Algebra I

Unit 1 Notes

Relationships between Quantities and Expressions

Name _____

Standard:	Learning Objective	What am I learning?	Mastery?
MGSE9–12.N.Q.1 Use units of measure (linear, area, capacity, rates, and time) as a way to understand problems:	1.1	How to convert units between English to English	
1. Identify, use, and record appropriate units of measure within context, within data displays, and on graphs;	1.2	How to convert units between Metric to Metric	
2. Convert units and rates using dimensional analysis (English-to-English and Metric- to-Metric without conversion factor provided and between English and Metric with conversion factor);	1.3	How to convert units between English to Metric	
3. Use units within multi-step problems and formulas; interpret units of input and resulting units of output.	1.4	How to convert and use rates	
MGSE9–12.N.Q.2 Define appropriate quantities for the purpose of descriptive modeling. Given a situation, context, or problem, students will determine, identify, and use appropriate quantities for representing the situation.	1.5	How to use appropriate units for measure (Example: using yards to measure a football field versus inches)	
MGSE9–12.N.Q.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.	1.6	How to estimate appropriately for scenarios (Example: money should be estimated to the nearest hundredth or cent value; round to the whole number for objects)	
MGSE9–12.A.SSE.1a Interpret parts of an expression, such as terms, factors, and coefficients, in context.	1.7	How to interpret parts of an expression such as terms, like terms, factors, coefficients, constants, and variables	
MGSE9–12.A.SSE.1b Given situations, which utilize formulas or expressions with multiple terms and/or factors, interpret the meaning (in context) of individual terms or factors.	1.8	How to interpret parts of an expression in the context of a word problem	
MGSE9–12.N.RN.2 Rewrite expressions involving radicals (i.e., simplify and/or use the operations of addition, subtraction, and multiplication, with radicals within expressions limited to square roots).	1.9	How to simplify radicals using prime factors	
	1.10	How to multiply radicals	
	1.11	How to add and subtract radicals using like radicands	
MGSE9–12.A.APR.1 Add, subtract, and multiply polynomials; understand that polynomials form a system analogous to the integers in that they are closed under these operations. (For the purpose of this course, operations with polynomials will be limited to the second degree.)	1.12	How to add polynomials using like terms	
	1.13	How to subtract polynomials using the distributive property and like terms	
	1.14	How to multiply polynomials using exponent properties and like terms	
MGSE9–12.N.RN.3 Explain why the sum or product of rational numbers is rational; why the sum of a rational number and an irrational number is irrational; and why the product of a nonzero rational number and an irrational number is irrational.	1.15	How to describe the characteristics and differences of rational and irrational numbers	
	1.16	How to describe different sums using combinations of rational and irrational numbers	
	1.17	How to describe different products using combinations of rational and irrational numbers	

Algebraic Expressions Vocabulary

ALGEBRA TERM AND DEFINITION	EXAMPLES
_____ A mathematical statement with variables, numbers, addition, subtraction, multiplication, division, parenthesis, square roots, exponents...	
_____ Symbols or letters used to represent an unknown	
_____ Items that are being added, subtracted, or divided	
_____ A term with the same variable raised to the same power	
_____ The number in front of a variable. It can be _____ or _____	
_____ The number up in the air next to a base. It tells you the number of times you multiply something by itself.	
_____ What the exponent sits on. You cannot have a base without an exponent. It is the part of the expression that has been raised to a power.	
_____ A number that has no variable. It can be _____ or _____	
_____ Items that are being multiplied together. These can be numbers, variables, expressions in parentheses.	

Operational Words

Addition (+)	Multiplication (·)	Exponents (x^n)
Subtraction (-)	Division (÷)	Square-Root (√)

Examples

A. The sum of a number and 10

_____

B. The product of 9 and x squared

_____

C. 9 less than g to the fourth power

_____

D. 8 + 3x

_____

Key Concepts

- Expressions are made up of **terms**. A term is a number, a variable, or the product of a number and variable(s). An addition or subtraction sign separates each term of an expression.

- In the expression $4x^2 + 3x + 7$, there are 3 terms: $4x^2$, $3x$, and 7.

- The **factors** of each term are the numbers or expressions that when multiplied produce a given product. In the example above, the factors of $4x^2$ are 4 and x^2. The factors of $3x$ are 3 and x.

- 4 is also known as the **coefficient** of the term $4x^2$. A coefficient is the number multiplied by a variable in an algebraic expression. The coefficient of $3x$ is 3.

- The term $4x^2$ also has an **exponent**. Exponents indicate the number of times a factor is being multiplied by itself. In this term, 2 is the exponent and indicates that x is multiplied by itself 2 times.

- Terms that do not contain a variable are called **constants** because the quantity does not change. In this example, 7 is a constant.

