May 2026
UPPER SCHOOL SUMMER MATH
Rising to 7th Grade-Pre-Algebra

Algebra I Readiness Packet

Dear Upper School Students,

This summer, we encourage you to continue to foster a belief in the importance and enjoyment of mathematics at home. Being actively involved in mathematical activities enhances learning.

In preparation for the 2026-2027 school year, each student in middle school is required to complete a summer math review packet. Each packet focuses on the prerequisite concepts and skills necessary for student success in each math class. The topics within this packet are important foundational concepts. READ THE INSTRUCTIONS. Even if it doesn't say "Show Your Work" at the top of the page, **you are expected to show your work on all pages.** If you need extra space, you must use and attach scratch paper to the packet.

Please bring your completed math packet (with scratch work attached) with you on the first day of school in August. Your math teachers will be collecting them, and the packets will be graded for timeliness and thoroughness of completion.

Have a wonderful summer!

The Middle School Mathematics Department

Grade 7 Savvas enVision Math Vocabulary

You are probably familiar with some of these already. Please continue to review and study the words this summer. You will see these throughout the year and well into your math future.

Number System & Exponents

- **Integer** — A whole number that can be positive, negative, or zero.
- **Rational Number** — A number that can be written as a fraction.
- **Irrational Number** — A number that cannot be written as a simple fraction.
- **Real Number** — Any rational or irrational number.
- **Repeating Decimal** — A decimal with digits that repeat forever.
- **Terminating Decimal** — A decimal that ends.
- **Square Root** — A number that multiplied by itself equals a given number.
- **Cube Root** — A number that multiplied by itself three times equals a given number.
- **Perfect Square** — A number with a whole number square root.
- **Exponent** — Shows how many times a base is multiplied by itself.
- **Base** — The repeated factor in an exponential expression.
- **Scientific Notation** — A way to write very large or very small numbers using powers of 10.

Algebra & Equations

- **Variable** — A letter or symbol representing an unknown number.
- **Expression** — A mathematical phrase without an equal sign.
- **Equation** — A mathematical sentence with an equal sign.
- **Inequality** — A mathematical statement comparing two values.
- **Coefficient** — The number multiplying a variable.
- **Constant** — A fixed value without a variable.
- **Like Terms** — Terms with the same variable and exponent.
- **Distributive Property** — Multiplying a number across terms inside parentheses.
- **Linear Equation** — An equation whose graph is a straight line.
- **Solution** — A value that makes an equation true.
- **Substitution** — Replacing a variable with a value or expression.
- **Slope** — The steepness of a line.
- **y-intercept** — The point where a line crosses the y-axis.
- **Rate of Change** — How much one quantity changes compared to another.
- **Function** — A relationship where each input has exactly one output.
- **Input** — The independent value in a function.

- **Output** — The dependent value in a function.
- **System of Equations** — Two or more equations solved together.
- **Elimination Method** — Solving a system by eliminating a variable.
- **Substitution Method** — Solving a system by replacing one variable with another expression.

Geometry

- **Transformation** — A change in the position or size of a figure.
- **Translation** — Sliding a figure without turning it.
- **Reflection** — Flipping a figure across a line.
- **Rotation** — Turning a figure around a point.
- **Dilation** — Enlarging or reducing a figure proportionally.
- **Congruent Figures** — Figures with the same shape and size.
- **Similar Figures** — Figures with the same shape but different sizes.
- **Angle** — Two rays sharing a common endpoint.
- **Parallel Lines** — Lines that never intersect.
- **Perpendicular Lines** — Lines that intersect at right angles.
- **Pythagorean Theorem** — Relationship between the sides of a right triangle.
- **Hypotenuse** — The longest side of a right triangle.
- **Legs of a Triangle** — The two shorter sides of a right triangle.
- **Volume** — The amount of space inside a 3D figure.
- **Cylinder** — A 3D shape with two parallel circular bases.
- **Cone** — A 3D figure with one circular base and a vertex.
- **Sphere** — A perfectly round 3D figure.

Statistics & Probability

- **Data** — Information collected for analysis.
- **Mean** — The average of a set of numbers.
- **Median** — The middle number in a data set.
- **Mode** — The number appearing most often.
- **Range** — The difference between the greatest and least values.
- **Scatter Plot** — A graph showing relationships between two variables.
- **Trend Line** — A line showing the general direction of data.
- **Association** — A relationship between two variables.
- **Bivariate Data** — Data involving two variables.
- **Probability** — The likelihood of an event occurring.
- **Sample Space** — All possible outcomes of an experiment.

Additional Academic Vocabulary

- **Evaluate** — Find the value of an expression.
- **Simplify** — Rewrite an expression in simplest form.
- **Justify** — Explain mathematical reasoning.
- **Estimate** — Find an approximate answer.
- **Ordered Pair** — A pair of numbers used to locate a point on a graph.
- **Coordinate Plane** — A graph formed by the x-axis and y-axis.
- **Origin** — The point (0,0) on the coordinate plane.
- **Quadrant** — One of the four sections of the coordinate plane.

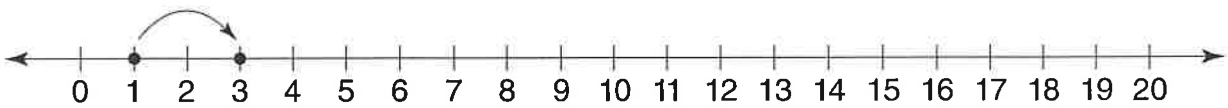
Name ______________________________

Number Patterns

Intervention Lesson **K2**

Find the next three numbers in the pattern 1, 3, 5, 7, 9, by answering 1 to 5.

1. Plot 1, 3, 5, 7, and 9 on the number line. Then continue to draw arrows from 3 to 5, from 5 to 7, and from 7 to 9.



2. How many spaces are between each number plotted on the number line? ______________

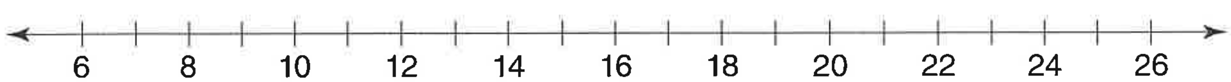
3. Do you add or subtract the number of spaces to get to the next number? ______________

4. What is the rule for this pattern? ______________

5. What are the next three numbers in the pattern 1, 3, 5, 7, 9? ______, ______, ______

6. Draw arrows on the number line to find the next two numbers in the following pattern.

26, 22, 18, 14, ______, ______



7. What is the rule for this pattern? ______________

Name ______________________________

Translating Words to Expressions (continued)

Write a number expression for each word phrase.

6. twice as many as 8 yards

____

7. 16 rings shared equally by 4 boys

____

8. 21 separated into 7 equal groups

____

9. the total of 14 boys and 15 girls

____

10. 16 fewer than 20

____

11. 3 times as far as 8 miles

____

12. 4 hours shorter than 6 hours

____

13. the total of 6, 3, and 8

____

14. 8 toys put into 2 equal groups

____

15. 6 more than 7 apples

____

16. 5 fewer than 12 eggs

____

17. 3 times as many as 9 carrots

____

18. **Reasoning** Can you have 7 fewer than 5 dogs?

19. **Reasoning** Socorra reads the phrase *18 decreased by 9* and writes the expression 9 – 18. Do you agree with Socorra's expression? Explain.

Name ______________________________

Equality and Inequality (continued)

Intervention Lesson **K7**

Compare. Write $<$, $>$, or $=$ for each $\bullet$.

