



Blessed
Sacrament
School

Pre Algebra

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Dear Parents:

This is your child's summer math packet. It is intended to strengthen and reinforce the math skills that were taught in 7th grade.

Please have your child work on it throughout the summer. Your son or daughter will hand it in the first week of school. It will be graded. If your child is having difficulty with any of the skills in the summer math packet, there are several links listed on my classroom website that they may find helpful.

Thank you for your cooperation.

Sincerely,

Mrs. Kunik

Mrs. Kunik

THINGS YOU NEED TO KNOW...

RATIONAL NUMBER OPERATIONS

- Adding
 - When the signs are the same, add the integers and keep the same sign.
 - When the signs are different, subtract the integers and keep the sign of the integer with the greatest absolute value.
- Subtracting
 - Keep the first number the same.
 - Change the subtraction sign to addition.
 - Change the second number to its opposite.
 - Follow the rules for addition.
- Multiplying and Dividing
 - Multiplying or dividing two integers with the SAME sign = positive product or quotient.
 - Multiplying or dividing two integers with DIFFERENT signs = negative product or quotient.

CONVERTING BETWEEN FRACTIONS AND DECIMALS

- **Fractions to Decimals**
 - Convert rational numbers to decimals using long division
 - The numerator becomes the dividend.
 - The denominator becomes the divisor.
 - Represent a repeating decimal by placing a line over the number(s) that repeat.
- Decimals to Fractions
 - Convert decimals to fractions using place value.
 - Write the decimal as a fraction based upon how you would say it. If the number extends to the tenths place, it will be a fraction with 10 as the denominator. If it extends to the hundredths place, it will be a fraction with 100 as the denominator, and so on.

THINGS YOU NEED TO KNOW...

SIMPLE PROBABILITY

- Number of Outcomes
 - Identify the total possible number of outcomes for each event.
 - Add or multiply the number of outcomes for each event to find the total number of outcomes
- Calculating Probability
 - Calculate the total number of outcomes.
 - Calculate the number of outcomes for one event.
 - Write a fraction with the event outcomes as the numerator and the total number of outcomes as the denominator.
 - Express the probability as a simplified fraction, a decimal or a percent.
- Making Predictions
 - Write the theoretical probability as a fraction in simplest form.
 - Multiply the fraction by the number of trials.
 - Simplify if necessary.

COMPOUND PROBABILITY





- Compound Event
 - An event that consists of two or more simple events.
- Mutually Exclusive Event
 - Two events that cannot occur at the same time and have no common outcomes.
- Overlapping Events
 - Two or more events that have at least one common outcome.
- Independent Events
 - Events where the outcome of one event does not have an affect on the other.
- “And” Events
 - Multiply the two probabilities to find the compound probability.
- “Or” Events
 - Add the two probabilities to find the compound probability.

THINGS YOU NEED TO KNOW...

PROPERTIES OF MATHEMATICS

- Associative Property
 - $(a + b) + c = a + (b + c)$
 - $(a \cdot b) \cdot c = a \cdot (b \cdot c)$
- Commutative Property
 - $a + b + c = a + b + c$
 - $a \cdot b \cdot c = a \cdot b \cdot c$
- Distributive Property
 - $a \cdot (b + c) = a \cdot b + a \cdot c$
- Identity Property
 - $a \cdot 1 = a$ and $a + 0 = a$
- Inverse Property
 - $a \cdot \frac{1}{a} = 1$ and $a + ^{-}a = 0$

GRAPHING INEQUALITIES

- Greater than or equal to : 
- Less than or equal to : 
- Greater than : 
- Less than : 

ANGLE RELATIONSHIPS

- Adjacent Angles: Angles that share a side.
- Complementary Angles: Angles that have a sum of 90° .
- Supplementary Angles: Angles that have a sum of 180° .
- Vertical Angles: Angles that share a vertex, but not a side.
- Parallel Lines: Two lines in a plane that never cross.
- Perpendicular Lines: Two lines in a plane that form a 90° angle at their intersection.