Expression	$4x^2 + 3x + 7$		
Terms	$4x^2$	$3x$	7
Factors	4 and x^2	3 and x	
Coefficients	4	3	
Constants			7

Examples	$6x^3 - 4xy + 7x^2 - 12$	$3a^2b - 16abc + 8.5$
Put the expression in descending order.		**ALREADY IN DESCENDING ORDER**
How many terms are there?		
Name the terms:		
Name the factors:		
Name the coefficient(s):		
Name the constant(s):		

You are buying 4 cokes a "d" dollars each. Tax is an additional $.58.

Write an expression for this situation.

How many terms are there?

Name the terms.

Name the factors.

Name the coefficients.

Name the constant.

Unit Conversions

VOCABULARY

<u>Unit Conversion</u> - the act of changing the unit of measure, for instance changing 24 inches to 2 feet.

<u>Dimensional Analysis</u> - a process of converting units by using the fact any number or expression can be multiplied by 1 without changing its value.
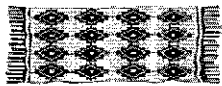
Find the value of the following expressions.

1. $\dfrac{8}{8}$ 2. $\dfrac{x}{x}$ 3. $\dfrac{3y}{3y}$ 4. $\dfrac{feet}{feet}$ all equal... _____!

What happens when we divide something by itself?

Length

1 foot (ft) = 12 inches (in)

1 yard (yd) = 36 inches

1 yard = 3 feet

1 mile (mi) = 5,280 feet

1 mile = 1,760 yards

Area

1 square foot (ft²) = 144 square inches (in²)

1 square yard (yd²) = 9 square feet

1 acre = 43,560 square feet

1 square mile (mi²) = 640 acres

Mass/Weight

1 pound (lb) = 16 ounces (oz)

1 ton (T) = 2,000 pounds

Time

1 minute (min) = 60 seconds (s)

1 hour (h) = 60 minutes

1 day (d) = 24 hours

1 week (wk) = 7 days

1 year (y) = 12 months (mo)

~~1 year = 52 weeks~~

1 year = 365 days

1 decade = 10 years

1 century (c) = 100 years

1 millennium = 1,000 years

Capacity

1 cup (c) = 8 fluid ounces (fl oz)

1 pint (pt) = 2 cups

1 quart (qt) = 2 pints

1 quart (qt) = 4 cups

1 gallon (gal) = 4 quarts

Standard Units

Sometimes, the information that we are given in a problem is in the wrong *format/unit*.

For instance, we may be given a measurement in <u>feet</u> but be asked to solve a problem about <u>miles</u>. In this case, we need to *convert* the feet to miles before we can solve the problem.

Step 1: Write your path
Step 2: Write the proportion(s)/conversions that make your path *(Use as many unit conversions as it takes to get from one unit to the final. Sometimes it will be one; often it will be more.)*
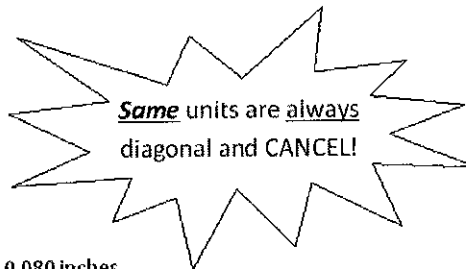**Step 3**: Write your units first (**no numbers**)
Step 4: Match the numbers with the units
Step 5: Multiply the numbers on top and bottom, then SIMPLIFY

Example:

Convert 128 miles into inches.

Start: miles   **End**: inches   **Path**: miles ⟶ <u>feet</u> ⟶ inches

Same units are always diagonal and CANCEL!

128 miles	5280 Feet	12 Inches	8,110,080 inches
1	1 Mile	1 Feet	1

= 8,110,080 inches
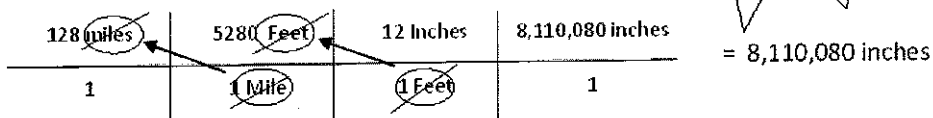
Ex 2) Convert 512 seconds to minutes.

_____   =

Ex 3) Convert 4.8 pounds to ounces.

_____   =

Ex 4) Convert 15 cups to quarts.

_____   =

Ex 5) Convert 10.2 cups to quarts.

_____   =

Ex 6) Convert 6.3 yards to inches.

_____   =

Metric Unit Conversions

Conversions on the metric chart are all powers of _____.

1 LARGE unit = _____ smaller units

"n" is the number of prefixes to get from the smaller to the bigger unit.

