8TH Grade Summer Reading 2025

Welcome to Eighth Grade!

Eighth Grade is an exciting year in ELA as we work to help you establish habits and develop practices that will prepare you for high school level material. It is our goal to support you through this period of growth and guide you towards becoming more independent and confident in your reading and writing.

Students who read over the summer maintain and build upon their comprehension skills, vocabulary, and reading fluency. In an effort to sustain growth, we are asking all incoming eighth grade students to read **at least two "free choice" novels** over the summer. Of course, you can read more! **Please be sure that your parents approve your book titles.**

While reading, we would like you to write down your thinking (also known as "annotations") on Post-its. Your Post-its can show any type of thinking about the text that you have- this includes questions. Please write neatly. Your teacher will look at your Post-it annotations in August.

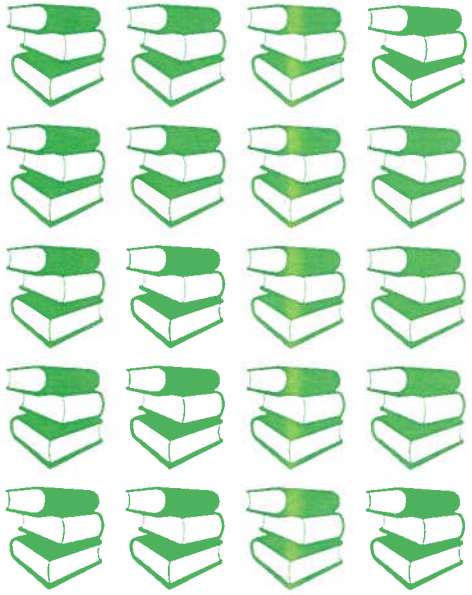
Also, please bring your novels with you to the first day of school along with the book report form (attached) and your typed final copy report. This report should be 12-point font, double-spaced, Times New Roman font. You should only **Pick ONE** of the two books to complete the book report form on.

Have a wonderful summer! Looking forward to seeing you in August!

Happy Reading,

St. Ann School ELA Teachers

WHY READ 20 MINUTES AT HOME?

Student A Reads	Student B Reads	Student C Reads
❖ 20 minutes per day.	❖ 5 minutes per day.	❖ 1 minute per day
❖ 3,600 minutes per school year.	❖ 900 minutes per school year.	❖ 180 minutes per school year.
❖ 1,800,000 words per year.	❖ 282,000 words per year.	❖ 8,000 words per year.
		
❖ Scores in the 90th percentile on standardized tests.	❖ Scores in the 50th percentile on standardized tests.	❖ Scores in the 10th percentile on standardized tests.

If they start reading for 20 minutes per night in Kindergarten, by the end of 6th grade, Student A will have read for the equivalent of 60 school days, Student B will have read for 12 school days, and Student C will have read for 3.

(Nagy and Herman, 1987.)

WANT TO BE A BETTER READER? SIMPLY READ.

Name:_____ **Date:**_____

Middle School Outline Template for
Book Report

This template will map out the information you need to include in your book report. **As you read the book, fill in the sections for this template.** You will receive a grade for this template and for the report (see points next to each item). When you go to write your book report, be sure to include the information completed on the following pages. **The final report must be typed and double spaced. Be sure to hand into your Reading teacher both this template and the book report when you return to school.**

Introductory paragraph - What is the name and author of the book on which you are choosing to write? (2 pts.)
Book title :_____ Author: _____

Write at least 3 facts about the author (Where is he/she from? What kinds of books does he/she write? About what topics does he/she write?) (3 pts.)
• _____ • _____ • _____

2nd paragraph
Write 1-2 sentences that give a brief summary of the book (ex: *Loser* is the story of Donald Zinkoff, a student who struggles to stand strong even though he is constantly teased by his classmates. • _____ _____

Write 2-3 sentences that describe the setting of the book (Where and when does the story take place? How is the setting significant to the story?)(8 pts)

- _____
- _____
- _____

3rd paragraph

Write a topic sentence about the major characters of the book (ex: There are several main characters involved in the book *The Giver) (8 pts.)*

- _____

Describe the main characters in the book in the 2nd paragraph (you may have 2, 3, 4, 5 or more important characters). Include characteristics of the characters that are important to the story.

- _____

_____

- _____

_____

- _____

_____

- _____

_____

4th paragraph

Write a topic sentence about the main events that occur in the book (ex: There are several main events that happen in the story of *The Giver) (10 pts.)*

- _____

Include the main events of the book in the 4th paragraph:

- First,_____
  _____

  _____
- Next,
  _____

  _____
- Then,
  _____

  _____
- Finally,
  _____

  _____

The 5th paragraph will discuss a section of the book you found to be most interesting. Start out this paragraph with the following quote.

"The part of the book I found to be most interesting is around page _____, when . . . ."
(jot down some of the interesting details here) (4 pts.)

Give at least 2 reasons why this part is interesting to you:

- _____

  _____

- _____

_____

The 6th paragraph will tell why you liked or disliked the book

The topic sentence should include whether you **liked** or **disliked** the book.

- _____

_____

Include 3-4 sentences that tell **why** you liked, or disliked or the book. (6 pts.)

- _____

_____

- _____

_____

- _____

_____

8th Grade Pre-Algebra

Dear incoming 8th grade student, May 2025

I am looking forward to working with you next year! In order to retain the skills you have learned this year, I am sending you a summer math packet to complete.

Attached is the packet to be completed by the first day of school. This will be your first grade of the year. Make sure to show all work neatly when appropriate. If you are having trouble with a concept in the packet, you may use your current math notebook or access any of the websites below for review.

Khan Academy
IXL
Math Antics
Prodigy

Have a great summer and I will see you next year!

Blessings,
Mrs. Schicitano

MATH 7 REVIEW

Name: _____

Date: _____ Per: _____

WEEK 1

SET A

1. Which is equivalent to the fraction below?

$$\frac{5}{8}$$

A. 0.58

B. 0.625

C. 0.675

D. 1.6

2. A theater has 34 rows of seats. If there are 17 seats in each row, how many seats are in the theater?

3. Which numbers are divisible by 3? Check all that apply.

☐ 78	☐ 139	☐ 203
☐ 397	☐ 414	☐ 657

4. What is the value of the expression below in simplest form?

$$\frac{12}{4^3}$$

A. 1

B. 27

C. $\frac{3}{16}$

D. $\frac{3}{8}$

MATH 7 REVIEW

Name: _____

Date: _____ Per: _____

WEEK 1

SET B

1. The table below gives the weight of three packages. What is the difference between the combined weight of Package A and Package B and the weight of Package C?

Package	A	B	C
Weight (oz)	2.93	1.7	5.04

2. Which set of numbers has a greatest common factor of 12?

A. 3 and 4

B. 6 and 18

C. 32 and 48

D. 36 and 96

3. What is the product of 2.5 and 7.08?

4. Which number has a 7 in the hundredths place?

A. 108.0754

B. 702.1625

C. 65.5172

D. 149.7028

MATH 7 REVIEW

Name: _____

Date: _____ Per: _____

WEEK 2

SET A

1. Alyssa filled her car tank with 16.8 gallons of gas. If gas costs $2.85 per gallon, how much did she pay? Round to the nearest cent.

2. Which expression results in the greatest value?

A. -20 + (-3)

B. -17 + 12

C. -14 + (-18)

D. -8 + 9

3. Bus A stops at a certain bus stop every 25 minutes. Bus B stops at the same stop every 40 minutes. If both buses are at the bus stop at 9:30 a.m., when is the next time they will be there together again?

