BOOK 1

Simply Good and Beautiful MATH 6

COURSE BOOK

The Good and the Beautiful
CURRICULUM

Simply Good and Beautiful

MATH 6

COURSE BOOK 1

Created by the Simply Good and Beautiful Math Team

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The Good and the Beautiful Curriculum

Book 1 Table of Contents

ABOUT THE COURSE

Supplies Needed

- *Simply Good and Beautiful Math 6 Course Book 1* and *Simply Good and Beautiful Math 6 Course Book 2*
- *Simply Good and Beautiful Math 6 Answer Key*
- *Simply Good and Beautiful Math Scratch Pad* or other scratch paper
- Device to access videos (highly recommended)
- Pencils
- 2 standard dice
- Colored pencils
- Protractor
- Ruler
- Scissors
- Bowl
- Tape or glue
- Paper
- Tape measure

Course Overview

Math 6 consists of Books 1 and 2. There are 120 total lessons divided into four units. Each unit ends with a unit review and assessment. The course is designed to be completed by the student independently, but parents/teachers can choose to be as involved in the lessons as they would like to be.

Lesson Overview

Most lessons are four pages and consist of a warm-up, video lesson, mental math, mini lesson, practice, and review.

Warm-Up: An activity that applies to the lesson topic.

Video Lesson: Videos provide detailed teaching and interactive guided practice of the lesson topic. Scan the QR code or go to goodandbeautiful.com/Math6 to access the videos. Videos are about 12–15 minutes in length.

Mental Math Checkup: A quick review of mental math skills and facts practice.

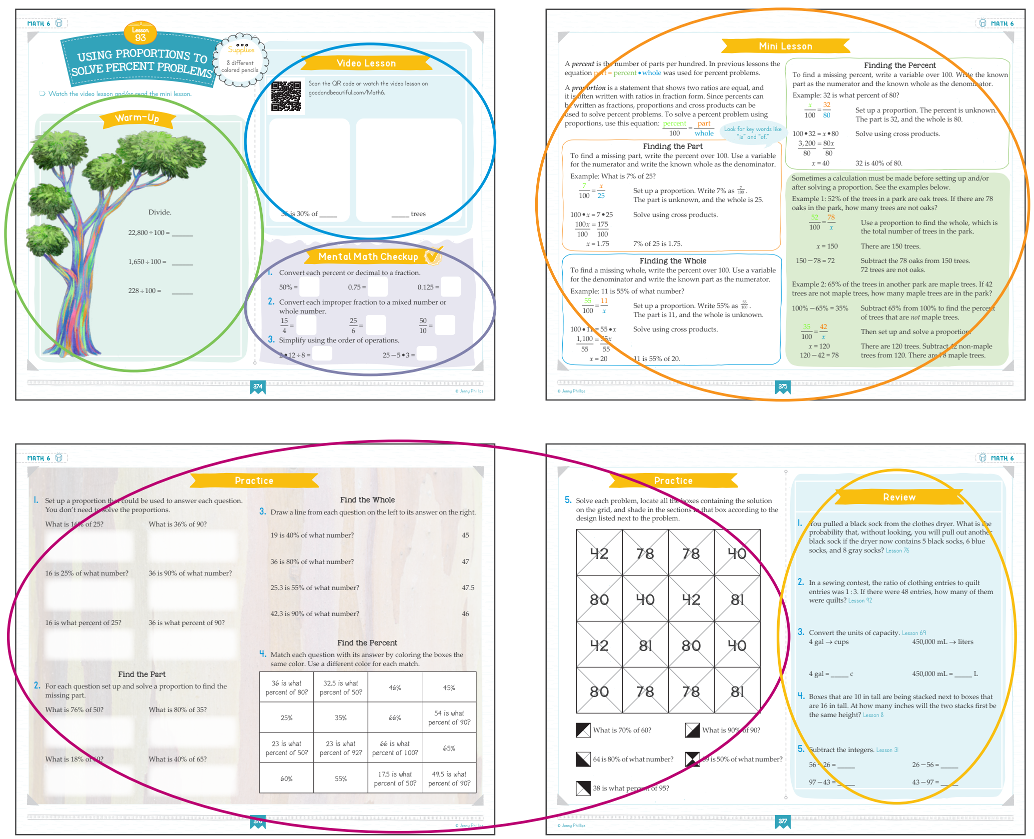
Mini Lesson: A concise written lesson on the topic.