Example: 1 kg = _____ cg = _____ cg

K_{ing}	H_{enry}	D_{ied}	$U_{nexpectedly}$	$D_{rinking}$	$C_{hocolate}$	M_{ilk}
Kilo 10 x 10 x 10 x **LARGER** than the unit 1 kilo = 1,000 units	Hecto 10 x 10 x **LARGER** than the unit 1 hecto = 100 units	Deca 10 x **LARGER** than the unit 1 deca = 10 units	*Unit* **Meter** (length) **Liter** (liquid volume) **Gram** (mass/weight) **1 unit**	Deci 10 x **SMALLER** than the unit 10 deci = 1 unit	Centi 10 x 10 x **SMALLER** than the unit 100 centi = 1 unit	Milli 10 x 10 x 10 x **SMALLER** than the unit 1,000 milli = 1 unit
5 kilo	50 hecto	500 deca	5,000 units	50,000 deci	500,000 centi	5,000,000 milli

Example 1: Convert from 122 cL to kL
   khdBdcm   _____ kL = _____ cL

Example 2: Convert from 45 g to mg
   khdBdcm   _____ g = _____ mg

Example 3: Convert from 4200 dm to hm
   khdBdcm   _____ hm = _____ dm

Example 4: Convert from 4.32 dag to mg
   khdBdcm   _____ dag = _____ mg

VOCABULARY

<u>Rate</u> - a unit of measure that includes both an amount and a time frame. For instance, miles per hour OR words per minute.

<u>Advanced Unit Conversions</u>

Sometimes it is necessary to go between different types of measurement (English to metric). In these problems the unit conversion will be given to you.

Ex. 1 Convert 30 inches to meters. Use 1 inch = 2.54 cm.

_____ =

Ex. 2 Convert 4 lbs to grams. Use 1 oz = 28.35 grams.

_____ =

Rates can be used as a **conversion factor** when doing unit conversions.

Example: 45 miles per hour.

_____ = _____

Ex. 1 How far can a person drive in 200 minutes if they are driving 45 miles per hour?

_____ =

Ex. 2 A student can read 22 pages per hour. How many minutes will it take for a student to finish 240 pages of their summer reading?

_____ =

Ex. 3 A student can type 38 words per minute. How many days will it take for a student to finish typing 50000 words for their Senior Project?

_____ =

Adding and Subtracting Polynomial Expressions

VOCABULARY

<u>Polynomial</u> - An expression of algebraic terms, especially the sum of several terms that contain different _____ of the same _____. (Ex: $5x^3 - 2x^2 + 7$)

For all addition and subtraction problems, we use CLT!

(_____   _____   _____)

Examples of like terms

$3x^2$, _____ $12xy$, _____ $5\sqrt{2}$, _____ $x^2\sqrt{x}$, _____

When combining like terms, we add or subtract _____!

Ex. 1 $5x + 7x^2 - 3x + 4$ Ex. 2 $6x^2 - 4x - 3x + 2 - 6x^2$

Ex. 3 $(5x^2 + 4x) + (3 - 7x)$ Ex. 4 $(4x^3 - 2x^2 + 5) + (3x^3 - 8x^2 - 3)$

When subtracting polynomials, we apply the subtraction to all parts of the polynomial behind the subtraction sign. Then, we CLT!

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

Mixed practice!

A) $(3x^2 - 4x + 2) + (2x - 5x^2 + 6)$ B) $(2x^3 + 5x - 2) - (2x - 3x^3 - 2)$

C) $(-2x^2 + 7x - 12) - (20 - 4x^2)$ D) $(8x^3 - 4x) + (3x^2 - 9x + 7)$

VOCABULARY

<u>Monomial</u> - A polynomial expression with _____ term. Example: $5x^2y$
<u>Binomial</u> - A polynomial expression with _____ terms. Example: $3x - 2y$
<u>Trinomial</u> - A polynomial expression with _____ terms. Example: $9x^2 + x - 1$

When multiplying monomials, multiply the _____.
(Variable) · (Variable) changes the _____. Example: x · x = _____

Example: $5x^3 \cdot 7x =$ _____

Ex. 2 $-7x \cdot 11x =$ _____   Ex. 3 $9x \cdot -4 =$ _____

Ex. 4 $-6 \cdot -12x =$ _____   Ex. 5 $10xy \cdot 8xy =$ _____

===

For all multiplication problems which include _____, we use
the _____   _____.

Example: $5x(2x - 3) =$ _____

Ex. 2 $-3x(10x + 6) =$ _____   Ex. 4 $7x(3x + -4) =$ _____

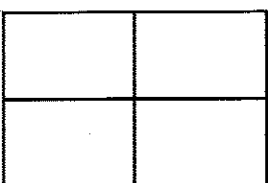Ex. 3 $-6x(-2x - 4) =$ _____   Ex. 5 $5xy(4x - y) =$ _____

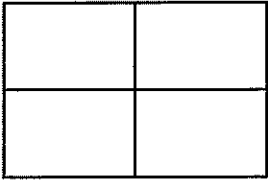===
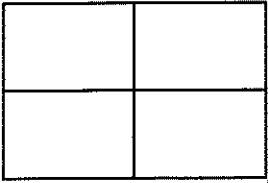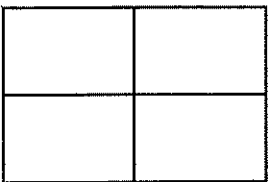
For multiplying a binomial by a binomial,
distribute _____. Then, _____!