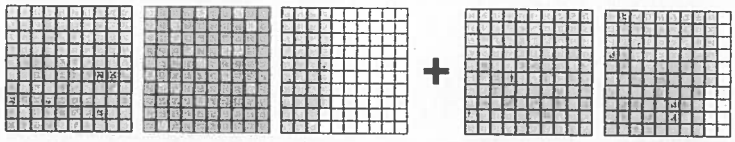
A. 12:20 p.m.

B. 12:50 p.m.

C. 1:10 p.m.

D. 1:30 p.m.

4. What is the value of the expression modeled by the decimal grids below?



A. 4.24

B. 4.32

C. 4.38

D. 4.46

MATH 7 REVIEW

Name: _____

Date: _____ Per: _____

WEEK 2

SET B

1. On a certain day, Miquel had a credit of $75 in his checking account and spent $240. Which represents the total change in his account that day?

A. $315

B. $365

C. -$135

D. -$165

2. Which fraction is equivalent to 0.008?

A. $\frac{2}{250}$

B. $\frac{4}{250}$

C. $\frac{2}{25}$

D. $\frac{4}{25}$

3. If the fractions below are equivalent, what are possible values for m and n?

$$\frac{16}{36}, \frac{m}{n}$$

A. $m = 4, n = 6$

B. $m = 12, n = 32$

C. $m = 20, n = 42$

D. $m = 24, n = 54$

4. In which quadrant is the point (7, -2) located on the coordinate plane?

A. Quadrant I

B. Quadrant II

C. Quadrant III

D. Quadrant IV

MATH 7 REVIEW

Name: _____

Date: _____ Per: _____

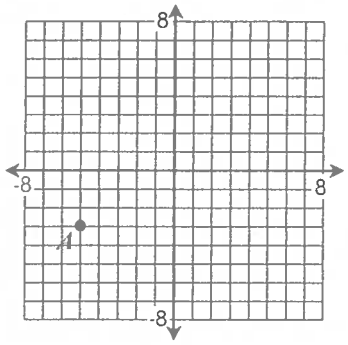
WEEK 3

SET C

1. Write the fraction below as an improper fraction in simplest form.

$$7\frac{1}{16}$$

2. Give the coordinates of point A on the graph below.



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3. Mrs. Green made treat bags using 132 chocolates and 72 lollipops. She made the greatest number of bags possible using all the candy, and the combination of chocolates and lollipops in each bag is the same. How many total pieces of candy are in each bag?

A. 12
B. 15
C. 17
D. 18

4. A bakery made $5\frac{1}{3}$ dozen donuts. If they sold $3\frac{5}{6}$ dozen, how many do they have remaining?

A. $2\frac{1}{3}$ dozen
B. $2\frac{1}{6}$ dozen
C. $1\frac{1}{2}$ dozen
D. $1\frac{2}{3}$ dozen

MATH 7 REVIEW

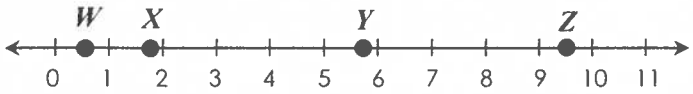
Name: _____

Date: _____ Per: _____

WEEK 3

SET D

1. Which point is closest to the value of $\frac{9}{5}$?



A. W
B. X
C. Y
D. Z

2. Which value when placed in the box makes the statement true?

$$-16 - \boxed{?} = -2$$

A. -14
B. -18
C. 14
D. 18

3. Which values could be placed in the box to make the 5-digit number divisible by 6? Check all that apply.

$$17{,}95\boxed{?}$$

☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
☐ 5	☐ 6	☐ 7	☐ 8	☐ 9

4. Dion purchased 1.2 pounds of grapes. If the grapes cost $2.09 per pound, how much did he pay to the nearest cent?

MATH 7 REVIEW

Name: _____

Date: _____ Per: _____

WEEK 5

SET A

1. What is the greatest common factor of 54 and 96?

2. A hockey team has won 27 of their first 40 games. What percent of the games have they won?

A. 62.5%

B. 64.5%

C. 67.5%

D. 71.5%

3. How many $\frac{5}{8}$-inch-thick slices of bread can be cut from a loaf of bread that is $16\frac{1}{2}$ inches long?

A. 25

B. 26

C. 27

D. 28

4. Josh's mom gave him money to spend at an amusement park. So far, he's used $\frac{3}{10}$ of the money on games and $\frac{1}{4}$ of the money on rides. What fraction of the money does he have left? Give your answer as a fraction in simplest form.

MATH 7 REVIEW

Name: _____

Date: _____ Per: _____

WEEK 5

SET B

1. Which product results in a 5 in the tens place?

A. 12.16×1.25

B. 1.5×0.9

C. 21.45×0.4

D. 67.2×0.75

2. The depth of a lake at a dock is 8 feet. The deepest part of the lake is 52 feet deeper than this point. Which expression can be used to find the depth of the lake at its deepest point relative to the surface of the water?

A. $-8 - (-52)$

B. $8 - (-52)$

C. $-52 + 8$

D. $-52 + (-8)$

3. 1.6% falls between which two values?

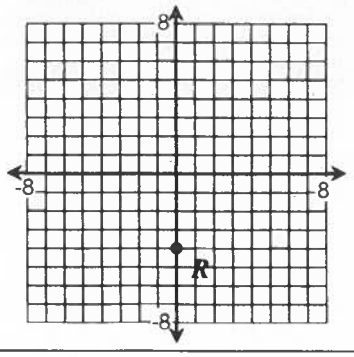
A. 0.001 and 0.02

B. 0.1 and 0.2

C. 1.5 and 1.7

D. 0.15 and 0.17

4. Give the coordinates of point R on the graph below.



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MATH 7 REVIEW

Name: _____

Date: _____ Per: _____

WEEK 6

SET C

1. Which has the least value?

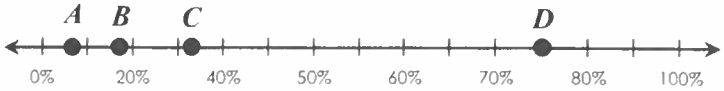
A. $(-15)^2$

B. $(-3)^5$

C. $(-6)^3$

D. $(-4)^4$

2. Which is closest to the location of $\frac{3}{40}$ as a percent on number line below?



A. *A*

B. *B*

C. *C*

D. *D*

3. What is the value of a in the expression below?

$$0.000000149 = 1.49 \times 10^{\boxed{a}}$$

$a =$

4. Beginning from the surface of the water, a submarine descended at a rate of 72 feet per minute for 6 minutes, then ascended 18 feet. What is the location of the submarine relative to the surface of the water?

A. -66 feet

B. -96 feet

C. -414 feet

D. -450 feet

MATH 7 REVIEW

Name: _____

Date: _____ Per: _____

WEEK 6

SET D

1. Between which two values does **5.8** lie?

A. $\sqrt{5}$ and $\sqrt{6}$

B. $\sqrt{5}$ and $\sqrt{10}$

C. $\sqrt{10}$ and $\sqrt{12}$

D. $\sqrt{25}$ and $\sqrt{36}$

2. Four values are given in the table below. Which correctly lists the values from least to greatest?

A	B	C	D
$\frac{2}{25}$	0.01×10^2	3%	$\frac{2}{9}$

A. B, D, A, C

B. C, A, D, B

C. B, C, D, A

D. C, D, B, A

3. Beth rode her bike for $7\frac{7}{8}$ miles, then ran $\frac{2}{3}$ of the distance she cycled. What was the total distance she cycled and ran?