Practice: Practice that is dedicated to the lesson topic.

Review: Daily review of topics from previous lessons.

Getting Started

Simply open the first course book. Students may choose to watch the video lesson or just read the mini lesson if they feel confident in the lesson topic. Please note that videos may contain material not included in the written mini lesson. Students may complete the warm-up before or during the video. Mental math may be completed at any point during the lesson. After completing the video and/or mini lesson, the student should complete the lesson practice and review sections. Parents/teachers should check the student's work daily and provide immediate help and feedback. Students who struggle with the lesson practice should be encouraged to review the mini lesson or the video for help. Note: If printing at home, print pages at actual size.



A Reference Chart is included at the end of each course book.

Frequently Asked Questions

How many lessons should my student do each week?

- There are 120 lessons in the course. If the student completes four lessons per week, he or she will complete the course in a standard school year with typical breaks for vacation or sickness.

How long do lessons take?

- The average time to complete a lesson is 45–60 minutes. This includes time to watch the video and complete the course book sections.

What if my child is too slow/fast?

- If your child takes longer than average but is understanding and retaining information, don't worry. You may want to break up the lessons. Watch the video and begin the practice. Then finish the practice and complete the review section at another time.
- To avoid holes in his or her math foundation, we suggest not skipping entire levels if your child works more quickly than average but is learning new concepts. Consider having your child do multiple lessons a day to complete the course faster.
- If your child takes less time than average and seems to already know all the information, consider giving the Unit Assessments to see if he or she can skip any units or move on to the next course.

Do you include any specific doctrine?

- No, the goal of our curriculum is not to teach doctrines specific to any particular Christian denomination but to teach general principles such as honesty, hard work, and kindness. All Bible references in our curriculum use the King James Version.

Does my student have to watch the videos?

- The videos contain the bulk of the teaching and are highly recommended. However, if your student feels confident in the topic being taught, he or she can skip the video and read the mini lesson instead. A student who struggles with the lesson practice should be encouraged to go back and watch the video.
- Some families prefer to have the parent/teacher teach the child using the mini lesson rather than have the child watch the video lesson independently.

Is Math 6 completed independently by the child?

- Yes, Math 6 is designed for your student to complete independently, though at times students may need parent/teacher assistance to understand a concept. Parents/teachers will need to check the child's work and should do so on a daily basis when possible, providing immediate feedback.

Is Math 6 a spiral or mastery program?

- Math 6 is a spiral course, constantly reviewing concepts your student has learned to ensure understanding and retention of information.

What if there isn't room to complete the work?

- Students should always keep scratch paper on hand while completing the lessons. The *Simply Good and Beautiful Math Scratch Pad* is available for purchase.

Is a calculator used in Math 6?

- This course is designed to be completed without the use of a calculator. Lesson 117 is an introduction to calculators. A scientific calculator is helpful in this lesson but isn't necessary. Calculators should not be used for any other lessons.

UNIT 1 OVERVIEW

LESSONS 1–30

Extra Supplies Needed

- 1 standard die
- colored pencils

New Concepts Taught

- absolute value
- area of a parallelogram
- area of a trapezoid
- distance on a coordinate plane
- division with a three-digit divisor and a six-digit dividend
- expanded notation of decimal numbers through the millionths place
- expanded notation with exponents
- greatest common factor of three-digit numbers
- identity and inverse properties
- negative fractions and decimal numbers on a number line
- nets and surface area of trapezoidal prisms and parallelepipeds
- prime factorization of four-digit numbers
- prime factorization to determine least common multiples
- rational numbers with exponents

Concepts Reviewed and Expanded Upon

- addition, subtraction, multiplication, and division of decimal numbers
- addition, subtraction, multiplication, and division of fractions
- area of a triangle
- area of irregular figures
- associative, commutative, and distributive properties
- convert between fractions, decimal numbers, and percents
- convert between improper fractions and mixed numbers
- divisibility rules
- equivalent fractions
- fraction comparisons
- fractions in simplest form
- negative numbers
- number patterns and infinite sequences
- order of operations
- triangle classification

Lesson 2

PRIME FACTORIZATION

Watch the video lesson and/or read the mini lesson.