Example: $(2x + 3)(4x - 1)$

Distributive Property	**Concrete Model**
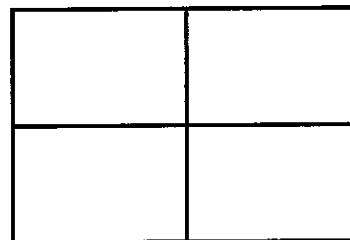
Problem	Distributive Property	Concrete Model
Ex. 2 $(3x + 6)(2x + 5)$		
Ex. 3 $(x - 8)(4x + 7)$		
Ex. 4 $(3x^2 - 7)(2x - 7)$		
Ex. 5 $(3x + 4)(3x - 4)$		
Ex. 6 $(2x - 6)^2$		

Area and Perimeter Applications

To find perimeter, _____ .

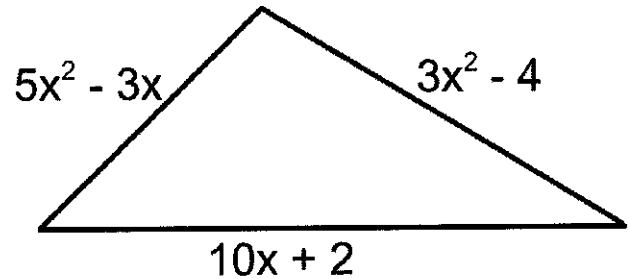To find area, _____ .

Area of Rectangle: A = (base)(height)

Area of Triangle: A = ½(base)(height)

Find an expression for the perimeters of the figures

4x - 3

x + 2

2x - 1

2x + 1

$5x^2 - 3x$ $3x^2 - 4$

10x + 2
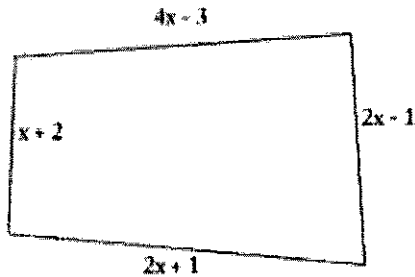
Rule for Perimeter =

Rule for Perimeter =

If x = 3, perimeter =

If x = 2, perimeter =

Find an expression for the areas of the figures

-2x + 6

6x + 11

4x - 1

2x + 5
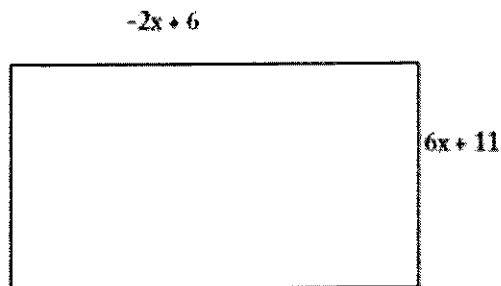
Rule for Area =

Rule for Area =
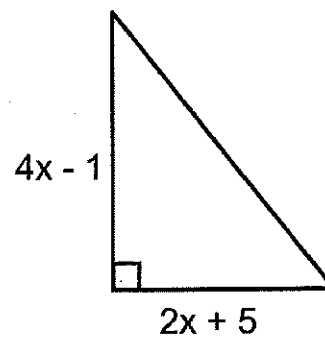
If x = 1, area =

If x = 4, area =

Rational and Irrational Numbers

Number Classifications
(from most general to most specific)

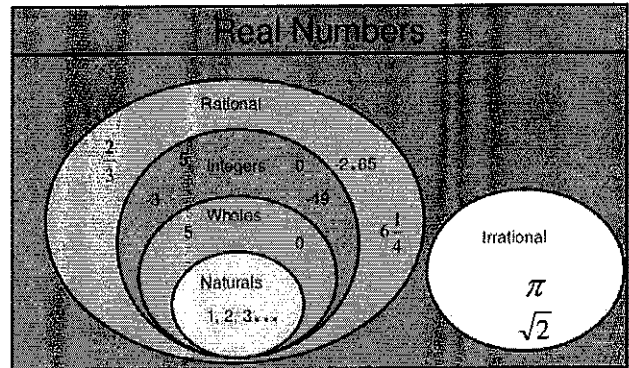*I. Real Numbers*: a value that represents a quantity along a number line.

  A. *Rational Numbers:* Numbers that can be expressed as a/b where a and b are integers.
  Look like whole numbers, terminating decimals, or repeating decimals.

    1. *Integers:* positive and negative whole numbers and zero.
      a. *Whole Numbers:* positive integers AND ZERO.
        i. *Natural Numbers:* positive integers. Does not include zero.

 B. *Irrational Numbers:* Numbers that CANNOT be expressed as a/b where a and b are integers.
  Look like non-terminating, non-repeating decimals.

II. Imaginary Numbers: a value that cannot be represented along a number line. Created by taking an even-root of a negative number like $\sqrt{-2}$. (An Algebra II topic!)