A. $12\frac{3}{4}$ miles

B. $12\frac{5}{8}$ miles

C. $13\frac{1}{4}$ miles

D. $13\frac{1}{8}$ miles

4. What is the quotient of 30 and 0.08?

MATH 7 REVIEW

Name: _____

Date: _____ Per: _____

WEEK 8

SET A

1. Which value is greater than 8.5%?

A. 0.0009

B. 0.12

C. 0.0475

D. 0.0086

2. Simplify the expression below.

$$7k - 10 + 2k - 2$$

3. If $m = -6 - (-2)$, find the value of the expression below.

$$m^2 - 5m$$

A. -4

B. 104

C. 24

D. 36

4. The value of a stock opened at -4 points. After 8 hours, the value of the stock was -52 points. What was the average change in the value of the stock each hour?

A. 6 points per hour

B. 8 points per hour

C. -6 points per hour

D. -8 points per hour

MATH 7 REVIEW

Name: _____

Date: _____ Per: _____

WEEK 8

SET B

1. Which value has an absolute value greater than $\frac{7}{3}$?

A. $-\frac{12}{5}$

B. $-\frac{15}{8}$

C. $\frac{9}{4}$

D. $\frac{11}{6}$

2. Find the value of the expression below.

$$25.6 - 7.8 \div 0.4$$

A. 5.8

B. 6.1

C. 42.9

D. 44.5

3. Justin bought 9 bags of trail mix, with $4\frac{2}{3}$ cups of trail mix in each bag. If he is equally placing the trail mix into 12 bowls, how many cups of trail mix will go in each bowl?

A. $2\frac{3}{4}$ cups

B. $2\frac{7}{9}$ cups

C. $3\frac{1}{2}$ cups

D. $3\frac{1}{3}$ cups

4. Which expression is equivalent to the phrase "the quotient of n less than 7, and 4"

A. $\frac{n}{4} - 7$

B. $7 - \frac{n}{4}$

C. $\frac{n-7}{4}$

D. $\frac{7-n}{4}$

MATH 7 REVIEW

Name: _____

Date: _____ Per: _____

WEEK 9

SET A

1. Which values when placed in the box will make the value of the expression negative? Check all that apply.

$$-7 - \boxed{?}$$

☐ -15	☐ -7	☐ -3
☐ 0	☐ 5	☐ 15

2. Find the value of the expression below when $r = 5$ and $s = -2$.

$$r^2 + 8rs - s^2$$

A. -51

B. -59

C. -66

D. -74

3. Write the expression below in factored form.

$$16k + 72$$

4. In which list are all values greater than $\frac{5}{12}$?

A. $\left\{\frac{11}{25}, 0.9\%, \frac{3}{10}\right\}$

B. $\left\{5 \times 10^{-2}, 0.42, \frac{3}{8}\right\}$

C. $\left\{\frac{3}{5}, 8\%, \frac{9}{20}\right\}$

D. $\left\{1.2 \times 10^{1}, \frac{4}{9}, \frac{7}{16}\right\}$

MATH 7 REVIEW

Name: _____

Date: _____ Per: _____

WEEK 9

SET B

1. Travis bought b bags of mulch at \$7 each and used a \$5 coupon off his order. Which expression represents the total cost?

A. $7(b - 5)$

B. $7 - 5b$

C. $7b - 5$

D. $7b + 5$

2. Kara lives $\frac{13}{20}$ miles from the bus stop. Her friend Liam lives $\frac{5}{8}$ miles from the bus stop. Which statement is true?

A. Kara lives $\frac{1}{40}$ miles closer to the bus stop.

B. Liam lives $\frac{1}{40}$ miles closer to the bus stop.

C. Kara lives $\frac{3}{40}$ miles closer to the bus stop.

D. Liam lives $\frac{3}{40}$ miles closer to the bus stop.

3. Carole has 84 ounces of blue paint and 192 ounces of yellow paint that she is mixing into bowls to create green paint. What is the greatest number of bowls she can use if the green mixture in each bowl is the same?

A. 8

B. 12

C. 16

D. 24

4. Which expression is equivalent to $a + a + b + b + c + c$?

A. $2abc$

B. $a^2 + b^2 + c^2$

C. $2(a + b + c)$

D. $a^2b^2c^2$

8TH ALG. 1

Dear incoming 8th grade student, May 2025

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Have a great summer and I will see you next year!

Blessings,
Mrs. Schicitano

Name: _____ **Pre-Algebra Review:** Packet #1

Topic #1: Operations with Rational Numbers

1. $-1\frac{2}{3}+4\frac{1}{6}$	**2.** $7\frac{5}{6}-\frac{5}{14}$	**3.** $-3\frac{7}{12}\cdot-\frac{6}{7}$	**4.** $-4\div\frac{3}{11}$

5. Lee ran a mile in $7\frac{1}{3}$ minutes. His friend Sam ran the same mile in $8\frac{5}{9}$ minutes. How many minutes faster did Lee run?

6. Holly has $45\frac{5}{16}$ pounds of fertilizer. If she plans to use $\frac{3}{5}$ of the fertilizer on her front lawn and the rest on her back lawn, how much fertilizer will she use on the back lawn?

7. A large container contains $41\frac{2}{3}$ cups of lemonade. If the lemonade is to be poured into smaller cups, each holding $3\frac{1}{8}$ cups of lemonade, how many cups can be filled?

Topic #2: Exponents and Scientific Notation

Negative Exponent Rule: $x^{-a} = \frac{1}{x^a}$	**Zero Exponent Rule:** $x^0 = 1$

8. Rewrite the expressions using only positive exponents. Simplify if possible.

a) 2^{-5}	**b)** $6^{-3}\cdot 8^2$	**c)** $3^4\cdot 12^{-1}\cdot 5^0$

9. Write the following values in scientific notation.

a) 823	**b)** 0.00000000195	**c)** 64,100,000

10. Write the following values in standard form.

a) 4.29×10^8	**b)** 8×10^{-1}	**c)** 7.5×10^{-4}

Topic #3: Square and Cube Roots

List the first 20 perfect square numbers:		
List the first 12 perfect cube numbers:		
11. Evaluate each expression.		
a) $\sqrt{49}$	**b)** $-\sqrt{256}$	**c)** $\sqrt{\frac{4}{25}}$
d) $\sqrt[3]{216}$	**e)** $\sqrt[3]{1,331}$	**f)** $\sqrt[3]{-8}$
12. Estimate the following values to the nearest tenth.		
a) $\sqrt{78}$	**b)** $\sqrt{262}$	**c)** $-\sqrt{115}$
13. Determine the consecutive integers between which each square root lies.		
a) $\sqrt{12}$	**b)** $-\sqrt{158}$	**c)** $-\sqrt{40}$