FORMULAS

- Area of circles: $A = \pi r^2$ Circumference of circles: $C = 2\pi r$ or $C = \pi d$
- Area of triangles: $\frac{1}{2}bh$ Area of trapezoids: $\frac{1}{2}(a+b)h$
- Volume of rectangular prisms: $l \cdot w \cdot h$ Volume of cylinders: $\pi r^2 h$
- Surface area: The sum of the area of each face of a figure.

PROPERTIES AND ORDER OF OPERATIONS

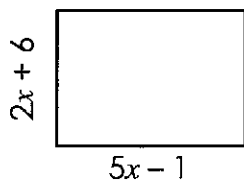
Identify the property: $6(1) = 6$	Identify the property: $(8 + 2) + 3 = 3 + (8 + 2)$	Identify the property: $4 \cdot 0 = 0$
Identify the property: "The way numbers are grouped does not affect the sum."	Identify the property: "The sum of any number and zero is the original number."	Identify the property: "The product of a number and the inverse of that number is one."
Write an equivalent expression using the associative property of addition. $(6 + 7) + 3 = \underline{\hspace{2cm}}$	Write an equivalent expression using the commutative property of multiplication. $2 \cdot (3 \cdot 5) = \underline{\hspace{2cm}}$	Fill in the blank to make the equation true. $2 \cdot \underline{\hspace{2cm}} = 1$
Fill in the blank to make the equation true. $8 \cdot \underline{\hspace{2cm}} = 0$	Simplify. <u>Example</u> $ \begin{array}{l} 6 + 6 - (3 - 5) \\ 6 + 6 - (-2) \\ 6 + 6 + 2 \\ 12 + 2 \\ \textcircled{14} \end{array} $	Simplify. $1 + 1 - (-5 - 4)$
Simplify. $\frac{(31 + 20 - 1)}{15 - 5}$	Simplify. $3 \cdot 22 \div 11 - 8$	Simplify. $35 \div 5(6 - 1 - 4)$

ADDING AND SUBTRACTING EXPRESSIONS

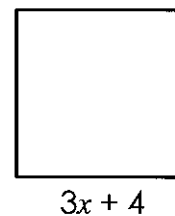
Simplify each expression.

<p><i>Example</i></p> $-(4x + 7) - 6x$ $-4x - 7 - 6x$ $\underline{-10x - 7}$	$-12(3x - 9) + 15$	$(1 + 10x) + (5 - 4x) - x$
$(2x - 10) - (2 - 4x)$	$(16 - 3x) + (2x + 9)$	$2(3x - 6) - (8x + 7)$
$4(x - 5) - 3(x - 2)$	$-6(x + 8) + 4(x + 4)$	$4(10x + 7) - 6(x - 6)$

Find the perimeter of the rectangle.




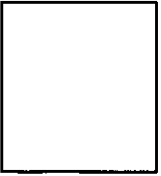

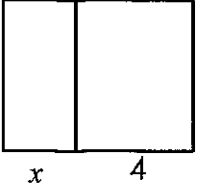
Find the perimeter of the square.



Melissa spent $\$4x - 5$ at the grocery store and Anna spent $\$2x + 9$. How much more did Melissa spend?

James scored $10x - 2$ points in one game and $6x + 12$ points in the next game. How many points did he score altogether?

FACTORIZING AND EXPANDING EXPRESSIONS

<p>Factor <i>Example</i></p> <p>$8x - 20$ $4(2x - 5)$</p>	<p>Factor.</p> <p>$-12 + 30x$</p>	<p>Factor.</p> <p>$11x + 16x$</p>
<p>Factor.</p> <p>$-6xy - 2y$</p>	<p>Factor.</p> <p>$25x^2 - 10x$</p>	<p>Factor.</p> <p>$40y - 16y^2$</p>
<p>Expand.</p> <p>$-4(x - 6)$</p>	<p>Expand.</p> <p>$8x - 4(x + 6)$</p>	<p>Expand.</p> <p>$3x - (4x - 6) + 10x$</p>
<p>Write an expression that represents the area of the figure.</p> 	<p>Write an expression as a sum that represents the area of the figure.</p> 	
<p>Write an expression that represents the perimeter of the figure.</p> 	<p>Write an expression that represents the perimeter of the figure.</p> 	

WRITING EXPRESSIONS AND EQUATIONS

Translate each phrase into an expression or equation.