Example	Decimal Equivalence	Rational or Irrational?	Specific Type
1) 4.57			
2) -5/3			
3) $\sqrt{8}$			
4) $-\sqrt{9}$			
5) 12			
6) 12/5			
7) π			
8) $5\sqrt{81}$			
9) -4/7			
10) $2\sqrt{24}$			
11) 0			
12) $\frac{\sqrt{3}}{2}$			

Simplifying Radical Expressions

VOCABULARY

$$\sqrt[4]{3}$$
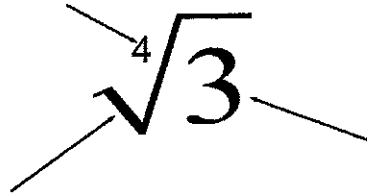
Product property: $\sqrt{ab}$ = _____

Example: $\sqrt{54}$ = _____ = _____

Simplifying Radicals (Square-Roots):

Step 1: Factor the radicand into its prime factors by using a factor tree.

Step 2: Group same factors in groups of 2.

Step 3: For every group of 2 you have, you have a perfect square. Multiply your pairs back together into one radical and the leftovers into a second radical.

Step 4: Simplify.

Ex. A $\sqrt{24}$ Ex. B $\sqrt{27}$

Ex. C $\sqrt{225}$ Ex. D $\sqrt{x^5}$

Ex. E $\sqrt{108x^5y^4}$ Ex. F $3x\sqrt{18x^4}$

Multiplying Radical Expressions

<u>Multiplying Radicals (Square-Roots):</u>

Step 1: Factor radicands.

Step 2: Multiply coefficients and combine factors of radicands under one radical.

Step 3: Simplify radical like a single radical expression.

Ex. A $\sqrt{18} \cdot \sqrt{24}$

Ex. B $\sqrt{32x^3y} \cdot \sqrt{72xy^2}$

Ex. C $2x\sqrt{15x^2} \cdot 3\sqrt{20x^3}$

How would you describe the product of a rational and a rational number?

How would you describe the product of a rational and an irrational number?

How would you describe the product of an irrational and an irrational number?

15

Adding and Subtracting Radical Expressions

For all addition and subtraction problems, we use CLT!

(_____ _____ _____)

Examples of like terms

$3x^2$, _____ $12xy$, _____ $5\sqrt{2}$, _____ $x^2\sqrt{x}$, _____

When combining like terms, we add or subtract _____!

Ex. 1 $3\sqrt{2} - 2\sqrt{3} + 5\sqrt{2}$ Ex. 2 $5\sqrt{6} + 3\sqrt{6} - 7\sqrt{2} + 9\sqrt{2}$

When adding and subtracting radicals, simplify each radical before combining.

Ex. 1 $7\sqrt{96} + 5\sqrt{32}$ Ex. 2 $-\sqrt{18} - \sqrt{50} + \sqrt{2}$

Ex. 3 $3\sqrt{20} + 5\sqrt{45} - 7\sqrt{5}$

How would you describe the sum of a rational and a rational number?

How would you describe the sum of a rational and an irrational number?

How would you describe the sum of an irrational and an irrational number?

Adding and Subtracting Radical Expressions

For all addition and subtraction problems, we use CLT!

(_____ _____ _____)

Examples of like terms

$3x^2$, _____ $12xy$, _____ $5\sqrt{2}$, _____ $x^2\sqrt{x}$, _____

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How would you describe the sum of a rational and a rational number?

How would you describe the sum of a rational and an irrational number?

How would you describe the sum of an irrational and an irrational number?

Name: _____ Date: _____

From Situation to Expression Task A

Write an algebraic expression that answers each of the following questions.

1. If you have x dollars, how would you represent how much money someone has who has 4 more dollars than you?

2. If you have to read p pages of history tonight, how would you represent someone who has to read twice as much history as you?

3. There are s students in your class but 3 are absent today.
    a. How many students are present?

    b. Your teacher is giving 4 pieces of candy to every student who is present today. How many pieces of candy does she need?

4. Jenny has y yards of ribbon and wants to cut streamers that are each 2 yards long. How many streamers can Jenny cut?

5. Hosea is x years old. His sister Juanita is twice as old as Hosea.
    a) How would you write an expression as to how old Juanita is now?

    b) How old will Juanita be in 5 years?

6. Mrs. Adams is h inches tall. She is three times as tall as her son. How tall is her son?

7. Thomas bought one CD that cost $x and another that cost $7.
    a) How much do the two CDs cost together?

    b) How much change will Thomas get from a $20 bill?

1

Name: _____ Date: _____

Identifying Parts of Expressions Homework

1. Identify each term, coefficient, constant, and factor in $5x^2 + 3x + 12$.

2. Write an expression with 4 terms, containing the coefficients 3, 6, and 9.

Translations

Translate each verbal expression to an algebraic expression.

7. Eight more than 3 times a number

8. The difference of 10 and a number

9. The quotient of 12 and a number

10. 15 less than twice a number

11. Three-fourths the square of a number

12. The product of 5 and the cube of a number increased by the difference of 6 and x

13. Half the sum of x and y decreased by one-third of y

2

Adding and Subtracting Polynomials

Name_____

Date_____ Period____

Simplify each expression.