Warm-Up

The warm-up is discussed in the video.
This section can be completed either before or during the video.

Write each expression as a number in standard form.

4^2 2^5 3^3

Write each expression using exponents.

$7 \times 7 \times 7 \times 7$ 10×10

Video Lesson

Scan the QR code or watch the video lesson on goodandbeautiful.com/Math6. This section is completed during the video.

60

Mental Math Checkup

Write the answers in the spaces provided. This section is completed independently.

1. Count by 50 from 0 to 500.
2. Add 10,000 to each number.

   726,101 27,193,716 827,719
3. How many quarters are in $2.00?

Mini Lesson

A ***prime number*** is a whole number that has exactly two factors: the number itself and the number 1. Examples: 5, 13, 67

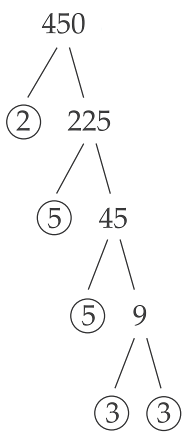
A ***composite number*** is a whole number that has more than two factors. Examples: 6, 27, 81

A ***factor pair*** is two factors of a number whose product is the given number; numbers in a factor pair are referred to as factors of the given number. Example: A factor pair of 46 is 2 and 23.

Prime factorization is a number written as the product of its prime factors. For example, the prime factorization of 60 can be written as $2 \times 2 \times 3 \times 5$ or $2^2 \times 3 \times 5$.

A ***factor tree*** is a diagram used to identify the prime factors of a composite number.

Example: Use a factor tree to find the prime factors of 450.



Start by writing the number you are factoring at the top.

Then use lines to separate the number into a factor pair.

Hint: If you don't see any obvious factors, you can begin with small numbers and use the divisibility rules to find a factor. Do not use 1 as a factor because 1 is not a prime number.

See the Reference Chart for divisibility rules.

Circle factors that are prime numbers.

Separate each composite number into a factor pair until every factor is a prime number.

$450 = 2 \times 3^2 \times 5^2$

Write the prime factors (the circled numbers) as a multiplication problem in order from least to greatest, using exponents when a factor repeats.

To check your work, multiply the prime factors. The product should equal the number you started with. $2 \times 3^2 \times 5^2 = 2 \times 9 \times 25 = 450$