<p>The sum of triple a number and nineteen.</p> <p><i>Example</i> $3x + 19$</p>	<p>Nine less than the quotient of twice a number and four.</p>	<p>Six more than a number cubed.</p>
<p>Four times the sum of three and a number.</p>	<p>Thirteen less than a number is fifty.</p>	<p>Twelve less than half a number is six.</p>
<p>Eighteen divided by a number squared is ten.</p>	<p>Three fifths of a number is fifteen.</p>	<p>Thirty divided by the sum of a number and three is twelve.</p>
<p>Manny has x baseball cards. Tim has four times as many baseball cards. Write an expression that represents how many baseball cards they have altogether.</p>		<p>Liam spent \$42 on 8 pounds of strawberries at \$$x$ per pound and a \$15 bouquet of flowers. Write an equation that can be used to find the cost of one pound of strawberries.</p>
<p>Nikolas had \$240 in the bank and bought 5 shirts for \$$y$ each. He has \$184 left in the bank. Write an equation that can be used to find out the cost of one shirt.</p>	<p>Jasmine sold 30 bracelets on Monday and 15 bracelets a day for the next few days. She sold a total of 105 bracelets. Write an equation that can be solved to determine the number of additional days she sold bracelets.</p>	

EVALUATING EXPRESSIONS

Example Evaluate each expression for the given value(s) of the variable(s).

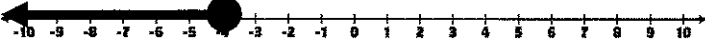

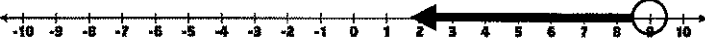

$a - (b - b); a = 5 \text{ and } b = 3$ $5 - (3 - 3)$ $5 - 0$ 5	$m + m - n; m = 2 \text{ and } n = 2$	$6r + p; r = 7 \text{ and } p = -2$
$m(p + m); m = 6 \text{ and } p = -1$	$y(9 - x \div 5); x = 5 \text{ and } y = 10$	$m - \left(\frac{n}{2} - m\right); m = -1, n = -10$
$y^2 + x^2; x = 8 \text{ and } y = -3$	$n - \frac{m}{6} + m; m = -6, n = 9$	$c + (a - b)^3; a = -3, b = -5, \text{ and } c = -10$
$a(a + b - b + a); a = -3 \text{ and } b = -2$	$p - (q + 6) - 7; p = -8 \text{ and } q = -9$	$\frac{p}{2} - (pq + q); p = -2, q = -1$
$(m + p)(10 - m^2); m = -5 \text{ and } p = 1$	$j - j + 10\left(\frac{h}{2}\right); h = 10, j = 5$	$\frac{x}{4} + x - y ; x = -8, y = -8$

SOLVING EQUATIONS

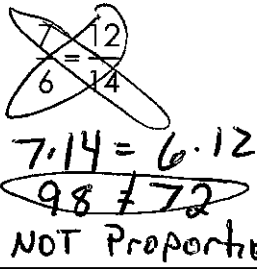
Example

<p>Solve. $-9x = 81$</p> $\frac{-9x}{-9} = \frac{81}{-9}$ $x = -9$ <hr/> $\begin{aligned} -9x &= 81 \\ -9(-9) &= 81 \\ 81 &= 81 \end{aligned}$	<p>Solve. $-90 = 18r$</p>	<p>Solve. $m - 1 = \frac{1}{2}$</p>
<p>Solve. $3 + \frac{x}{2} = 7$</p>	<p>Solve. $\frac{p+3}{18} = 1$</p>	<p>Solve. $-7 = \frac{r}{2} + 3$</p>
<p>Solve. $5(-4 - 2n) = -90$</p>	<p>Solve. $-112 = -8(3r + 5)$</p>	<p>Solve. $-4(-3x + 4) - 8 = -84$</p>
<p>A cookie recipe calls for 10 cups of milk. Magda has already put in 7.3 cups. How many more cups does she need to put in?</p>	<p>300 reduced by twice a number is 146. What is the number?</p>	
<p>Ryan spent half of his weekly allowance on video games. To earn more money, he ran to the grocery store and earned another \$8. What was his weekly allowance if he ended the week with a total of \$14?</p>	<p>Ellie ran $4x + 5$ miles today and $3x - 2$ miles yesterday. If she ran a total of 31 miles, what is the value of x?</p>	