1) $(x^2 - x) + (8x - 2x^2)$

2) $(6a - 3a^2) + (2a^2 - 3a)$

3) $(4x - 6) + (5x + 3)$

4) $(2a^2 + 4a) - (3a + 8)$

5) $(10p + 11) - (11p + 13 + 16p^2)$

6) $(8n^2 - 2n) + (6n - 8n^2)$

7) $(8b + 8) - (6 - 7b)$

8) $(7r^2 + r - 3) + (6r - 3r^2 + 10) + (2 + r^2)$

9) $(10x - 2) + (12 + x) - (x - x^2)$

10) $(9a + 1 - 11a^2) - (a + 8a^2 + 2) - (6a^2 - 9)$

11) $(-3m^2 + m) + (4m^2 + 6m)$

12) $(2x^2 + 1) + (x^2 - 2x + 1)$

13) $(3x^2 - x) + 5x^3 + (-4x^3 + x^2 - 8)$

14) $(5x^2 - 2x - 1) - (3x^2 - 5x + 7)$

15) Subtract $t - 3t^2 + 7$ from $5t - 9$

16) Subtract $y^2 - y$ from $y^2 + 3y$

3

Multiplying Polynomials

Find each product.

1) $6v(2v + 3)$

2) $7(-5v - 8)$

3) $2x(-2x - 3)$

4) $-4(v + 1)$

5) $(2n + 2)(6n + 1)$

6) $(4n + 1)(2n + 6)$

7) $(x - 3)(6x - 2)$

8) $(8p - 2)(6p + 2)$

9) $(6p + 8)(5p - 8)$

10) $(3m - 1)(8m + 7)$

11) $(2a - 1)(8a - 5)$

12) $(5n + 6)(5n - 5)$

For the numbers below, decide whether they are rational or irrational. Remember to simplify first.

    a. 8.731

    b. $\sqrt{8}$

    c. $\frac{10}{3}$

    d. $-\sqrt{8}$

    e. $1.\overline{6}$

    f. $\sqrt{81}$

    g. $3.2 + \frac{10}{3}$

    h. $\sqrt{5} + 3$

    i. $\sqrt{5}i.\sqrt{3} + -\frac{3}{2}$

    j. -8 · 2.75

    k. $\sqrt{12} \cdot \sqrt{25}$

    l. $-5 \cdot \sqrt{12}$

5

Name_____

Simplifying Radical Expressions

Date_____ Period_____

Simplify.

1) $\sqrt{125n}$

2) $\sqrt{216v}$

3) $\sqrt{512k^2}$

4) $\sqrt{512m^3}$

5) $\sqrt{216k^4}$

6) $\sqrt{100v^3}$

7) $\sqrt{80p^3}$

8) $\sqrt{45p^2}$

9) $\sqrt{147m^3n^3}$

10) $\sqrt{200m^4n}$

11) $\sqrt{75x^2y}$

12) $\sqrt{64m^3n^3}$

13) $\sqrt{16u^4v^3}$

14) $\sqrt{28x^3y^3}$

15) $\sqrt{36x^2y^3}$

16) $\sqrt{384x^4y^3}$

17) $7\sqrt{96m^3}$

18) $6\sqrt{72x^2}$

19) $-6\sqrt{150r}$

20) $5\sqrt{80a^2}$

21) $2\sqrt{125v}$

22) $-8\sqrt{24k^3}$

23) $-4\sqrt{192x}$

24) $2\sqrt{8p^2q^3r}$

25) $-4\sqrt{216x^2y^2z}$

26) $-3\sqrt{24a^4b^2c^3}$

27) $3\sqrt{16x^4y^4z}$

28) $-2\sqrt{48a^3b^4c^2}$

29) $6\sqrt{75mp^2q^3}$

30) $4\sqrt{36x^2y^3z^4}$

Adding and Subtracting Radical Expressions

Simplify.

1) $-3\sqrt{24} - 3\sqrt{2} + 2\sqrt{2}$

2) $-3\sqrt{45} - \sqrt{5} + 2\sqrt{2}$

3) $-\sqrt{18} - \sqrt{6} + 2\sqrt{2}$

4) $-3\sqrt{12} - 2\sqrt{27} - 2\sqrt{45}$

5) $3\sqrt{8} + 2\sqrt{27} + 3\sqrt{3}$

6) $2\sqrt{12} + 3\sqrt{45} + 3\sqrt{3}$

7) $3\sqrt{54} - 3\sqrt{45} + 3\sqrt{45}$

8) $\sqrt{72} + 4\sqrt{128} - \sqrt{96} + 4\sqrt{8}$

9) $-2\sqrt{3} + 3\sqrt{27}$

10) $-3\sqrt{45} - \sqrt{5} + 2\sqrt{2}$

11) $-\sqrt{18} - \sqrt{6} + 2\sqrt{2}$

12) $2\sqrt{6} + 3\sqrt{54}$

13) $-\sqrt{5} + 3\sqrt{5} + 2\sqrt{45}$

14) $3\sqrt{8} + 2\sqrt{27} + 3\sqrt{3}$

8

Multiplying Radical Expressions

Simplify the Radical Expressions.