Topic #4: The Real Number System

THE REAL NUMBERS: _____

IRRATIONAL NUMBERS: _____ **RATIONAL NUMBERS:** _____

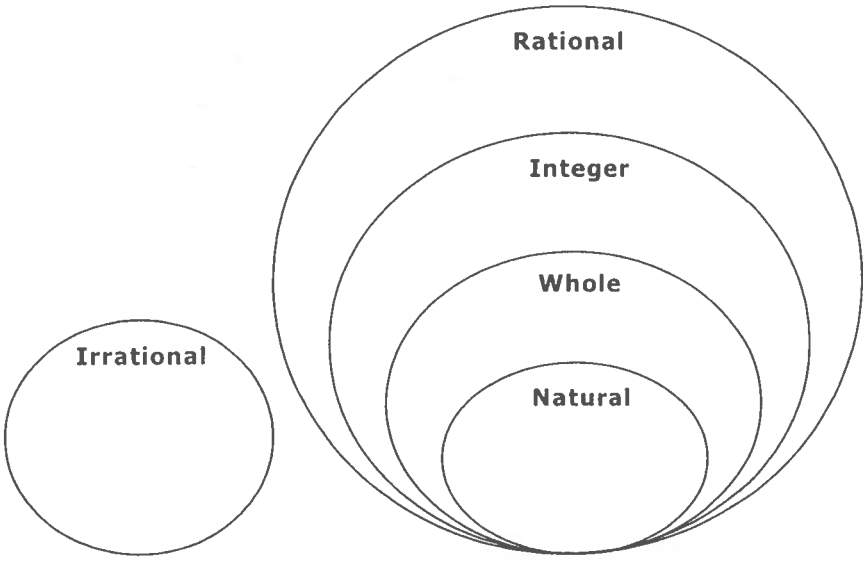
INTEGERS: _____

WHOLE NUMBERS: _____

NATURAL NUMBERS: _____

14. Place the LETTER of the values to the left in the smallest set that contains the value.

A. 7	**B.** $-\frac{45}{9}$
C. $-\sqrt{36}$	**D.** π
E. 6.0487	**F.** $0.\overline{2}$
G. $\sqrt{196}$	**H.** $-\sqrt{90}$
I. 0	**J.** 8^{-1}
K. -19	**L.** $\lvert -24 \rvert$
M. $\sqrt{\frac{1}{16}}$	**N.** 3.7×10^2



Give an example of each, if possible.	
15. A rational number that is not an integer.	**16.** A natural number that is not a whole number.
17. An integer that is an irrational number.	**18.** A rational number that is a whole number.

Topic #5: Comparing & Ordering Number Forms

Rewrite #19 in order from least to greatest, then #20 in order from greatest to least.
19. $\left\{\sqrt{225}, 2^6, 1\times10^1, \sqrt[3]{512}, \sqrt{60}, 4^2\right\}$
20. $\left\{4\%, \frac{4}{9}, 4\times10^{-3}, \frac{2}{5}, 4^{-1}, \frac{3}{8}\right\}$

Topic #6: Order of Operations

Evaluate each expression. Write your answer as a simplified fraction if necessary.	
21. $5^2-(3^3-12)\div\lvert-5\rvert$	**22.** $\frac{\sqrt{64}-3^3+55}{5+(7-4^2)}$
23. $\frac{18+2(4-1)^3}{9^2-21}$	**24.** $\frac{7}{6}-\frac{9}{5}\cdot\frac{10}{27}$

Topic #7: Evaluating Expressions

Evaluate each expression given the replacement values.	
25. $x^3 - 2x^2 + 17$ (if $x = 3$)	**26.** $a^2 - b^2$ (if $a = -7$ and $b = 4$)
27. $2m^2 - \sqrt{mn} + n^3$ (if $m = 12$ and $n = 3$)	**28.** $\frac{5}{12}x \div \frac{10}{3}y$ (if $x = -4$ and $y = 6$)

Topic #8: Properties

PROPERTY NAME	WHAT IT MEANS	EXAMPLE(S)
COMMUTATIVE		
ASSOCIATIVE		
DISTRIBUTIVE		
IDENTITY		
INVERSE		
ZERO PRODUCT		

Name the property that justifies each statement.	
29. $\frac{2}{7} \cdot \frac{7}{2} = 1$	**30.** $(-5 + 3) + 8 = -5 + (3 + 8)$
31. $(x + y) + 0 = x + y$	**32.** $6(2r + s) = 12r + 6s$
33. $8 - (2y + 7) = 8 - (7 + 2y)$	**34.** $8m + (-8m) = 0$
35. $(2p^2)q = 2(p^2q)$	**36.** $1 \cdot (a - 3b) = a - 3b$

H.S. ALG.

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Have a great summer and I will see you next year!

Blessings,
Mrs. Schicitano

Name _____ Class _____ Date _____

1-1 Reteaching

You can represent mathematical phrases and real-world relationships using symbols and operations. This is called an algebraic expression.

For example, the phrase *3 plus a number* n can be expressed using symbols and operations as $3 + n$.

Problem

What is the phrase *5 minus a number* d as an algebraic expression?

$$\underbrace{5}_{5} \quad \underbrace{\textit{minus}}_{-} \quad \underbrace{\textit{a number d}}_{d}$$

The phrase *5 minus a number* d, rewritten as an algebraic expression, is $5 - d$.

The left side of the table below gives some common phrases used to express mathematical relationships, and the right side of the table gives the related symbol.

Phrase	Symbol
sum	+
difference	−
product	×
quotient	÷
less than	−
more than	+

Exercises

Write an algebraic expression for each word phrase.

1. 5 plus a number d

2. the product of 5 and g

3. 11 fewer than a number f

4. 17 less than h

5. the quotient of 20 and t

6. the sum of 12 and 4

Write a word phrase for each algebraic expression.

7. $h + 6$

8. $m - 5$

9. $q \times 10$

10. $\frac{35}{r}$

11. $h + m$

12. $5n$

Name _____ Class _____ Date _____

1-2 Reteaching

Exponents are used to represent repeated multiplication of the same number. For example, $4 \times 4 \times 4 \times 4 \times 4 = 4^5$. The number being multiplied by itself is called the base; in this case, the base is 4. The number that shows how many times the base appears in the product is called the exponent; in this case, the exponent is 5. 4^5 is read *four to the fifth power*.

Problem

How is $6 \times 6 \times 6 \times 6 \times 6 \times 6 \times 6$ written using an exponent?

The number 6 is multiplied by itself 7 times. This means that the base is 6 and the exponent is 7. $6 \times 6 \times 6 \times 6 \times 6 \times 6 \times 6$ written using an exponent is 6^7.

Exercises

Write each repeated multiplication using an exponent.

1. $4 \times 4 \times 4 \times 4 \times 4$

2. $2 \times 2 \times 2$

3. $1.1 \times 1.1 \times 1.1 \times 1.1 \times 1.1$

4. $3.4 \times 3.4 \times 3.4 \times 3.4 \times 3.4 \times 3.4$

5. $(-7) \times (-7) \times (-7) \times (-7)$

6. $11 \times 11 \times 11$

Write each expression as repeated multiplication.

7. 4^3

8. 5^4

9. 1.5^2

10. $\left(\frac{2}{7}\right)^4$

11. x^7

12. $(5n)^5$

13. Trisha wants to determine the volume of a cube with sides of length s. Write an expression that represents the volume of the cube.

Name _____ Class _____ Date _____

1-3 Reteaching

A number that is the product of some other number with itself, or a number to the second power, such as $9 = 3 \times 3 = 3^2$, is called a perfect square. The number that is raised to the second power is called the square root of the product. In this case, 3 is the square root of 9. This is written in symbols as $\sqrt{9} = 3$. Sometimes square roots are whole numbers, but in other cases, they can be estimated.

Problem

What is an estimate for the square root of 150?

There is no whole number that can be multiplied by itself to give the product of 150.

$10 \times 10 = 100$

$11 \times 11 = 121$

$12 \times 12 = 144$

$13 \times 13 = 169$

You cannot find the exact value of $\sqrt{150}$, but you can estimate it by comparing 150 to perfect squares that are close to 150.

150 is between 144 and 169, so $\sqrt{150}$ is between $\sqrt{144}$ and $\sqrt{169}$.