10. $10 + 4 \bullet 9 + 9$ ______

11. $14 - 9 \bullet 6 + 11$ ______

12. $7 + 2 \bullet 16 - 7$ ______

13. $20 + 7 \bullet 13 - 4$ ______

14. $8 + 13 \bullet 17 + 4$ ______

15. $12 - 5 \bullet 9 + 5$ ______

16. $6 + 6 \bullet 13 - 1$ ______

17. $18 - 3 \bullet 15 - 1$ ______

18. $15 + 9 \bullet 6 + 13$ ______

19. $6 + 8 \bullet 20 - 8$ ______

20. $18 - 16 \bullet 7 - 5$ ______

21. $19 - 7 \bullet 12 + 3$ ______

Replace the $\bullet$ with a number to make the sentence true.

22. $9 + \bullet = 19$ ______________

23. $17 < \bullet + 9$ ______________

24. $14 > 9 + \bullet$ ______________

25. $\bullet - 6 < 8$ ______________

26. $7 + \bullet = 14$ ______________

27. $12 > \bullet - 8$ ______________

28. $7 + \bullet > 12$ ______________

29. $18 - \bullet < 4$ ______________

30. $\bullet - 12 = 6$ ______________

31. **Reasoning** Why can you NOT use 5 to replace the circle in $3 + \bullet > 8$?

32. Wyatt has \$22 in his wallet. LaVaughn has \$16 in his bank and then he adds \$8 more. Which boy has more money? ______________

Name ____

Mental Math: Using Properties

1. Use the Distributive Property to complete the number sentence and make it true.

   $23 \times (15 + 12) = (23 \times 15) + (23 \times \_\_\_\_)$

The Distributive Property can be used to break apart numbers and make it easier to multiply.

2. Use the Distributive Property to find 4×17 by filling in the blanks.

   $4 \times 17 = 4 \times (10 + \_\_\_\_)$

   $= (4 \times \_\_\_\_) + (4 \times \_\_\_\_)$

   $= \_\_\_\_ + 28 = \_\_\_\_$

3. Use the Commutative Property of Multiplication to complete the number sentence and make it true.

   $19 \times 12 = \_\_\_\_ \times 19$

4. Use the Associative Property of Multiplication to complete the number sentence and make it true.

   $(38 \times 4) \times 25 = 38 \times (\_\_\_\_ \times 25)$

The Commutative and Associative Properties can be used to make computations easier when there are compatible numbers in the factors.

5. Use the Commutative and Associative Properties to find $4 \times (287 \times 25)$ by filling in the blanks.

   $4 \times (287 \times 25) = 4 \times (\_\_\_\_ \times 287)$ Which property? __________

   $= (\_\_\_\_ \times 25) \times 287$ Which property? __________

   $= \_\_\_\_ \times 287$

   $= \_\_\_\_\_\_\_\_$

6. Use the Identity Property of Multiplication to complete the number sentence and make it true.

   $573 \times 1 = \_\_\_\_$

7. Use the Identity Property of Multiplication to find $793 \times (238 - 237)$ by filling in the blanks.

   $793 \times (238 - 237) = 793 \times \_\_\_\_ = \_\_\_\_$

Name ______________________________________

Mental Math: Using Properties (continued)

8. Use the Zero Property of Multiplication to complete the number sentence and make it true.

$489 \times 0 =$ _____

9. Use the Zero Property of Multiplication. $793 \times 0 \times 83 =$ _____

Fill in the blanks to show how to use mental math to find the product. Name the property or properties used.

10. $5 \times (83 \times 2) = 5 \times ($ _____ $\times 83)$ Which property? ___________

$= (5 \times$ _____ $) \times 83$ Which property? ___________

$=$ _____ $\times 83$

$=$ _____

11. $35 \times 128 \times 0 =$ _____ Which property? ___________

12. $12 \times 1 \times 4 = 12 \times 4$ Which property? ___________

$=$ _____

13. $3 \times 45 = (3 \times 40) + (3 \times$ _____ $)$ Which property? ___________

$=$ _____ $+$ _____

$=$ _____

14. $(70 \times 4) \times 25 = 70 \times ($ _____ $\times 25)$ Which property? ___________

$= 70 \times$ _____

$=$ _____

15. **Reasoning** A bookcase has 4 shelves. Each shelf has 5 hard-cover books and 23 paperback books. How many books are on the shelves? Explain how to find the total number of books mentally.

Name ______________________________

Properties of Operations

1. Fill in the blanks to complete the table and summarize the properties of addition and multiplication.

Property	Example	Generalization for Any Numbers *a*, *b*, and *c*
Commutative Property of Addition	$12 + 4 = 4 +$ ____	$a + b = b +$ ____
Associative Property of Addition	$(7 + 3) + 8 = 7 + (3 +$ ____$)$ ____ $+ 8 = 7 +$ ____	$(a + b) + c =$ $a + (b +$ ____$)$
Identity Property of Addition	$5 + 0 =$ ____ $0 + 71 =$ ____	$a + 0 =$ ____ and $0 + a =$ ____
Commutative Property of Multiplication	$5 \times 8 = 8 \times$ ____	$a \times b = b \times$ ____
Associative Property of Multiplication	$(6 \times 2) \times 4 = 6 \times ($____ $\times 4)$ ____ $\times 4 = 6 \times$ ____	$(a \times b) \times c =$ $a \times (b \times$ ____$)$
Identity Property of Multiplication	$17 \times 1 =$ ____ $1 \times 6 =$ ____	$a \times 1 =$ ____ and $1 \times a =$ ____
Zero Property of Multiplication	$34 \times 0 =$ ____ $0 \times 98 =$ ____	$a \times 0 =$ ____ and $0 \times a =$ ____

2. Tell which property is used.

$(5 \times 7) \times 20 = (7 \times 5) \times 20$

____________ Property of ____________

$(7 \times 5) \times 20 = 7 \times (5 \times 20)$

____________ Property of ____________

Name ______________________________

Properties of Operations (continued)

Find each n. Name the property that you used.

3. $3 \times 6 = 6 \times n$

____

____

4. $n \times 5 = 0$

____

____

5. $365 \times n = 365$

____

____

6. $(3 \times 2) \times n = 3 \times (2 \times 10)$

____

____

7. $5 \times 6 \times 4 \times 0 = n$

____

____

8. $n + 45 = 45$

____

____

9. $17 + 62 = 62 + n$

____

____

10. $21 + (n + 14) = (21 + 50) + 14$

____

____

11. $3 \times (14 - 14) = n$

____

____

12. $6 + (9 - n) = 6$

____

____

13. **Reasoning** Katie says she is thinking of two numbers whose product is 0. John claims that he knows one number for certain. Is he right? How does he know?

____

Use the Properties of Operations to Complete.

14. $10 + \_\_\_\_ = 10$

15. $(10 \times 6) \times 2 = \_\_\_\_ \times (6 \times 2)$

16. $(8 + 2) + 6 = (2 + \_\_\_\_) + 6$

17. $14 + 16 = \_\_\_\_ + 14$

18. $c \times d = d \times \_\_\_\_$

19. $(q \times r) \times s = q \times (\_\_\_\_ \times s)$

Name ______________________________

Intervention
Lesson **K13**

Variables and Expressions

1. Complete the table.

Number	**Number + 5**
2	$2 + 5 =$ ______
8	$8 + 5 =$ ______
10	______ $+ 5 =$ ______
15	______ $+ 5 =$ ______
21	______ $+ 5 =$ ______

You can use n for the number and $n + 5$ as the rule.
The n is called a variable, because it varies to represent different numbers.

2. To find $n + 5$, when $n = 4$, put 4 in place of n and then add.

$n \quad + 5$

$\downarrow$

______ $+ 5 =$ ______

3. Find $3 \times n$, when $n = 7$.

$3 \times \quad n$

$\downarrow$

$3 \times$ ______ $=$ ______

4. Find $30 - 6 + q$, when $q = 8$.

$30 - 6 + \quad q$

$\downarrow$

$30 - 6 +$ ______

$=$ ______ $+$ ______

$=$ ______

Name ______________________________

Variables and Expressions (continued)

Evaluate each expression for $b = 6$.