1) $-3\sqrt{18} \cdot 3\sqrt{176}$

6) $4\sqrt{99} \cdot 7\sqrt{20}$

2) $3\sqrt{48} \cdot \sqrt{28}$

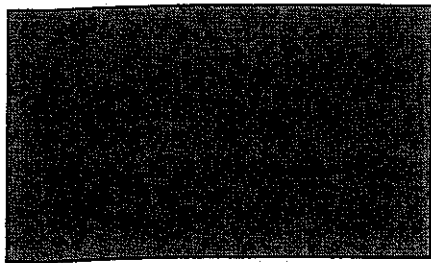7) $-\sqrt{18n} \cdot \sqrt{112n}$

3) $\sqrt{48d} \cdot \sqrt{63d}$

8) $-\sqrt{44p} \cdot -\sqrt{32p}$

4) $\sqrt{99g} \cdot 7\sqrt{28g}$

9) $\sqrt{48q} \cdot \sqrt{44q}$

5) $6\sqrt{8} \cdot 4\sqrt{112}$
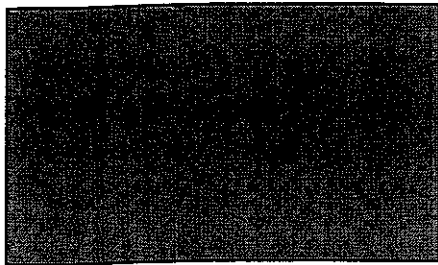
10) $-2\sqrt{48} \cdot 6\sqrt{99}$

x + 5

2x—3

1. Find the algebraic expression for the area of the figure.

2. Using your answer from #1, if x = 4, what would the area of the figure be?

3. If x = 4, what would the length of each side be? Using these side lengths, what is the area of the figure?

4. How does your answer to #3 compare to your answer from #2?

2x - 3

3x + 8

5. Find the algebraic expression for the area of the figure.

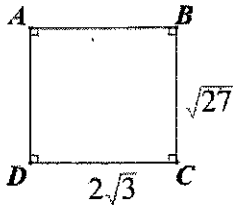6. Using your answer from #5, if x = 7, what would the area of the figure be?

7. Find the algebraic expression for the perimeter of the figure.

8. Using your answer from #7, if x = 7, what would the perimeter of the figure be?
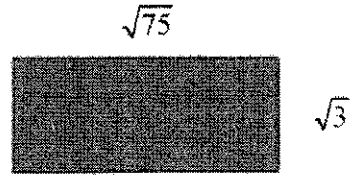
10

Name_____ Block____

Review: Area & Perimeter with Radicals

A $\overline{}$ B
$\sqrt{27}$
D $\quad 2\sqrt{3} \quad$ C

$\sqrt{75}$
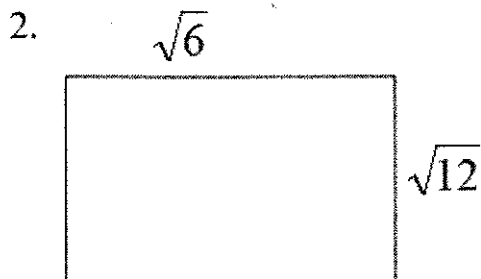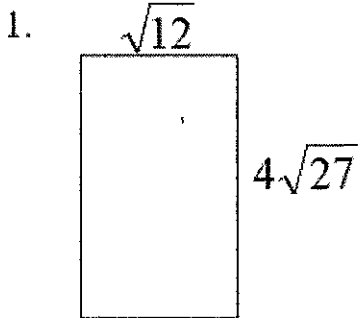
$\sqrt{3}$

Find the area:

Find the area:

Find the perimeter:

Find the perimeter:

Task (A): Area & Perimeter with Radicals

Score: _____/50

Find the area and perimeter of each rectangle.

	Area	Perimeter
1. $\sqrt{12}$ $4\sqrt{27}$		
2. $\sqrt{6}$ $\sqrt{12}$		

II

	Area	Perimeter
3. $\sqrt{8}$ $2\sqrt{2}$		
4. $\sqrt{12}$ $\sqrt{27}$		
5. $\sqrt{8}$		

12
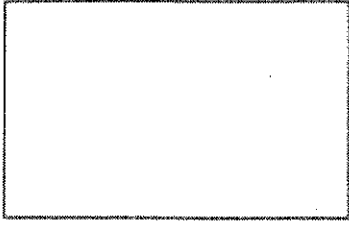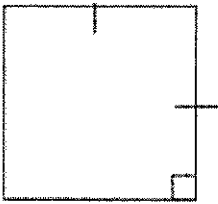
Intro to Unit Conversions

For each of the following, convert to the new unit.
Show all work using correct dimensional analysis to get full credit.