$\sqrt{144} < \sqrt{150} < \sqrt{169}$

$12 < \sqrt{150} < 13$

The square root of 150 is between 12 and 13. Because 150 is closer to 144 than it is to 169, we can estimate that the square root of 150 is slightly greater than 12.

Exercises

Find the square root of each number. If the number is not a perfect square, estimate the square root to the nearest integer.

1. 100	**2.** 49	**3.** 9
4. 25	**5.** 81	**6.** 169
7. 15	**8.** 24	**9.** 40

10. A square mat has an area of 225 cm^2. What is the length of each side of the mat?

Name _____ Class _____ Date _____

1-4 Reteaching

Equivalent algebraic expressions are expressions that have the same value for all values for the variable(s). For example $x + x$ and $2x$ are equivalent expressions since, regardless of what number is substituted in for x, simplifying each expression will result in the same value. Certain properties of real numbers lead to the creation of equivalent expressions.

Commutative Properties

The commutative properties of addition and multiplication state that changing the order of the addends does not change the sum and that changing the order of factors does not change the product.

Addition: $a + b = b + a$ Multiplication: $a \cdot b = b \cdot a$

To help you remember the commutative properties, you can think about the root word "commute." To commute means to move. If you think about commuting or moving when you think about the commutative properties, you will remember that the addends or factors move or change order.

Problem

Do the following equations illustrate commutative properties?

a. $3 + 4 = 4 + 3$ **b.** $(5 \times 3) \times 2 = 5 \times (3 \times 2)$ **c.** $1 - 3 = 3 - 1$

$3 + 4$ and $4 + 3$ both simplify to 7, so the two sides of the equation in part (a) are equal. Since both sides have the same two addends but in a different order, this equation illustrates the Commutative Property of Addition.

The expression on each side of the equation in part (b) simplifies to 30. Both sides contain the same 3 factors. However, this equation does not illustrate the Commutative Property of Multiplication because the terms are in the same order on each side of the equation.

$1 - 3$ and $3 - 1$ do not have the same value, so the equation in part (c) is not true. There is not a commutative property for subtraction. Nor is there a commutative property for division.

Associative Properties

The associative properties of addition and multiplication state that changing the grouping of addends does not change the sum and that changing the grouping of factors does not change the product.

Addition: $(a + b) + c = a + (b + c)$ Multiplication: $(a \cdot b) \cdot c = a \cdot (b \cdot c)$

Name _____ Class _____ Date _____

1-5 Reteaching

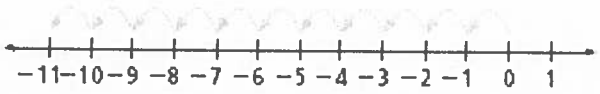
You can add real numbers using a number line or using the following rules.

Rule 1: To add two numbers with the same sign, add their absolute values. The sum has the same sign as the addends.

Problem

What is the sum of –7 and –4?

Use a number line.



Start at zero.
Move 7 spaces to the left to represent -7.
Move another 4 spaces to the left to represent -4.

The sum is -11

Use the rule.

$-7 + (-4)$	The addends are both negative.
$\|-7\| + \|-4\|$	Add the absolute values of the addends.
$7 + 4 = 11$	$\|-7\| = 7$ and $\|-4\| = 4$.
$-7 + (-4) = -11$	The sum has the same sign as the addends.

Rule 2: To add two numbers with different signs, subtract their absolute values. The sum has the same sign as the addend with the greater absolute value.

Problem

What is the sum of –6 and 9?

Use the rule.

$9 + (-6)$	The addends have different signs.
$\|9\| - \|-6\|$	Subtract the absolute values of the addends.
$9 - 6 = 3$	$\|9\| = 9$ and $\|-6\| = 6$.
$9 + (-6) = 3$	The positive addend has the greater absolute value.

Name _____ Class _____ Date _____

1-6 Reteaching

Multiplying and Dividing Real Numbers

You need to remember two simple rules when multiplying or dividing real numbers.

1. The product or quotient of two numbers with the same sign is positive.
2. The product or quotient of two numbers with different signs is negative.

Problem

What is the product $-6(-30)$?

$-6(-30) = 180$ -6 and -30 have the same sign so the product is positive.

Problem

What is the quotient $72 \div (-6)$?

$72 \div (-6) = -12$ 72 and -6 have different signs so the quotient is negative.

Exercises

Find each product or quotient.

1. $-5(-6)$ **2.** $7(-20)$ **3.** -3×22

4. $44 \div 2$ **5.** $81 \div (-9)$ **6.** $-55 \div (-11)$

7. $-62 \div 2$ **8.** $25 \cdot (-4)$ **9.** $(-6)^2$

10. $-9.9 \div 3$ **11.** $-7.7 \div (-11)$ **12.** $-1.4(-2)$

13. $-\frac{1}{2} \times \frac{1}{3}$ **14.** $-\frac{2}{3}\left(-\frac{3}{5}\right)$ **15.** $\frac{3}{4} \cdot \left(-\frac{1}{3}\right)$

16. The temperature dropped 2°F each hour for 6 hours. What was the total change in temperature?

17. Reasoning Since $5^2 = 25$ and $(-5)^2 = 25$, what are the two values for the square root of 25?

Name _____ Class _____ Date _____

1-7 Reteaching

The Distributive Property states that the product of a sum and another factor can be rewritten as the sum of two products, each term in the sum multiplied by the other factor. For example, the Distributive Property can be used to rewrite the product $3(x + y)$ as the sum $3x + 3y$. Each term in the sum $x + y$ is multiplied by 3; then the new products are added.

Problem

What is the simplified form of each expression?

a. $4(x + 5)$
$= 4(x) + 4(5)$ Distributive Property
$= 4x + 20$ Simplify.

b. $(2x - 3)(-3)$
$= 2x(-3) - 3(-3)$ Distributive Property
$= -6x + 9$ Simplify.

The Distributive Property can be used whether the factor being multiplied by a sum or difference is on the left or right.

The Distributive Property is sometimes referred to as the Distributive Property of Multiplication over Addition. It may be helpful to think of this longer name for the property, as it may remind you of the way in which the operations of multiplication and addition are related by the property.

Exercises

Use the Distributive Property to simplify each expression.

1. $6(z + 4)$ **2.** $2(-2 - k)$ **3.** $(5x + 1)4$ **4.** $(7 - 11n)10$

5. $(3 - 8w)4.5$ **6.** $(4p + 5)2.6$ **7.** $4(y + 4)$ **8.** $6(q - 2)$

Write each fraction as a sum or difference.

9. $\frac{2m - 5}{9}$ **10.** $\frac{8 + 7z}{11}$ **11.** $\frac{24f + 15}{9}$ **12.** $\frac{12d - 16}{6}$

Simplify each expression.

13. $-(6 + j)$ **14.** $-(-9h - 4)$ **15.** $-(-n + 11)$ **16.** $-(6 - 8f)$

Name _____ Class _____ Date _____

1-8 Reteaching

An Introduction to Equations

An equation is a mathematical sentence with an equal sign. An equation can be true, false, or open. An equation is true if the expressions on both sides of the equal sign are equal, for example $2 + 5 = 4 + 3$. An equation is false if the expressions on both sides of the equal sign are not equal, for example $2 + 5 = 4 + 2$.

An equation is considered open if it contains one or more variables, for example $x + 2 = 8$. When a value is substituted for the variable, you can then decide whether the equation is true or false for that particular value. If an open sentence is true for a value of the variable, that value is called a solution of the equation. For $x + 2 = 8$, 6 is a solution because when 6 is substituted in the equation for x, the equation is true: $6 + 2 = 8$.