5. $b - 4$ ________

6. $3 + b$ ________

7. $8 - b$ ________

8. $13 + b - 1$ ________

Evaluate each expression for $c = 11$.

9. $c + 10$ ________

10. $14 - 5 + c$ ________

11. $11 - c$ ________

12. $15 - c$ ________

Evaluate each expression for $x = 3$.

13. $2x$ ________

14. $\frac{x}{6}$ ________

15. $7x$ ________

16. $\frac{18}{x}$ ________

Complete each table.

17.

x	$x - 4$
4	0
9	5
15	
	17

18.

n	$7 + n$
6	
15	22
20	27
50	

19.

x	$5x$
3	
7	
12	
20	

20.

y	$\frac{56}{y}$
2	
7	
14	
56	

21. Jeff is three years younger than Steve. Complete the table to show Jeff's age.

Steve's age	n	10	15	21	35
Jeff's age	$n - 3$				

22. **Reasoning** Using the table in Exercise 21, if Jeff is 45, how old is Steve? ________

Name ______________________________

More Variables and Expressions

To evaluate an expression, place the known value in place of the variable. Then use the order of operations to simplify.

1. Find $3n - 5$, when $n = 7$.

$3 \times$ ____ $- 5$	Put 7 in place of n.
$=$ ____ $- 5$	Use the order of operations, multiply first.
$=$ ____	Subtract.

2. Find $3k - \frac{k}{4}$, when $k = 8$.

$3 \times$ ____ $- \frac{\square}{4}$	Put 8 in place of k.
$=$ ____ $-$ ____	Multiply and divide first.
$=$ ____	Subtract.

3. Find $4y + 2z$, when $y = 5$ and $z = 7$.

$4 \times$ ____ $+ 2 \times$ ____	Put 5 in place of y and 7 in place of z.
$=$ ____ $+$ ____	Multiply first.
$=$ ____	Add.

4. Find $(3a - b) \div c$, when $a = 10$, $b = 6$, and $c = 2$.

$(3 \times$ ____ $-$ ____$) \div$ ____	Put 10 in place of a, 6 in place of b, and 2 in place of c
$= ($____ $-$ ____$) \div$ ____	Use the order of operations, do parentheses first. Inside the parentheses, multiply first.
$=$ ____ $\div$ ____	Subtract inside the parentheses.
$=$ ____	Divide.

Name ______________________

More Variables and Expressions (continued)

Evaluate each expression for $x = 3$.

5. $\left(\frac{x}{3}\right) + 15$ ______

6. $24 - (2x)$ ______

7. $(3x) + 5$ ______

8. $(4x) - 12$ ______

9. $(5x) - \left(\frac{15}{x}\right)$ ______

10. $35 + \left(\frac{21}{x}\right)$ ______

11. $(19 + x) \div 11$ ______

12. $(6x) + x - 12$ ______

13. $5x \div 3$ ______

Evaluate each expression for $a = 9$, $b = 2$, and $c = 0$.

14. $(a + 7b) + c$ ______

15. $13c + a$ ______

16. $(a + b) \times 3$ ______

17. $12b - 14c$ ______

18. $(a + b + c) \times 2$ ______

19. $(11 + a) \div b$ ______

20. $c \times (b + c)$ ______

21. $4a - 5b$ ______

22. $(a - b - c) \times 4$ ______

23. $7b - 12c$ ______

24. $(2a + b) \div 5$ ______

25. $a \times (b - c)$ ______

Use the data at the right to answer Exercises 26–28.

Veggie Pizza House		
Size	**Pizza**	**Beverages**
small	\$5.00	\$1
large	\$8.00	\$2

26. The cost of x small pizzas with y small beverages is given by the expression $5x + y$. How much do 3 small pizzas and 2 small beverages cost? ______

27. The cost of x large pizzas with y large beverages is given by the expression $8x + 2y$. How much do 2 large pizzas with 3 large beverages cost? ______

28. **Reasoning** Micka purchases 4 small veggie pizzas and 3 large beverages. Romano purchases 3 large pizzas and 4 small beverages. Who spent more money? Explain.

Name ____________________

Solving Addition and Subtraction Equations (continued)

Solve each equation.

10. $w + 5 = 10$ ____

11. $n - 17 = 5$ ____

12. $77 = m + 8$ ____

13. $49 = a - 21$ ____

14. $y - 27 = 27$ ____

15. $0 = w - 10$ ____

16. $m + 41 = 52$ ____

17. $x - 74 = 100$ ____

18. $323 = a + 11$ ____

19. $12 = n - 14$ ____

20. $y + 54 = 98$ ____

21. $k - 40 = 51$ ____

22. $159 = n - 12$ ____

23. $a - 159 = 12$ ____

24. $205 = a + 148$ ____

25. $w + 37 = 98$ ____

26. $35 = x - 149$ ____

27. $y - 84 = 31$ ____

28. $178 = a + 167$ ____

29. $19 = n - 67$ ____

30. $m - 248 = 16$ ____

31. $w + 156 = 208$ ____

32. $n - 110 = 400$ ____

33. $177 = x - 45$ ____

34. **Reasoning** To solve the equation $x + 14 = 30$, Guido added 14 to both sides of the equation and got a solution of $x = 44$. Do you agree with Guido? If not, why?

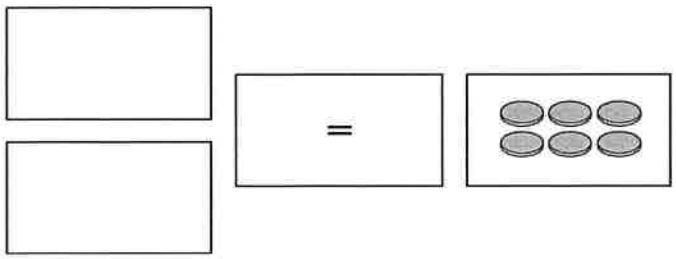
____

Name ______________________________

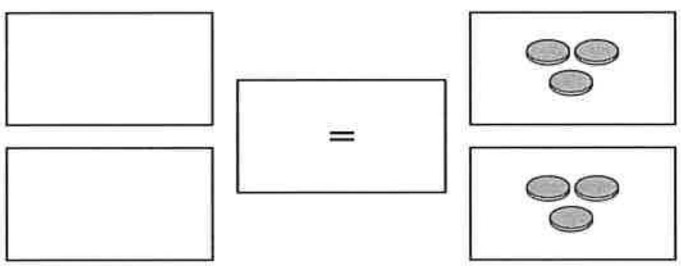
Solving Multiplication and Division Equations

Materials counters, 6 per student or pair; pieces of paper cut in half, 5 half-sheets per student or pair

1. Show $2x = 6$ with counters and paper as shown below.
Use a blank sheet of paper for each x.



2. Equals divided by equals are equals.
Divide each side of the equals sign into 2 equal parts.



3. Remove all but one blank of paper and one group of counters from each side. What is left? $x =$ ______

4. Fill in the blanks to show what you did.

$2x = 6$

$\frac{2x}{2} = \frac{6}{\square}$ Divide both sides by 2.

$x =$ ______

5. Does the value of x you found in 4 above make the equation $2x = 6$ true? ______

6. Fill in the blanks to solve $\frac{n}{7} = 3$.

$\frac{n}{7} = 3$

$7 \times \frac{n}{7} =$ ______ $\times 3$ Multiply both sides by 7.

$n =$ ______

Name ________________________________

Intervention Lesson **K24**

Solving Multiplication and Division Equations (continued)

7. Does the value of n you found in Exercise 6 make the equation $\frac{n}{7} = 3$ true? ______

Fill in the blanks to solve each equation.