1. 18000 seconds = _____ minutes

2. 43 hours = _____ minutes

3. 16000 ounces = _____ pounds

4. 4.1 tons = _____ pounds

5. 850 yd = _____ feet

6. 1250 yd = _____ miles

7. 1.25 years = _____ minutes

8. 566,000 seconds = _____ days

Use these set-ups to get started, then draw your own on the back to finish.

1.

2.

3.

4.

13

14

Chapter 2 - Unit Conversion Worksheet

Objective: - Identify equivalence statements and convert them into factor labels
- Solve the conversions using factor labels

When converting from one a unit to another it is useful to use conversion factors. Conversion factors are fractions that equal 1 because the numerator (top) equals the denominator (bottom), but they use different units. In algebra you learned that multiplying any quantity by 1 does not change the quantity's value, so we can use conversion factors to change the units of a measurement without changing the value of a measurement.

For instance, since 1 km = 1000 m, 1 min = 60 s, and 1 hr = 60 min, (equivalence statements) we can create the conversion factors below:

$$\frac{1\ km}{1000\ m} = 1 \qquad \frac{1\ min}{60\ s} = 1 \qquad \frac{1\ hr}{60\ min} = 1 \qquad and \qquad \frac{1000\ m}{1\ km} = 1 \qquad \frac{60\ s}{1\ min} = 1 \qquad \frac{60\ min}{1\ hr} = 1$$

By using all 3 of these conversion factors you can convert 15 km/hr into m/s. Be careful to use the conversion factor that cancels the units you are trying to convert out of. If you can cancel (reduce to 1) those units you did it correctly.

$$\frac{15\ \cancel{km}}{1\ \cancel{hr}} \left| \frac{1000\ m}{1\ \cancel{km}} \right| \frac{1\ \cancel{hr}}{60\ \cancel{min}} \left| \frac{1\ \cancel{min}}{60\ s} \right| = 4.2\ m/s$$

Carry out the following conversions. If you have trouble, start by writing out the conversion factors you'll need.

1.   4.56 km into mm

2.   4.5 lb into mg

3.   0.00045 Gmol into damol

4.   1.00 year (non-leap year) into seconds.

5.   36 km into cm.

6.   55g into kg.

15

7.   22kg into mg

8.   5 m/s into mi/hr

9.   60 L into mL

10.   170 cm/min into m/s

11.   The speed of light (in a vacuum) is 3.0×10^8 m/s. Convert this speed into km/day and mi/hr.

12.   95kg = _____ g

13.   3.5cm= _____dam

14.   25 MHz = _____ Hz

15.   343 m/s = _____ mi/hr

16.   32 ft/s^2 = _____ m/s^2

17. 1.013×10^5 N/m^2 = _____ N/cm^2

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Solve each questions showing all of your work.

Convert 0.45 years into hours.	Convert 50.6 grams (g) into kilograms (kg).
Convert 8.5 pints to liters. Use 1 L = 1.06 Qt.	Apples sell for 43 cents a pound. How much do 3.2 pounds of apples cost in dollars?

Zion sends 27 texts per hour. If Zion texts 14 hours a day, how many weeks does it take for Zion to send 25,000 texts?

The new hybrid cars get 70 miles per gallon. How many miles can you drive on 8 quarts of gas?

Sarah can study 20 pages per night. Each page has three homework problems. If she studies for 3 nights, how many homework problems will she do?

Unit Conversions Practice

- There are 5280 feet in one mile
- There are 0.034 ounces in one milliliter
- There are 0.454 kg in one pound
- There are 1.6 kilometers in one mile

- There are 73 gallons in 2 barrels
- There are 1.05 quarts in one liter
- There are 4 quarts in one gallon

Do the following one-step unit conversions:

1)   Convert 120 lbs to kilograms.

2)   Convert 451 mL to ounces.

3)   Convert 4 quarts to liters.

4)   Convert 0.045 barrels to gallons.

Do the following multi-step unit conversions:

5)   Convert 65 ounces to liters.

6)   Convert 12 liters to barrels.

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Do the following word problems using dimensional analysis.

1. A child requires a 5 ml dose of medicine each day. How many days would a gallon of this medicine last?

2. The moon is 384,403 km from the earth. Estimate how many quarters laid end to end it would take to reach the moon if a quarter has a diameter of 2.3 cm.

3. A clerk can sort 375 sheets per hour. If there are 225 sheets in an inch, how long will it take her to file 125 inches of loose sheets?

4. Recycling one metric ton of corrugated cardboard will save about 17 trees. A warehouse recycled 14,327 kilograms of corrugated cardboard over the last year. How many trees did this save?
(1 metric ton = 1,000 kilograms)
A. 14   C. 244
B. 143   D. 2420

5. Twenty-four 750 milliliter bottles are shipping out of the warehouse. In total, how many liters were shipped?
A. 18   C. 75
B. 24   D. 180

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