Practice

1. Circle the composite numbers in each set.

$\{2, 7, 12, 17, 22, 27\}$ $\{1, 3, 5, 7, 9, 11, 13\}$

$\{5, 10, 15, 20, 25, 30\}$ $\{4, 11, 19, 26, 33, 40\}$

$\{7, 16, 25, 34, 43, 52\}$ $\{0, 11, 22, 33, 44, 55\}$

2. Write all the prime numbers between 1 and 50.

______, ______, ______, ______, ______, ______, ______, ______,

______, ______, ______, ______, ______, ______, ______

3. Cross out the numbers below that are divisible by ALL of these numbers: 2, 3, 4, 5, 6, 9, and 10.

1,242	750	18,000	3,636
5,400	140,600	82,800	112,140

Practice Continued

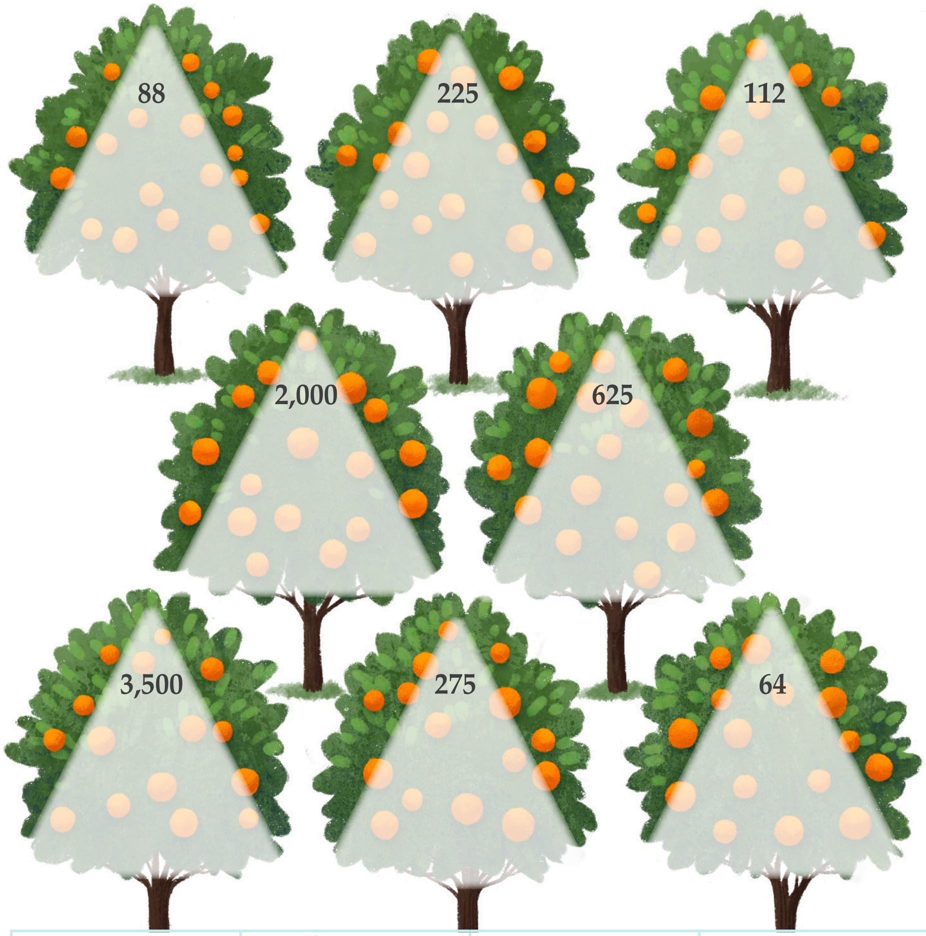
4. Create a factor tree for each number. Then write the prime factorization of each number, using exponents when a factor repeats.

5. Using the prime factorization given below, write each number in standard form.

$2^5 \times 3 =$ _____ $3^2 \times 5 \times 7 =$ _____ $2^3 \times 11 =$ _____ $7 \times 13^2 =$ _____ $2^2 \times 5^2 \times 17 =$ _____ $2 \times 3 \times 5 \times 7^2 =$ _____

Practice

6. Write the prime factorization of the numbers below. Then match each answer with the letter in the box to solve the riddle.



A	$3^2 \times 5^2$	E	5^4	F	$2^4 \times 5^3$	H	$5^2 \times 11$
L	2^6	M	$2^4 \times 7$	O	$2^3 \times 11$	T	$2^2 \times 5^3 \times 7$

How many oranges grow on a tree?

___ ___ ___   ___ ___   ___ ___ ___ ___ !
225 64 64   88 2,000   3,500 275 625 112

Review

1. Complete each problem.

$42{,}179 + 24{,}629 =$ __________

$6{,}530 \div 12 =$ __________

$6{,}183 \times 41 =$ __________

2. Find the opposite of each number. Lesson 1

Number	Opposite
–8	
5	
–3	

3. Find the absolute value of each number. Lesson 1

$|-39| =$ ☐ $|525| =$ ☐ $\left|-\frac{1}{2}\right| =$ ☐

4. Compare the following using <, >, or =. Lesson 1

$|-45|$ ○ $|-25|$ 14 ○ $|-14|$

5. List the factors of each number. Then circle the common factors.

12: ___, ___, ___, ___, ___, ___

24: ___, ___, ___, ___, ___, ___, ___, ___

Lesson 9

ADDING, SUBTRACTING, AND MULTIPLYING FRACTIONS AND MIXED NUMBERS

Watch the video lesson and/or read the mini lesson.

Warm-Up

Complete the problems.

$$\frac{3}{14} + \frac{6}{14}$$

$$\frac{11}{12} - \frac{1}{12}$$

Video Lesson

Scan the QR code or watch the video lesson on goodandbeautiful.com/Math6.

$$7\frac{3}{4} - 3\frac{1}{4}$$

$$\frac{2}{3} \times \frac{5}{9} \times \frac{3}{10}$$

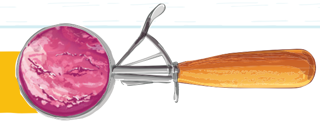
Mental Math Checkup

1. Count by 30 from 0 to 300.
2. Multiply each number by 1,000.

   712 ______ 42 ______

   1,270 ______
3. How many nickels are in $2.00? ______

Mini Lesson



Adding and Subtracting Fractions

When adding or subtracting fractions with different denominators, first convert the fractions to equivalent fractions with a common denominator. Then add or subtract the numerators. The denominator stays the same.