8. $5b = 400$

$\frac{5b}{\square} = \frac{400}{\square}$

$b =$ ______

9. $\frac{c}{4} = 19$

______ $\times \frac{c}{4} =$ ______ $\times 19$

$c =$ ______

10. **Reasoning** Why can you multiply both sides of $\frac{h}{7} = 3$ by 7 and still have a true equation?

Solve each equation.

11. $4a = 16$ ______

12. $\frac{m}{15} = 2$ ______

13. $7x = 56$ ______

14. $16b = 32$ ______

15. $10y = 40$ ______

16. $\frac{z}{24} = 3$ ______

17. $15n = 90$ ______

18. $\frac{c}{12} = 7$ ______

19. $\frac{t}{9} = 20$ ______

20. $19r = 38$ ______

21. $35s = 140$ ______

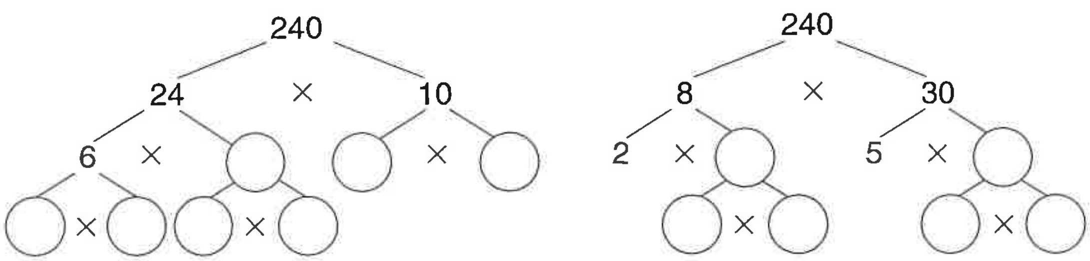
22. $\frac{v}{72} = 4$ ______

23. **Reasoning** To solve an equation like $\frac{d}{5} = 7$, you multiply both sides of the equation by 5. Why do you multiply instead of divide?

Name ______________________________

Prime Factorization

1. Use the two factor trees shown to factor 240. For the first circle, think of what number times 6 is 24. For the next two circles, factor 10. Continue factoring each number. Do not use the number 1.



2. What are the numbers at the ends of the branches for each tree?

______________________ ______________________

3. **Reasoning** What do all the numbers at the end of each branch have in common?

4. **Reasoning** What do you notice about the numbers in the two groups?

5. Arrange the numbers from least to greatest and include a multiplication sign between each pair of numbers. $2 \times$ ____ $\times$ ____ $\times$ ____ $\times$ ____ $\times 5$

Your answer to 5 above shows the prime factorization of 240. If you multiply all the factors back together, you get 240.

6. Write the prime factorization of 240 using exponents.

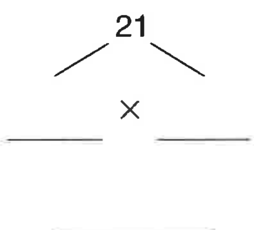
______ $\times 3 \times 5$

Name ________________________________

Prime Factorization (continued)

Complete each factor tree. Write the prime factorization with exponents, if you can. Do not use the number 1 as a factor.

7.



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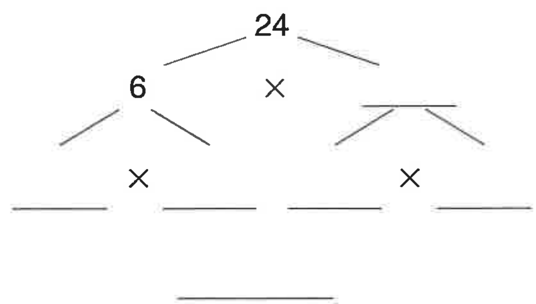

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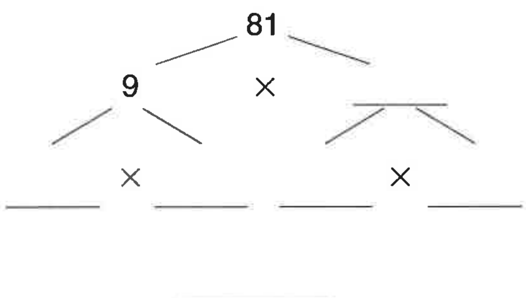

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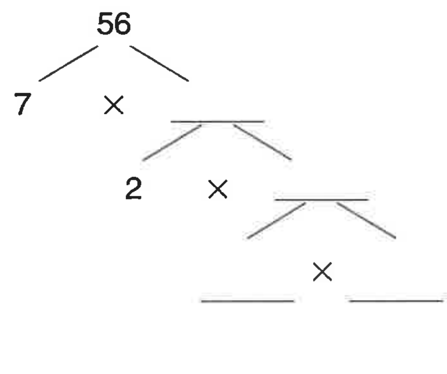


For Exercises 11 to 22, if the number is prime, write prime.
If the number is composite, write the prime factorization of the number.

11. 11 ____________

12. 18 ____________

13. 41 ____________

14. 40 ____________

15. 16 ____________

16. 17 ____________

17. 80 ____________

18. 95 ____________

19. 35 ____________

20. 72 ____________

21. 48 ____________

22. 55 ____________

23. **Reasoning** Holly says that the prime factorization for 44 is 4×11. Is she right? Why or why not?

Name ______________________________

Greatest Common Factor (continued)

Find the greatest common factor of 16, 20 and 32 by answering 6 to 10.

6. List the factors of 16. ______________________

7. List the factors of 20. ______________________

8. List the factors of 32. ______________________

9. List the common factors of 16, 20 and 32: ____________

10. What is the greatest common factor of 16, 20 and 32? ______

Find the greatest common factor (GCF).

11. 8, 12	**12.** 16, 20	**13.** 15, 25	**14.** 18, 45
______	______	______	______
15. 35, 81	**16.** 21, 24	**17.** 34, 40	**18.** 7, 31
______	______	______	______
19. 6, 42	**20.** 8, 32, 40	**21.** 35, 42, 70	**22.** 10, 35, 75
______	______	______	______

23. A teacher has 35 desks in her room and 45 books. What is the greatest number of rows she can have if she wishes to have the same number of desks in each row and the same number of books for each row of desks?

24. **Reasoning** Hope says the greatest common factor of 12 and 36 is 6. Is she right? Why or why not?

Name ____

Adding and Subtracting on a Number Line

At the beginning of June, 62 children arrived at Camp Firefly. A week later, 17 more children arrived. At the end of June, 25 children went home. How many children were at Camp Firefly at the end of June? Find 62 + 17 − 25.

Use this information to answer 1 to 6.

1. What are you asked to find? How many children arrived at the camp at the beginning of June?

____

2. How can you use a number line to find the answer? How do you show addition? How do you show subtraction?

3. Which number is added? ______

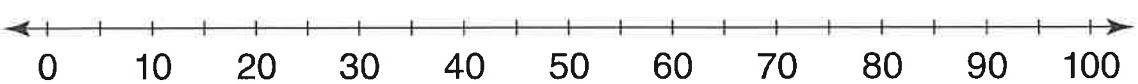
Why is it added? ______________________

4. Which number is subtracted? ______

Why is it subtracted? ______________________

5. Use the number line to solve the problem.

62 + 17 − 25 = ______



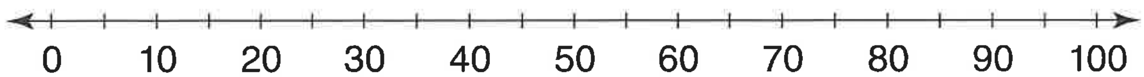
6. How did you know where the second and third arrows should begin?