WRITING AND SOLVING INEQUALITIES

<p>Write the inequality represented on the number line.</p> <p><i>Example</i></p>  <p>$x \leq -4$</p>	<p>Write the inequality represented on the number line.</p> 	
<p>Write the inequality represented on the number line.</p> 	<p>Write the inequality represented on the number line.</p> 	
<p>Write as an inequality. "A number is no more than six."</p>	<p>Write as an inequality. "The product of four and a number is more than ten."</p>	<p>Write as an inequality. "The difference of a number squared and three is at least twelve"</p>
<p>Is the given number a solution to the inequality? $3x + 1 < 10$; 3</p>	<p>Is the given number a solution to the inequality? $2x - 5 \geq 7$; 8</p>	<p>Is the given number a solution to the inequality? $-2x - 7 \leq 15$; 7</p>
<p>Solve. $\frac{4+x}{5} \leq 3$</p>	<p>Solve. $\frac{v-10}{6} > -1$</p>	<p>Solve. $-1 + \frac{x}{14} < -2$</p>

PROPORTIONAL RELATIONSHIPS

<p>Is the relationship proportional? <i>Example</i></p>  <p>$7 \cdot 14 = 6 \cdot 12$ $98 = 72$ NOT Proportional</p>	<p>Is the relationship proportional?</p> $\frac{3}{5} = \frac{7.5}{11.5}$	<p>Is the relationship proportional?</p> $\frac{7}{8} = \frac{10.5}{12}$																														
<p>Is the relationship proportional?</p> <table border="1"> <tbody> <tr> <td>x</td> <td>1</td> <td>2</td> <td>4</td> <td>8</td> </tr> <tr> <td>y</td> <td>2</td> <td>4</td> <td>6</td> <td>10</td> </tr> </tbody> </table>	x	1	2	4	8	y	2	4	6	10	<p>Is the relationship proportional?</p> <table border="1"> <tbody> <tr> <td>x</td> <td>2</td> <td>3</td> <td>6</td> <td>11</td> </tr> <tr> <td>y</td> <td>1</td> <td>1.5</td> <td>3</td> <td>5.5</td> </tr> </tbody> </table>	x	2	3	6	11	y	1	1.5	3	5.5	<p>Is the relationship proportional?</p> <table border="1"> <tbody> <tr> <td>x</td> <td>5</td> <td>6</td> <td>7</td> <td>8</td> </tr> <tr> <td>y</td> <td>15</td> <td>18</td> <td>21</td> <td>24</td> </tr> </tbody> </table>	x	5	6	7	8	y	15	18	21	24
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y	15	18	21	24																												
<p>Find the value of p.</p> $\frac{4}{p} = \frac{10}{3}$	<p>Find the value of k.</p> $\frac{k}{9} = \frac{7}{6}$	<p>Find the value of x.</p> $\frac{4}{10} = \frac{9}{x}$																														
<p>A rectangle is 2 feet tall and 3 feet wide. If it is enlarged to have a height of 6 feet and maintains the same proportions, what will the width be?</p>	<p>Samuel purchased 8 DVDs for \$72. How much would he spend for 12 DVDs?</p>																															
<p>A recipe calls for 2 sticks of butter for every $\frac{1}{4}$ cup of brown sugar. How many sticks of butter are needed if 2.5 cups of brown sugar are used?</p>	<p>The number of blue fish to red fish in a tank is proportional. If there are 34 blue fish and 50 red fish in Tank A, how many blue fish are in Tank B if there are 75 red fish?</p>																															

CALCULATING UNIT RATE

Find the unit rate.

