16\sqrt{15} + \sqrt{5}}$	<p>d. $-3\sqrt{20} - 4\sqrt{45} + 8\sqrt{3}$</p> $-3\sqrt{2 \cdot 2 \cdot 5} - 4\sqrt{3 \cdot 3 \cdot 5} + 8\sqrt{3}$ $-3 \cdot 2\sqrt{5} - 4 \cdot 3\sqrt{5} + 8\sqrt{3}$ $-6\sqrt{5} - 12\sqrt{5} + 8\sqrt{3}$ $\boxed{-18\sqrt{5} + 8\sqrt{3}}$
<p>10. Simplifying Complex Radical Expressions</p>	<p>-Remember your rules of exponents</p> <p>-Multiply outside numbers/variables together</p> <p>-Multiply inside numbers/variables together</p>	<p>a. Simplify completely:</p> $-4\sqrt{6}(3 + 5\sqrt{2})$ $-12\sqrt{6} - 20\sqrt{12}$ $-12\sqrt{6} - 20\sqrt{2 \cdot 2 \cdot 3}$ $-12\sqrt{6} - 20 \cdot 2\sqrt{3}$ $\boxed{-12\sqrt{6} - 40\sqrt{3}}$	<p>b. Simplify completely:</p> $\sqrt{x}(x\sqrt{x^2y} - \sqrt{xy^2})$ $x\sqrt{x^3y} - \sqrt{x^2y^2}$ $x \cdot \sqrt{x \cdot x \cdot x \cdot y} - \sqrt{x \cdot x \cdot y \cdot y}$ $x \cdot x\sqrt{xy} - xy$ $\boxed{x^2\sqrt{xy} - xy}$