Name ____________________

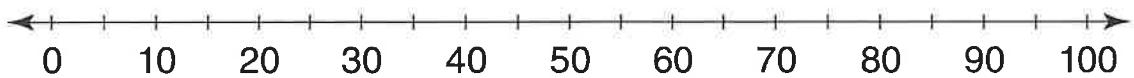
Adding and Subtracting on a Number Line (continued)

In 7 through 11, use the number line to solve the problem.

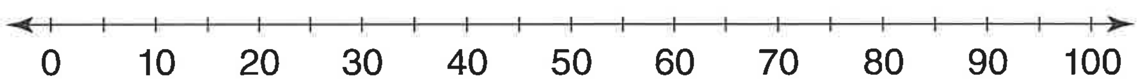
7. 45 + 28 = _______



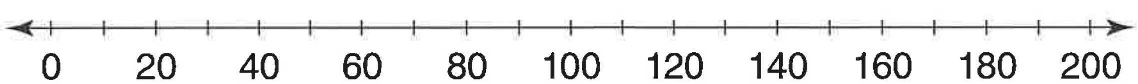
8. 22 + 73 = _______



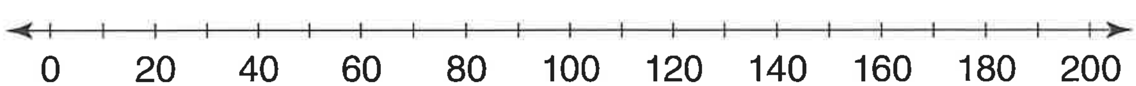
9. 98 − 77 = _______



10. 167 − 55 + 30 = _______



11. 95 + 90 − 65 = _______



Name ____________________

Comparing and Ordering Fractions

Jen ate $\frac{7}{9}$ of a salad. Jack ate $\frac{5}{9}$ of a salad. Find out who ate the greater part of a salad by answering Exercises 1–3.

Compare $\frac{7}{9}$ and $\frac{5}{9}$.

1. Are the denominators the same? ______

If the denominators are the same, then compare the numerators.
The fraction with the **greater** numerator is **greater than** the other fraction.

2. Compare. Write >, <, or =. $7 \bigcirc 5$

$\frac{7}{9} \bigcirc \frac{5}{9}$

3. Who ate the greater part of a salad, Jen or Jack? ________

Compare $\frac{3}{5}$ and $\frac{3}{4}$ by answering Exercises 4 to 6.

4. Are the denominators the same? ______

5. Are the numerators the same? ______

If the numerators are the same, compare the denominators.
The fraction with the **greater** denominator is **less than** the other fraction.

6. Compare. Write >, <, or =. $5 \bigcirc 4$

$\frac{3}{5} \bigcirc \frac{3}{4}$

Compare $\frac{3}{4}$ and $\frac{2}{3}$ by answering Exercises 7 to 11.

7. Are the denominators the same? ______

8. Are the numerators the same? ______

If neither the numerators or the denominators are the same, change to equivalent fractions with the same denominator.

9. What is the LCM of 3 and 4? ______

Name ____

Comparing and Ordering Fractions (continued)

10. Rewrite $\frac{2}{3}$ and $\frac{3}{4}$ as equivalent fractions with a denominator of 12.

$\frac{3}{4} = \frac{\square}{12}$ $\frac{2}{3} = \frac{\square}{12}$

11. Compare. Write >, <, or =. $\frac{9}{12} \bigcirc \frac{8}{12}$

$\frac{3}{4} \bigcirc \frac{2}{3}$

Write $\frac{5}{6}$, $\frac{5}{9}$, and $\frac{1}{3}$ in order from least to greatest by answering 12 to 15.

12. Use the denominators to compare. Write >, <, or =. $\frac{5}{6} \bigcirc \frac{5}{9}$

13. Rewrite $\frac{1}{3}$ so that it has a denominator common with $\frac{5}{9}$. $\frac{1}{3} = \frac{\square}{9}$

14. Compare the numerators. Write >, <, or =. $\frac{5}{9} \bigcirc \frac{3}{9}$

$\frac{5}{9} \bigcirc \frac{1}{3}$

15. Use the comparisons to write $\frac{5}{9}$, $\frac{5}{6}$, and $\frac{1}{3}$ in order from least to greatest.

_______ < _______ < _______

Compare. Write >, <, or =.

16. $\frac{3}{7} \bigcirc \frac{1}{7}$ **17.** $\frac{5}{8} \bigcirc \frac{10}{16}$ **18.** $\frac{3}{11} \bigcirc \frac{4}{10}$ **19.** $\frac{3}{4} \bigcirc \frac{2}{3}$

20. $\frac{3}{5} \bigcirc \frac{9}{15}$ **21.** $\frac{5}{6} \bigcirc \frac{5}{8}$ **22.** $\frac{5}{8} \bigcirc \frac{7}{12}$ **23.** $\frac{7}{9} \bigcirc \frac{4}{9}$

24. $\frac{1}{4}, \frac{6}{7}, \frac{3}{5}$ **25.** $\frac{5}{8}, \frac{8}{10}, \frac{2}{7}$ **26.** $\frac{5}{9}, \frac{10}{12}, \frac{5}{7}$ **27.** $\frac{3}{9}, \frac{12}{15}, \frac{5}{6}$

__________ __________ __________ __________

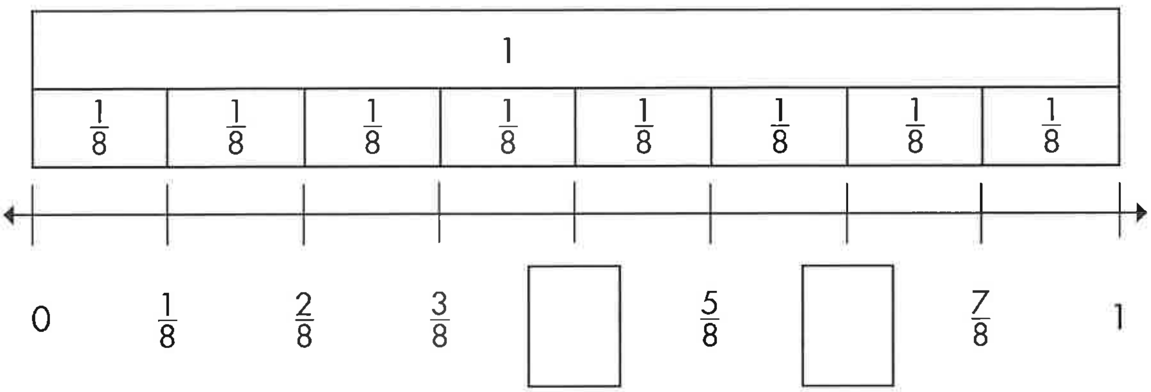
28. **Reasoning** Mario has two pizzas the same size. He cuts one into 4 equal pieces and the other into 5 equal pieces. Which pizza has larger pieces? Explain.

Name ______________________________

Intervention Lesson **M4**

Fractions on the Number Line

Each fraction names a point on a number line. Name the missing fractions on the number line below by answering Exercises 1 to 3.



1. How many equal lengths is the distance between 0 and 1 divided into? ______

Since, the distance between 0 and 1 is divided into 8 equal lengths, each length is $\frac{1}{8}$ of the whole length.