Problem

Is the equation true, false, or open? Explain.

a. $15 + 21 = 30 + 6$ The equation is true, because both expressions equal 36.

b. $24 \div 8 = 2 \cdot 2$ The equation is false, because $24 \div 8 = 3$ and $2 \cdot 2 = 4$; $3 \neq 4$.

c. $2n + 4 = 12$ The equation is open, because there is a variable in the on the left side.

Tell whether each equation is true, false, or open. Explain.

1. $2(12) - 3(6) - 12$

2. $3x + 12 = -19$

3. $14 - 19 = -5$

4. $2(-8) + 4 = 12$

5. $7 - 9 + 3 = x$

6. $(28 + 12) \div -2 = -20$

7. $14 - (-8) - 14 = 8$

8. $(13 - 16) \div 3 = 1$

9. $42 \div 7 + 3 = 9$

Problem

Is $x = -3$ a solution of the equation $4x + 5 = -7$?

$4x + 5 = -7$

$4(-3) + 5 = -7$ Substitute -3 for x.

$-7 = -7$ Simplify.

Since $-7 = -7$, -3 is a solution of the equation $4x + 5 = -7$.

Tell whether the given number is a solution of each equation.

10. $4x - 1 = -27; -7$

11. $18 - 2n = 14; 2$

12. $21 = 3p - 5; 9$

13. $k = (-6)(-8) - 14; -62$

14. $20v + 36 = -156; -6$

15. $8v + 13 = 21; 1$

16. $-24 - 17t = -58; 2$

17. $-26 = \frac{1}{3}m + 5; -7$

18. $\frac{1}{4}g - 8 = \frac{3}{2}; 38$

Name _____ Class _____ Date _____

1-9 Reteaching

Tables, equations, and graphs are some of the ways that a relationship between two quantities can be represented. You can use the information provided by one representation to produce one of the other representations; for example, you can use data from a table to produce a graph. You can also use any of the representations to draw conclusions about the relationship.

Problem

Are (2, 11) and (5, 3) solutions of the equation $y = 3x + 5$?

For each ordered pair, you can substitute the x- and y- coordinates into the equation for x and y and then simplify to see if the values satisfy the equation.

For (2, 11):		For (5, 3):
$11 = 3(2) + 5$	Substitute for x and y.	$3 = 3(5) + 5$
$11 = 11$	Multiply and then add.	$3 \neq 20$

Since both sides of the equation have the same value, the ordered pair (2, 11) is a solution of the equation $y = 3x + 5$. Since the two sides of the equation have different values, the ordered pair (5, 3) is not a solution of the equation $y = 3x + 5$.

Problem

The table shows the relationship between the number of hours Kaya works at her job and the amount of pay she receives. Extend the pattern. How much money would Kaya earn if she worked 40 hours?

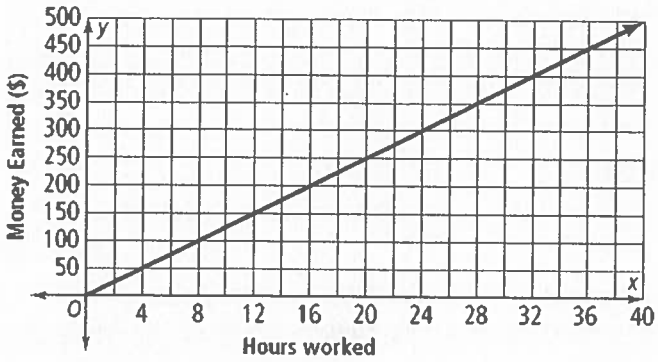
Hours Worked	Money Earned ($)
3	37.50
6	75
9	112.50
12	150

Method 1: Write an equation.

$y = 12.50x$	Kaya earns $12.50 per hour.
$= 12.50(40)$	Substitute 40 for x.
$= 500$	Simplify.

She would earn $500 in 40 hours.

Method 2: Draw a graph.



She would earn $500 in 40 hours.

Name _____ Class _____ Date _____

2-1 Reteaching

You can use the properties of equality to solve equations. Subtraction is the inverse of addition.

Problem

What is the solution of $x + 5 = 33$?

In the equation, $x + 5 = 33$, 5 is added to the variable. To solve the equation, you need to isolate the variable, or get it alone on one side of the equal sign. Undo adding 5 by subtracting 5 from each side of the equation.

Drawing a diagram can help you write an equation to solve the problem.

Whole		33	
Part	Part	X	5

Solve

$x + 5 = 33$

$x + 5 - 5 = 33 - 5$ — Undo adding 5 by subtracting 5.

$x = 28$ — Simplify. This isolates x.

Check

$x + 5 = 33$ — Check your solution in the original equation.

$28 + 5 \stackrel{?}{=} 33$ — Substitute 28 for x.

$33 = 33$ ✓

The solution to $x + 5 = 33$ is 28.

Division is the inverse of multiplication.

Problem

What is the solution of $\frac{x}{5} = 12$?

In the equation, $\frac{x}{5} = 12$, the variable is divided by 5. Undo dividing by 5 by multiplying by 5 on each side of the equation.

X				
12	12	12	12	12

Solve	$\frac{x}{5} = 12$	
	$\frac{x}{5} \cdot 5 = 12 \cdot 5$	Undo dividing by 5 by multiplying by 5.
	$x = 60$	Simplify. This isolates x.

The solution to $\frac{x}{5} = 12$ is 60.

Name _____ Class _____ Date _____

2-2 Reteaching

Properties of equality and inverse operations can be used to solve equations that involve more than one step to solve. To solve a two-step equation, identify the operations and undo them using inverse operations. Undo the operations in the reverse order of the order of operations.

Problem

What is the solution of $5x - 8 = 32$?

$5x - 8 + 8 = 32 + 8$	To get the variable term alone on the left side, add 8 to each side.
$5x = 40$	Simplify.
$\frac{5x}{5} = \frac{40}{5}$	Divide each side by 5 since x is being multiplied by 5 on the left side. This isolates x.
$x = 8$	Simplify.
Check $5x - 8 = 32$	Check your solution in the original equation.
$5(8) - 8 = 32$	Substitute 8 for x.
$32 = 32$ ✓	Simplify.

To solve $-16 = \frac{x}{3} + 5$ you can use subtraction first to undo the addition, and then use multiplication to undo the division.

Problem

What is the solution of $-16 = \frac{x}{3} + 5$?

$-16 - 5 = \frac{x}{3} + 5 - 5$	To get the variable term alone on the right, subtract 5 from each side.
$-21 = \frac{x}{3}$	Simplify.
$3(-21) = 3\left(\frac{x}{3}\right)$	Since x is being divided by 3, multiply each side by 3 to undo the division. This isolates x.
$-63 = x$	Simplify.

Name _____ Class _____ Date _____

2-3 Reteaching

To solve multi-step equations, use properties of equality, inverse operations, the Distributive Property, and properties of real numbers to isolate the variable. Like terms on either side of the equation should be combined first.

Problem

a) What is the solution of $-3y + 8 + 13y = -52$?

$-3y + 13y + 8 = -52$	Group the terms with y together so that the like terms are grouped together.
$10y + 8 = -52$	Add the coefficients to combine like terms.
$10y + 8 - 8 = -52 - 8$	To get the variable term by itself on the left side, subtract 8 from each side.
$10y = -60$	Simplify.
$\frac{10y}{10} = \frac{-60}{10}$	Divide each side by 10 since y is being multiplied by 10 on the left side. This isolates y.
$y = -6$	Simplify.

b) What is the solution of $-2(3n - 4) = -10$?