Example

hours	2	3	5	6	8
miles	80	120	200	240	320

1 hr / 40 miles

Find the unit rate.

lbs.	2	4	9	10
\$	7	14	31.50	35

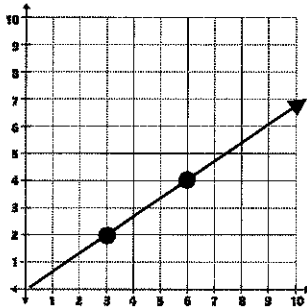
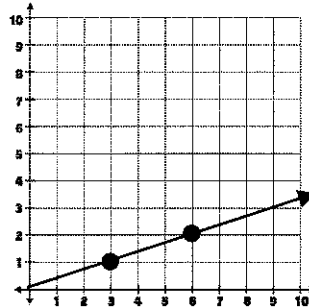
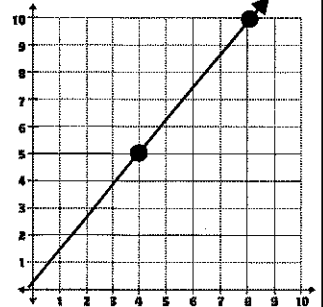
Find the unit rate.

6 rolls of paper towels
for \$5.04

Find the unit rate.

48 minutes to walk 3 miles

Find the unit rate.

3.5 cups of sugar are
needed for 2 dozen cookies.Find the
unit rate.Find the
unit rate.Find the
unit rate.

A soccer league split 128 players evenly among 8 teams. How many players were on each team?

Dianne paid \$13.75 for 11 cups of coffee for her office. What was the cost of one cup of coffee?

A pizzeria bakes 6 dozen slices of pizza an hour. How many slices are baked each minute?

A rosebush grew 12 inches in June. What was the average growth per day?

CALCULATIONS WITH PERCENT

<p>What is 80% of 90? <u>Example</u></p> $\begin{array}{r} 90 \\ \times 0.80 \\ \hline 720 \\ \hline 7200 \end{array}$ <p style="text-align: center;">(72)</p>	60 is 40% of what number?	94.5 is what percent of 210?
10.5 is what percent of 35?	What is 5% of 6?	17 is 20% of what number?
Enrollment in 7th grade went from 1,200 to 1,180. Find the percent change.	The price of a small pizza changed from \$7.50 to \$9.00. Find the percent change.	The temperature changed from 42° to 22°. Find the percent change.
The Taylor family had a \$74 dinner bill. How much did they pay after including an 18% tip?	Amari sold his home for \$220,000. He paid 5% commission to his Realtor. How much did Amari pay the Realtor?	
The cost of a \$745 laptop is discounted 20%. Mary has a coupon that takes 10% off the sale price. How much does she pay for the laptop?	A store marked up the cost of a \$40 pair of shoes by 15%. If someone used a 15% coupon to purchase, how much did they pay for the shoes?	

SCALE {MODELS, DRAWINGS, FIGURES}

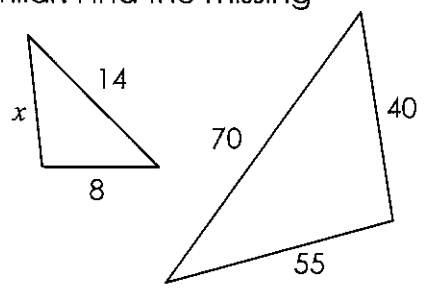
Figures are not drawn to scale.

4
55
x 8
440

11
40440

Example

The figures are similar. Find the missing dimension.



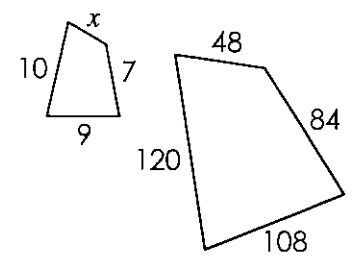
$$\frac{8}{x} = \frac{40}{55}$$

$$8 \cdot 55 = 40x$$

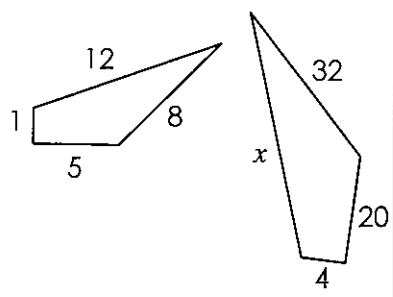
$$440 = 40x$$

$$11 = x$$

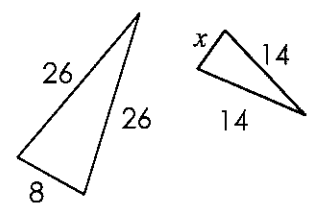
The figures are similar. Find the missing dimension.