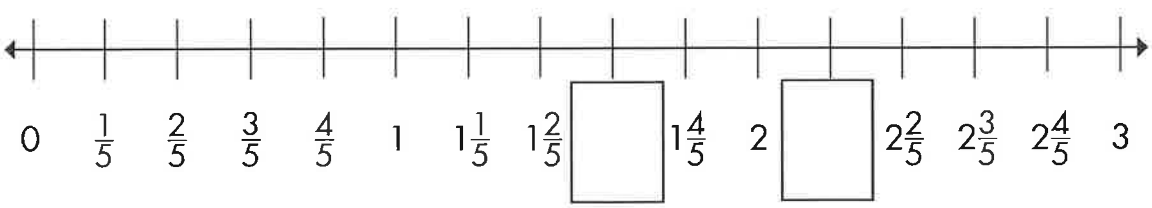
2. To name the first missing fraction, count by eighths. $\frac{1}{8}, \frac{2}{8}, \frac{3}{8},$ ______

Write $\frac{4}{8}$ in the first box above.

3. To name the next missing fraction, keep counting. $\frac{4}{8}, \frac{5}{8},$ ______

Write $\frac{6}{8}$ in the second box above.

Name the missing numbers on the number line below by answering Exercises 4 to 6.



4. How many equal parts is the distance between 0 and 1 divided into? ______

Since, the distance between 0 and 1 is divided into 5 equal lengths, each length is $\frac{1}{5}$ of the whole length.

Name ____________________

Intervention Lesson **M4**

Fractions on the Number Line (continued)

5. To name the first missing fraction, count by fifths.

$\frac{1}{5}, \frac{2}{5}, \frac{3}{5}, \frac{4}{5}, 1, 1\frac{1}{5}, 1\frac{2}{5},$ ______

Write $1\frac{3}{5}$ in the first box on the number line.

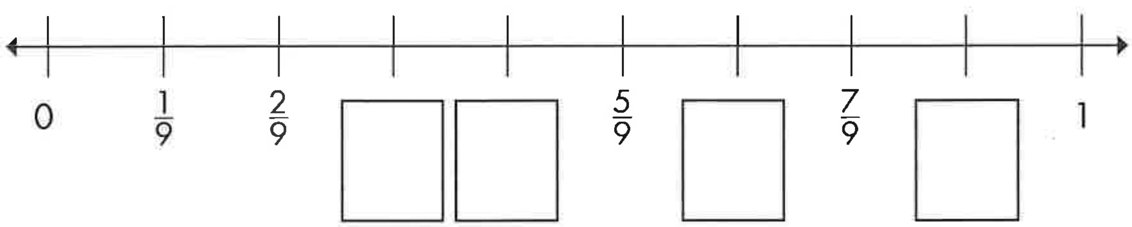
6. To name the second missing fraction, continue counting.

$1\frac{3}{5}, 1\frac{4}{5}, 2,$ ______

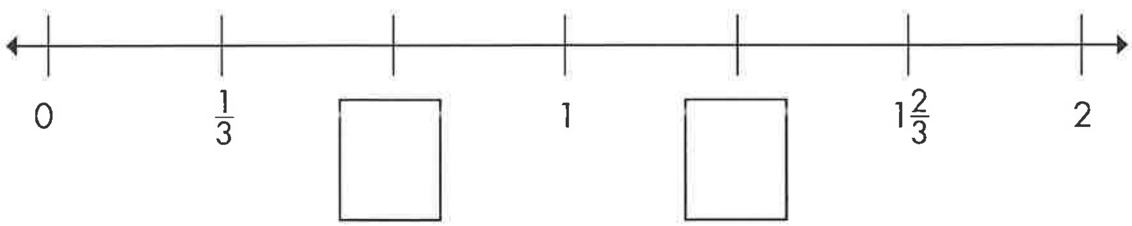
Write $2\frac{1}{5}$ in the second box on the number line.

Write the missing fraction or mixed number for each number line.

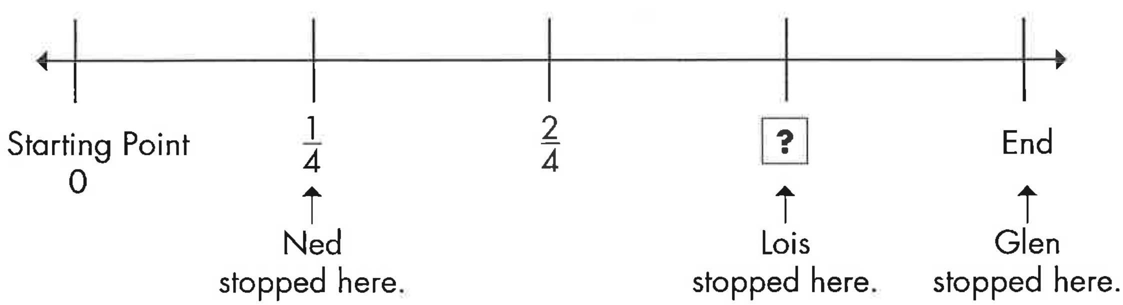
7.



8.



9. The number line shows how far Glen, Ned, and Lois ran in a one-mile race. Write a fraction that shows how far Ned and Lois ran.



Ned ______ Lois ______

Name ______________________________

Decimals on the Number Line

Intervention Lesson **M17**

Draw a point at 4.3 on the number line by answering Exercises 1 to 4.

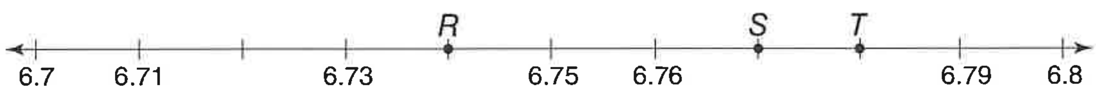
1. How many equal spaces are there between 4 and 5? ______

2. Since there are 10 equal spaces between the whole numbers 4 and 5, each space is a tenth. One tenth more than 4 is 4.1. The first tick mark after 4 is 4.1. Label 4.1.

3. One tenth more than 4.1 is 4.2. Continue labeling the tick marks 4.2, 4.3, 4.4, and so on.

4. Draw a point at 4.3.

Use the number line below to answer 5 to 10.



Name the decimal at point *R* by answering Exercises 5 to 8.

5. How many equal parts are there between 6.7 and 6.8? ______

6. Since there are 10 equal parts between two numbers in the tenths, each of the parts is a hundredth. One hundredth more than 6.7 is 6.71. One hundredth more than 6.71 is 6.72. Label 6.72.

7. Continue labeling the missing decimals by counting by hundredths.

8. What decimal is at point *R*? ______

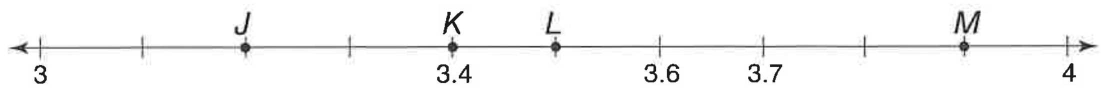
9. What point is at 6.77? ______

10. **Reasoning** If the number line continued, what tick mark would follow 6.8? ______

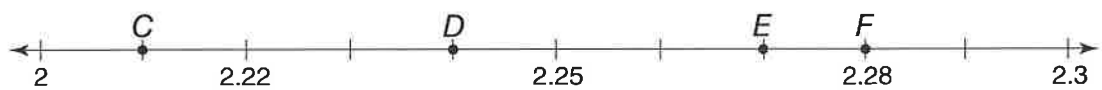
Name ______________________________

Decimals on the Number Line (continued)

For Exercises 11–18, name the decimal that should be written at each point.