$26n + 8 = -10$	Distribute the -2 into the parentheses by multiplying each term inside by -2.
$-6n + 8 - 8 = -10 - 8$	To get the variable term by itself on the left side, subtract 8 from each side.
$-6n = -18$	Simplify.
$\frac{-6n}{-6} = \frac{-18}{-6}$	Divide each side by -6 since n is being multiplied by -6 on the left side. This isolates n.
$n = 3$	Simplify.

Solve each equation. Check your answer.

1. $4 - 6h - 8h = 60$

2. $-32 = -7n - 12 + 3n$

3. $14 + 12 = -15x + 2x$

4. $8(-3d + 2) = 88$

5. $-22 = -(x - 4)$

6. $35 = -5(2k + 5)$

7. $3m + 6 - 2m = -22$

8. $4(3r + 2) - 3r = -10$

9. $-18 = 15 - 3(6t + 5)$

10. $-5 + 2(10b - 2) = 31$

11. $7 = 5x + 3(x - 2) + 5$

12. $-18 = 3(-z + 6) + 2z$

13. Reasoning Solve the equation $14 = 7(2x - 4)$ using two different methods. Show your work. Which method do you prefer? Explain.

Name _____ Class _____ Date _____

2-4 Reteaching

Solving Equations With Variables on Both Sides

To solve equations with variables on both sides, you can use the properties of equality and inverse operations to write a series of simpler equivalent equations.

What is the solution of $2m - 4 + 5m = 13 - 6m - 4$?

$7m - 4 = -6m + 9$	Add the terms with variables together on the left side and the constants on the right side to combine like terms.
$7m - 4 + 6m = -6m + 9 + 6m$	To move the variables to the left side, add $6m$ to each side.
$13m - 4 = 9$	Simplify.
$13m - 4 + 4 = 9 + 4$	To get the variable term alone on the left, add 4 to each side.
$13m = 13$	Simplify.
$\frac{13m}{13} = \frac{13}{13}$	Divide each side by 13 since x is being multiplied by 13 on the left side. This isolates x.
$m = 1$	Simplify.

What is the solution of $3(5x - 2) = -3(x + 6)$?

$15x - 6 = -3x - 18$	Distribute 3 on the left side and -3 on the right side into the parentheses by multiplying them by each term inside.
$15x - 6 + 6 = -3x - 18 + 6$	To move all of the terms without a variable to the right side, add 6 to each side.
$15x = -3x - 12$	Simplify.
$15x + 3x = -3x - 12 + 3x$	To get the variable terms to the left side, add $3x$ to each side.
$18x = -12$	Simplify.
$\frac{18x}{18} = -\frac{12}{18}$	Divide each side by 18 since x is being multiplied by 18 on the left side. This isolates x.
$x = -\frac{2}{3}$	Simplify and reduce the fraction.

Solve each equation. Check your answer.

1. $-5x + 9 = -3x + 1$

2. $14 + 7n = 14n + 28$

3. $22(g - 1) = 2g + 8$

4. $-d + 12 - 3d = 5d - 6$

5. $4(m - 2) = -2(3m + 3)$

6. $-(4y - 8) = 2(y + 4)$

7. $5a - 2(4a + 5) = 7a$

8. $11w + 2(3w - 1) = 15w$

9. $4(3 - 5p) = -5(3p + 3)$

Name _____ Class _____ Date _____

2-5 Reteaching

A literal equation is an equation that involves two or more variables. When you work with literal equations, you can use the methods you have learned in this chapter to isolate any particular variable. To solve for specific values of a variable, simply substitute the values into your equation and simplify.

What is the solution of $4x - 5y = 3$ for y? What is the value of y when $x = 10$?

$4x - 5y - 4x = 3 - 4x$	To get the y-term by itself on the left side, subtract $4x$ from each side.
$-5y = -4x + 3$	Simplify.
$\frac{-5y}{-5} = \frac{-4x+3}{-5}$	Divide each side by -5 since y is being multiplied by -5 on the left side. This isolates y.
$y = \frac{4}{5}x - \frac{3}{5}$	Simplify by dividing each term by -5. Notice, this changes the sign of each term.
$y = \frac{4}{5}(10) - \frac{3}{5}$	To find the value of y when $x = 10$, substitute 10 in for x.
$y = 7\frac{2}{5}$	Simplify by multiplying first, then subtracting.

When you rewrite literal equations, you may have to divide by a variable or variable expression. When you do so in this lesson, assume that the variable or variable expression is not equal to zero because division by zero is not defined.

Solve the equation $ab - bc = cd$ for b.

$b(a - c) = cd$	Since b is a factor of each term on the left side, it can be factored out using the Distributive Property.
$\frac{b(a-c)}{a-c} = \frac{cd}{a-c}$	To get b by itself, divide each side by $a - c$ since b is being multiplied by $a - c$. Remember $a - c \neq 0$.
$b = \frac{cd}{a-c}$	Simplify.

Solve each equation for y. Then find the value of y for each value of x.

1. $y + 5x = 2; -1, 0, 1$

2. $6x = 2y - 4; 1, 2, 4$

3. $6x - 3y = -9; -2, 0, 2$

4. $4y = 5x - 8; -2, -1, 0$

5. $3y + 2x = -5; 0, 2, 3$

6. $5x = 8y - 6; -1, 0, 1$

7. $3(y - 2) + x = 1; -1, 0, 1$

8. $\frac{x+2}{y-3} = 1; -1, 0, 1$

9. $\frac{y+4}{x-5} = -3; -2, 2, 4$

Name _____ Class _____ Date _____

2-6 Reteaching

A unit rate is a rate with denominator 1. For example, $\frac{12 \text{ in.}}{1 \text{ ft}}$ is a unit rate. Unit rates can be used to compare quantities and convert units.

Problem

Which is greater, 74 inches or 6 feet?

It is helpful to convert to the same units. Conversion factors, a ratio of two equivalent measures in different units, are used to do conversions.

Multiply the original quantity by the conversion factor(s) so that units cancel out, leaving you with the desired units.

$$6\cancel{\text{ft}} \times \frac{12 \text{ in.}}{1 \cancel{\text{ft}}} = 72 \text{ in.}$$

Since 72 in. is less than 74 in., 74 in. is greater than 6 ft.

Rates, which involve two different units, can also be converted. Since rates involve two different units, you must multiply by two conversion factors to change both of the units.

Problem

Jared's car gets 26 mi per gal. What is his fuel efficiency in kilometers per liter? You need to convert miles to kilometers and gallons to liters. This will involve multiplying by two conversion factors.

There are 1.6 km in 1 mi. The conversion factor is either $\frac{1.6 \text{ km}}{1 \text{ mi}}$ or $\frac{1 \text{ mi}}{1.6 \text{ km}}$.

Since miles is in the numerator of the original quantity, use $\frac{1.6 \text{ km}}{1 \text{ mi}}$ as the conversion factor so that miles will cancel.

$$26\frac{\cancel{\text{mi}}}{\text{gal}} \times \frac{1.6 \text{ km}}{1 \cancel{\text{mi}}}$$

There are 3.8 L in 1 gal. The conversion factor is either $\frac{3.8 \text{ L}}{1 \text{ gal}}$ or $\frac{1 \text{ gal}}{3.8 \text{ L}}$.

Since gallons is in the denominator of the original quantity, use $\frac{1 \text{ gal}}{3.8 \text{ L}}$ as the conversion factor so that gallons will cancel.

$$26\frac{\cancel{\text{mi}}}{\cancel{\text{gal}}} \times \frac{1.6 \text{ km}}{1 \cancel{\text{mi}}} \times \frac{1 \cancel{\text{gal}}}{3.8 \text{ L}} \approx 10.9\frac{\text{km}}{\text{L}}$$

Jared's vehicle gets 10.9 kilometers per liter.