The figures are similar. Find the missing dimension.



The figures are similar. Find the missing dimension.



A road sign stands 15 feet tall and casts a 40 foot shadow. Find the length of the shadow cast by a smaller sign that is 9 feet tall. Round to the nearest tenth if necessary.

A model house has a scale of 3 inches : 10 feet. If the real house is 35 feet wide, how wide is the model? Round to the nearest tenth if necessary.

A girl who is 36 inches tall casts a 9 foot shadow. Find the height of a child who casts a 12 foot shadow. Round to the nearest tenth if necessary.

Two cities on a map are 70 miles away from each other. How far apart are the cities on a map if the scale is 1.5 inches : 26 miles? Round to the nearest tenth if necessary.

The scale drawing of a swimming pool is 8 inches wide and 15 inches long. If the actual pool is 14 feet wide, calculate the length.

On a map, $\frac{1}{4}$ inch represents 3.5 miles. How far apart are two cities that have 3.5 inches between them on the map? Round to the nearest tenth if necessary.

MEASURES OF CENTER AND VARIABILITY

Find the measures of center and the interquartile range for each set of data.

Examples
Age of Professors
 43, 46, 54, 60, 70, 66, 42, 51
 mean - add numbers and divide by how many numbers there are
 median - put numbers from smallest to largest median is the middle number
 mode - most often
 range - biggest - smallest

Mean	$\begin{array}{r} 2 \\ 43 \\ 46 \\ 54 \\ 60 \\ 70 \\ 66 \\ + 42 \\ \hline 51 \end{array}$ $8 \overline{)432}$	Median	$42, 43, 46, \underline{51}, 54, 60, 66, 70$
Mode	NONE	Range	$\begin{array}{r} 70 \\ - 42 \\ \hline 28 \end{array}$

Annual Rainfall (in inches)

Stem	Leaf
0	5 7 9
1	2 8
2	0
3	0 2 8 8
4	1 2

Key: 1|5 = 15 inches

Mean		Median	
Mode		Range	

Hours Slept

Hours	Frequency
6	4
7	3
8	6
9	5
10	2

Mean		Median	
Mode		Range	

Age of Soccer Players

Mean		Median	
Mode		Range	

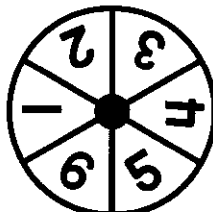
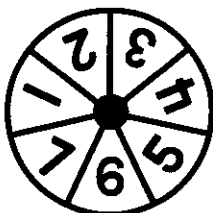
RANDOM SAMPLES & SIMPLE PROBABILITY

Example

A teacher wants to find out how his students feel about the last test. He surveys 8 random students from one of his eight classes. Is the sample random? Explain.

No, the sample does not represent the population of all eight classes.

A cell phone company sends flyers to 800 randomly selected subscribers advertising a new sale. Is the sample random? Explain.

<p>How many outcomes are there when randomly selecting a letter from the alphabet?</p>	<p>How many outcomes are there when flipping a coin?</p>	<p>How many outcomes are on the spinner?</p> 
<p>Find the probability of rolling a 4 or smaller on a number cube.</p>	<p>Find the probability of landing on an even number.</p> 	<p>Find the probability of picking a red card from a standard deck of cards.</p>

There are 8 green, 6 blue and 4 red erasers in a drawer. One eraser is chosen at random. Express each probability as a fraction in simplest form.

Example

Find the probability of picking a green eraser.

$\frac{8}{18}$
 $\frac{4}{9}$

Find the probability of picking a red eraser.

Find the probability of picking a blue or red eraser.

Find the probability of not picking a blue eraser.

A spinner is labeled 1 – 13. The spinner is spun once. Express each probability as a decimal.

<p>Find the probability of spinning an odd number.</p>	<p>Find the probability of spinning a number greater than 4.</p>	<p>Find the probability of landing on 5 or an even number.</p>	<p>Find the probability of landing on a number that is not 11 or 13.</p>
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