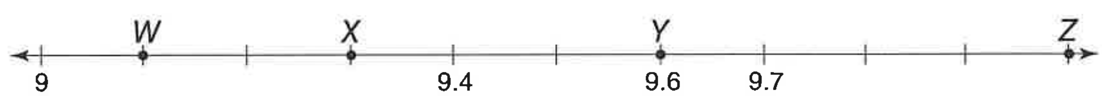


11. Point *J* ________ **12.** Point *K* ________ **13.** Point *L* ________ **14.** Point *M* ________

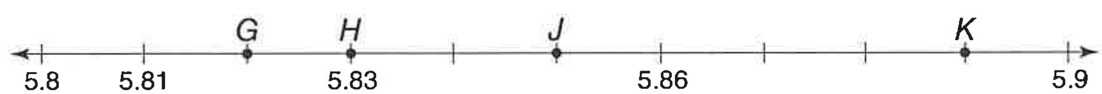


15. Point *C* ________ **16.** Point *D* ________ **17.** Point *E* ________ **18.** Point *F* ________

For Exercises 19–26, name the point on the number line for each decimal.



19. 9.6 ________ **20.** 9.3 ________ **21.** 10 ________ **22.** 9.1 ________



23. 5.85 ________ **24.** 5.89 ________ **25.** 5.83 ________ **26.** 5.82 ________

27. Reasoning What other decimal could be written at point 5.9 on the number line above? ________

Name ____

Rates and Unit Rates

A rate is a special type of ratio that compares quantities with unlike units of measure, such as hits per game.

The table shows the number of hits for some members of a baseball team. Use the table for Exercises 1 to 7.

Name	Number of Hits	Number of Games
Maurice	20	10
Wade	24	8
Alfonso	30	12

1. What is Maurice's rate of hits to games? _____ hits in _____ games

2. To find Maurice's unit rate, divide the number of hits by the number of games.

_____ ÷ _____ = _____ hits per game

On average, Maurice gets 2 hits per game.

3. What is Wade's rate of hits to games? ____________________

4. On average, how many hits per game does Wade get?

_____ ÷ _____ = _____ hits per game

5. What is Alfonso's rate of hits to games? ____________________

6. On average, how many hits per game does Alfonso get?

_____ ÷ _____ = _____ hits per game

7. **Reasoning** Although Alfonso had the most hits, his unit rate was not the highest. Why not?

Rates and Unit Rates (continued)

Find the unit rate.

8. 525 points in 15 games

____

9. 54 teachers for 6 schools

____

10. 33 apples for 11 fruit baskets

____

11. $1.77 for 3 pounds of bananas

____

12. 312 miles every 12 gallons

____

13. 185 feet in 37 seconds

____

14. 42 tennis balls in 14 cans

____

15. 110 calories in 4 servings

____

16. $1.50 for 3 power bars

____

17. 1,530 miles in 6 hours

____

18. $48 in 8 hours

____

19. 96 aces in 12 sets

____

20. Samantha scored 6 goals playing soccer in 18 games. What units would you use to describe her rate? What is her rate?

____

21. A light bulb manufacturer claims that each bulb lasts at least 480 hours. Suppose you get 3,000 hours of use from 6 light bulbs. Write this information as a rate.

____

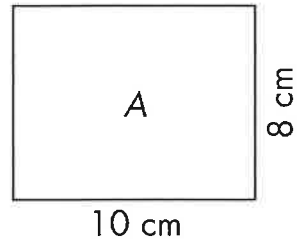
Name ______________________________

Intervention Lesson **M31**

Equivalent Ratios

Equivalent ratios can be found by multiplying or dividing both terms of the ratio by the same number.

Rectangle *A* has a length of 10 centimeters and a width of 8 centimeters. The ratio of the length to the width is $\frac{10}{8}$. Find two ratios equivalent to $\frac{10}{8}$.



1. Try multiplying by 5.

$$\begin{matrix}\text{length} \rightarrow \\ \text{width} \rightarrow\end{matrix}\frac{10}{8} = \frac{10 \times \square}{8 \times 5} = \frac{\square}{\square}$$

2. What is one ratio that is equivalent to $\frac{10}{8}$? _____

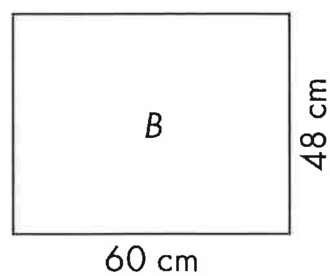
3. Try dividing by 2.

$$\begin{matrix}\text{length} \rightarrow \\ \text{width} \rightarrow\end{matrix}\frac{10}{8} = \frac{10 \div \square}{8 \div 2} = \frac{\square}{\square}$$

4. What is another ratio equivalent to $\frac{10}{8}$? _____

5. Why is $\frac{8}{6}$ not equivalent to $\frac{10}{8}$?

Rectangle *B* has a length of 60 centimeters and a width of 48 centimeters. Is the ratio of the sides of Rectangle *B* equivalent to the ratio of the sides of Rectangle *A*?



6. What is the ratio of the length to the width in Rectangle *B*? _____

7. To see whether $\frac{10}{8}$ is equivalent to $\frac{60}{48}$, try to multiply both terms of $\frac{10}{8}$ by the same number to get $\frac{60}{48}$.

$$\frac{10}{8} = \frac{10 \times \square}{8 \times \square} = \frac{\square}{\square}$$

8. Is the ratio of the sides of Rectangle *A* equivalent to the ratio of the sides of Rectangle *B*? _____

Name ____________________

Equivalent Ratios (continued)

Write three ratios that are equivalent to each of the following.

9. $\frac{4}{8}$ ____________

10. $\frac{10}{6}$ ____________

11. $\frac{6}{18}$ ____________

12. $\frac{5}{10}$ ____________

13. $\frac{8}{12}$ ____________

14. $\frac{8}{6}$ ____________

Tell whether the ratios in each pair are equivalent.

15. $\frac{5}{6}, \frac{15}{18}$ ____________

16. $\frac{8}{14}, \frac{4}{7}$ ____________

17. $\frac{5}{6}, \frac{30}{42}$ ____________

18. $\frac{6}{15}, \frac{30}{25}$ ____________

19. $\frac{5}{8}, \frac{25}{45}$ ____________

20. $\frac{16}{20}, \frac{4}{5}$ ____________

21. $\frac{27}{30}, \frac{9}{10}$ ____________

22. $\frac{16}{18}, \frac{2}{9}$ ____________

23. Tanya uses photo-editing software to reduce an image. The original is 6 inches wide and 4 inches long. The reduced image is 3 inches wide. The ratio of width to length is equivalent for both images. Explain how Tanya can calculate the height of the reduced image.

24. **Reasoning** How many ratios are equivalent to $\frac{10}{8}$? Explain.

Name ____________________

Constant of Proportionality

Rosa is filling her swimming pool with a garden hose. After 3 hours, there are 1,620 gallons of water in the pool. After 5 hours, there are 2,700 gallons of water in the pool.

Use the information about Rosa's swimming pool to answer Exercises 1–4.

1. If 1,620 gallons of water are in the pool in 3 hours and 2,700 gallons of water are in the pool in 5 hours, you can divide the number of gallons of water, y, by the number of hours, x, to find the unit rate of the number of gallons of water per hour.

$\frac{y}{x} = \frac{\square}{3} = \_\_\_\_$

$\frac{y}{x} = \frac{\square}{\square} = \_\_\_\_$

2. The table shows some other ratios for the relationship of numbers of gallons of water, y, to number of hours, x. Is the number of gallons per hour the same for each entry in the table? How do you know?

y	1,080	2,160	3,240	3,780	4,320
x	2	4	6	7	8

____

3. The number 540 is the constant of proportionality, k, that relates the x and y terms of each of these ratios. Express k in terms of x and y.

$k = \frac{\square}{\square}$

4. Write an equation that uses the value of k to represent the relationship between the number of hours, x, and the number of gallons of water, y.

$y = \_\_\_\_ \cdot x$

Name ______________________________

Constant of Proportionality (continued)

Tori read that the average cost of 64 ounces of milk was $1.12. Suppose that the cost of a bottle of milk is proportionate to the number of ounces in the bottle.