Name _____ Class _____ Date _____

2-7 Reteaching

A proportion is an equation that states that two ratios are equal. If a quantity in a proportion is unknown, you can solve a proportion to find the unknown quantity as shown below.

Problem

What is the solution of $\frac{3}{4} = \frac{x}{14}$?

There are two methods for solving proportions—using the Multiplication Property of Equality and the Cross Products Property.

1) The Multiplication Property of Equality says that you can multiply both sides of an equation by the same number without changing the value.

$\frac{3}{4} = \frac{x}{14}$

$14\left(\frac{3}{4}\right) = \left(\frac{x}{14}\right)14$ To isolate x, multiply each side by 14.

$\frac{42}{4} = x$ Simplify.

$10.5 = x$ Divide 42 by 4.

2) The Cross Products Property says that you can multiply diagonally across the proportion and these products are equal.

$\frac{3}{4} = \frac{x}{14}$

$(4)(x) = (3)(14)$ Multiply diagonally across the proportion.

$4x = 42$ Multiply.

$\frac{4x}{4} = \frac{42}{4}$ To isolate x, divide each side by 4.

$x = 10.5$ Simplify.

Real world situations can be modeled using proportions.

Problem

A bakery can make 6 dozen donuts every 21 minutes. How many donuts can the bakery make in 2 hours?

A proportion can be used to answer this question. It is key for you to set up the proportion with matching units in both numerators and both denominators.

For this problem, you know that 2 hours is 120 minutes and 6 dozen is 72 donuts.

Correct:

$$\frac{72 \text{ donuts}}{21 \text{ min}} = \frac{x \text{ donuts}}{120 \text{ min}}$$

Incorrect:

$$\frac{72 \text{ donuts}}{21 \text{ min}} = \frac{120 \text{ min}}{x \text{ donuts}}$$

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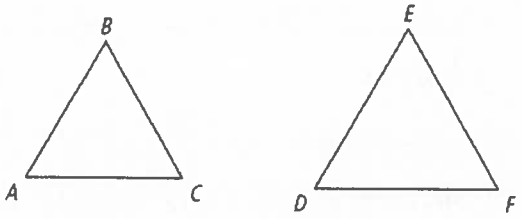
2-8 Reteaching

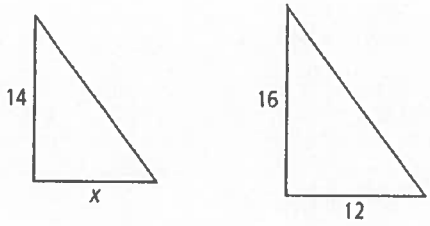
In similar figures, the measures of corresponding angles are equal, and the ratios of corresponding side lengths are equal. It is important to be able to identify the corresponding parts in similar figures.



Since $\angle A \cong \angle D$, $\angle B \cong \angle E$, and $\angle C \cong \angle F$, $\frac{AB}{DE} = \frac{BC}{EF}$, $\frac{AB}{DE} = \frac{AC}{DF}$. This fact can help you to find missing lengths.

Problem

What is the missing length in the similar figures?



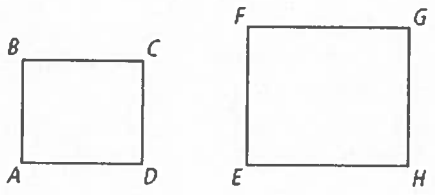
First, determine which sides correspond. The side with length 14 corresponds to the side with length 16. The side with length x corresponds to the side with length 12. These can be set into a proportion.

$\frac{14}{16} = \frac{x}{12}$	Write a proportion using corresponding lengths.
$(16)\,x = (14)\,(12)$	Cross Products Property
$16x = 168$	Multiply.
$x = 10.5$	Divide each side by 16 and simplify.

Exercises

The figures in each pair are similar. Identify the corresponding sides and angles.

1.



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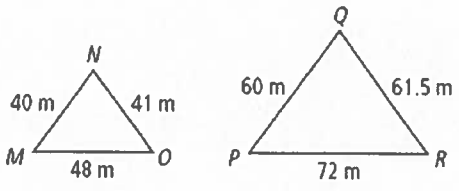

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2-9 Reteaching

Percents compare whole quantities, represented by 100%, and parts of the whole.

Problem

What percent of 90 is 27?

There are two ways presented for finding percents.

1) You can use the percent proportion $\frac{a}{b} = \frac{p}{100}$. The percent is represented by $\frac{p}{100}$. The base, b, is the whole quantity and must be the denominator of the other fraction in the proportion. The part of the quantity is represented by a.

$\frac{27}{90} = \frac{p}{100}$	Substitute given values into the percent proportion. Since you are looking for percent, p is the unknown.
$27(100) = (90)(p)$	Cross Products Property
$2700 = 90p$	Multiply.
$30 = p$	Divide each side by 90 and simplify.

27 is 30% of 90.

2) The other way to find percents is to use the percent equation. The percent equation is $a = p\% \times b$, where p is the percent, a is the part, and b is the base.

$27 = p\% \times 90$	Substitute 27 for a and 90 for b.
$0.3 = p\%$	Divide each side by 90.
$30\% = p\%$	Write the decimal as a percent.

27 is 30% of 90.

Exercises

Find each percent.

1. What percent of 125 is 50?
2. What percent of 14 is 35?
3. What percent of 24 is 18?
4. What percent of 50 is 75?

Problem

75% of 96 is what number?

In this problem you are given the percent p and the whole quantity (base) b.

$a = p\% \times b$	Write the percent equation.
$a = 75\% \times 96 = 72$	Substitute 75 for p and 96 for b. Multiply.

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2-10 Reteaching

A percent change occurs when the original amount changes and the change is expressed as a percent of the original amount. There are two possibilities for percent change: percent increase or perent decrease. The following formula can be used to find percents of increase/decrease.

$$\text{percent change} = \frac{\text{amount of increase or decrease}}{\text{original amount}}$$

Problem

In its first year, membership of the community involvement club was 32 members. The second and third years there were 28 members and 35 members respectively. Determine the percent change in membership each year.

From the first to the second year, the membership went down from 32 to 28 members, representing a percent decrease. The amount of decrease can be found by subtracting the new amount from the original amount.

$$\text{percent change} = \frac{\text{original amount - new amount}}{\text{original amount}}$$

Percent Change Formula for percent decrease.

$$= \frac{32 - 28}{32}$$

Substitute 32 for the original number and 28 for the new number.

$$= \frac{4}{32} = 0.125$$

Subtract. Then divide.

Membership decreased by 12.5% from the first year to the second year.

From the second to the third year, the membership increased from 28 to 35 members, representing a percent increase. The amount of increase can be found by subtracting the original amount from the new amount.

$$\text{percent change} = \frac{\text{original amount - new amount}}{\text{original amount}}$$

Percent Change Formula for percent increase.

$$= \frac{32 - 28}{32}$$

Substitute 28 for the original number and 35 for the new number.

$$= \frac{7}{32} \approx 0.22$$

Subtract. Then divide.

Membership increased by about 22% from the second year to the third year.

Exercises

Tell whether each percent change is an increase or decrease. Then find the percent change. Round to the nearest percent.

1. Original amount: 25
   New amount: 45

2. Original amount: 17
   New amount: 10

3. Original amount: 22
   New amount: 21