5. Write an equation that relates the cost of a bottle of milk, y, to the number of ounces of milk, x, in the bottle.

$y =$ __________ $\cdot\ x$

6. At this rate, what would be the cost of 8 ounces of milk?

__________ • __________ = __________

For Exercises 7–9, write the constant of proportionality in each of the equations.

7. $160 = k8$ __________

8. $y = 30x$ __________

9. $8 = \frac{y}{x}$ __________

For Exercises 10–11, determine whether the x- and y-values represent a proportional relationship. If the relationship is proportional, identify the constant of proportionality.

10.

x	5	6	7	8	9
y	$0.30	$0.36	$0.49	$0.56	$0.63

____

11.

x	15	16	17	18	19
y	$90	$96	$102	$108	$114

____

12. A recipe calls for $\frac{1}{2}$ cup of yogurt for every cup of sour cream. Write an equation that relates the amount of yogurt, y, to the amount of sour cream, x.

Name ______________________________________

Recognizing Proportional Relationships

The table shows examples of the number of cups of banana related to the number of cups of vanilla yogurt for a smoothie recipe.

Cups of vanilla yogurt	$2\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{1}{4}$	$\frac{3}{4}$
Cups of banana	9	6	5	3

1. How is the number of cups of yogurt related to the number of cups of banana?

$2\frac{1}{4} \div 9 =$ ______ $1\frac{1}{2} \div 6 =$ ______

$1\frac{1}{4} \div 5 =$ ______ $\frac{3}{4} \div 3 =$ ______

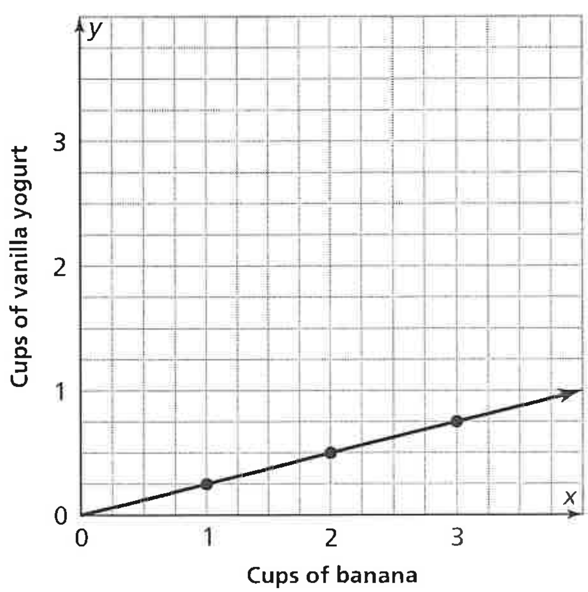
2. What is the unit rate for this relationship?

______ cup of vanilla yogurt to ______ cup of banana

3. Is the relationship proportional? Why or why not?

____

4. A proportional relationship can be graphed as a straight line that passes through (0,0) on the coordinate plane.



Which ordered pair represents 1 cup of banana as its *x*-coordinate?

____

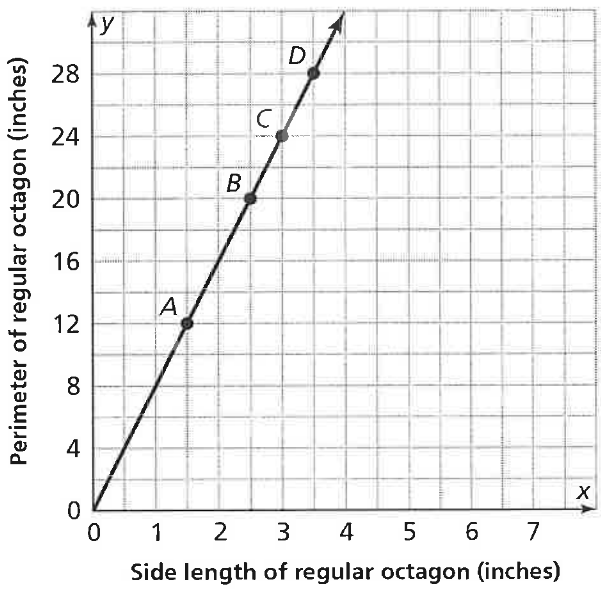
Which ordered pair represents $\frac{3}{4}$ cup of yogurt as its *y*-coordinate?

____

Name ______________________________

Recognizing Proportional Relationships (continued)

5. Use points *A*, *B*, *C*, and *D* to make a table that shows the ratios of the *y* to *x* coordinates.



	Point *A*	Point *B*	Point *C*	Point *D*
x				
y				

$\frac{y}{x}$ ratios:

6. Three of the $\frac{y}{x}$ ratios represented in the table are proportionally related. Which ratio is not proportionally related to the others? Explain.

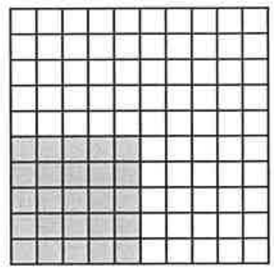
x	$1\frac{2}{3}$	$1\frac{1}{4}$	3	$4\frac{1}{2}$
y	$3\frac{1}{3}$	$2\frac{1}{2}$	7	9

7. **Reasoning** Is the relationship between the perimeter of a regular octagon and the length of a side proportional?

Name ______________________________

Relating Percents, Decimals, and Fractions

The hundred grid below represents the number of students out of 100 surveyed that ride the bus to school. Write this number as a percent, a decimal, and a fraction in simplest form by answering 1 to 7.



1. How many students were surveyed? ______

2. How many students ride the bus out of 100? ______

3. What percent of the students surveyed ride the bus? ______

4. Write a decimal to represent the shaded part of the hundred grid. ______

5. What fraction of the hundred grid is shaded? ______

6. Write the fraction from item 5 in simplest form. ______

7. The percent, decimal, and fraction forms are all equal. Use one of each form to fill in the blanks. ______ = ______ = ______

The same survey of 100 students found that 32% walk to school. Write this percent as a decimal and a fraction in simplest form by answering 8 to 10.

8. To change a percent to a decimal, remove the percent sign and move the decimal point two places to the left. What decimal is equal to 32%? ______

9. To change a percent to a fraction, remove the percent sign and write the number over a denominator of 100. What fraction is equal to 32%? ______

10. Write the fraction from item 9 in simplest form. ______

Name ____________________

Relating Percents, Decimals, and Fractions (continued)

Write each expression in two other ways.

11. 19% ____________

12. $\frac{23}{100}$ ____________

13. 0.7 ____________

14. 11% ____________

15. 2% ____________

16. $\frac{9}{100}$ ____________

17. 0.13 ____________

18. 25% ____________

Write each percent as a decimal and as a fraction in simplest form.

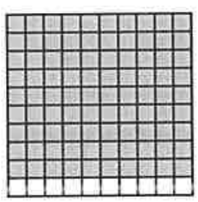
19. 60% ____________

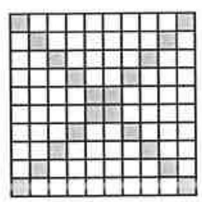
20. 5% ____________

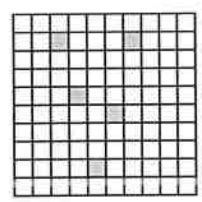
21. 16% ____________

22. 45% ____________

Express each shaded part as a decimal, as a percent, and as a fraction in simplest form.

23.  ____________

24.  ____________

25.  ____________

26. In Mrs. Hughes's class $\frac{3}{5}$ of the students voted to have tacos at their end of the year party. What percentage of students voted for tacos? ____________

27. **Reasoning** When dividing a number by 100, the decimal point is moved two places to the left. How does this relate to the conversion of a percent into a decimal?