$$\frac{3}{10} + \frac{7}{8} = \frac{12}{40} + \frac{35}{40} = \frac{47}{40} = 1\frac{7}{40}$$

Adding and Subtracting Mixed Numbers

$$8\frac{4}{9} + 11\frac{7}{9} =$$

$$19\frac{11}{9} =$$

$$19 + 1\frac{2}{9} =$$

$$20\frac{2}{9}$$

Add the whole numbers, and then add the fractions.

Write answers in simplest form.

The same principles apply to subtracting mixed numbers: subtract the whole numbers, and then subtract the fractions.

Multiplying Fractions by Fractions, Whole Numbers, and Mixed Numbers

To multiply fractions, multiply the numerators, and then multiply the denominators.

$$\frac{6}{7} \times \frac{11}{12} = \frac{66}{84} = \frac{11}{14}$$

To multiply a fraction by a whole number, first convert the whole number to a fraction by writing it with a denominator of 1. Then multiply the fractions.

$$5 \times \frac{4}{15} = \frac{5}{1} \times \frac{4}{15} = \frac{20}{15} = 1\frac{5}{15} = 1\frac{1}{3}$$

To multiply mixed numbers, first convert the mixed numbers to improper fractions. Then multiply the fractions.

$$2\frac{1}{5} \times 3\frac{1}{2} = \frac{11}{5} \times \frac{7}{2} = \frac{77}{10} = 7\frac{7}{10}$$

Canceling Before Multiplying Fractions

Canceling is a way to simplify fractions before multiplying them. To cancel, find one numerator and one denominator that are divisible by the same factor. Divide both the numerator and the denominator by that factor and write the quotients in place of the canceled numbers. Then multiply the fractions.

$$\frac{\overset{1}{\cancel{2}}}{7} \times \frac{3}{\underset{2}{\cancel{4}}} = \frac{3}{14}$$

$$\frac{\overset{1}{\cancel{5}}}{\underset{3}{\cancel{9}}} \times \frac{\overset{2}{\cancel{6}}}{\underset{5}{\cancel{25}}} = \frac{2}{15}$$

$$\frac{\overset{1}{\cancel{7}}}{\underset{5}{\cancel{10}}} \times \frac{\overset{\overset{1}{\cancel{2}}}{\cancel{4}}}{\underset{1}{\cancel{3}}} \times \frac{\overset{3}{\cancel{9}}}{\underset{\underset{1}{\cancel{2}}}{\cancel{14}}} = \frac{3}{5}$$

Cancellations may be performed in any order; just make sure to divide both a numerator and a denominator by the same number.

MATH TIP!

Canceling first makes multiplying fractions easier. If all common factors are canceled before multiplying, the answer will be in simplest form.

Subtracting a Fraction or Mixed Number from a Whole Number

To subtract a fraction or mixed number from a whole number, write the whole number as a mixed number or improper fraction by taking 1 from the whole number and writing it as a fraction equal to 1. Use the same denominator as the fraction being subtracted. Then subtract.

$$1 - \frac{8}{15} =$$

$$\frac{15}{15} - \frac{8}{15} =$$

$$\frac{7}{15}$$

$$12 - 4\frac{1}{2} =$$

$$11\frac{2}{2} - 4\frac{1}{2} =$$

$$7\frac{1}{2}$$

Complete each problem in the ice cream scene. Once you find the answer, use the matching letter to solve the riddle.

F $\frac{9}{14} + \frac{17}{28} =$ ____

T $1\frac{6}{11} + \frac{1}{2} =$ ____

C $8\frac{4}{6} + 5\frac{1}{9} =$ ____

H $\frac{4}{5} + \frac{9}{10} =$ ____

E $\frac{11}{15} - \frac{3}{5} =$ ____

O $\frac{7}{8} + \frac{3}{5} =$ ____

B $\frac{8}{16} + \frac{8}{32} =$ ____

Why did the ice cream truck break down?

___ ___ ___ ___ ___ ___ ___   ___ ___
$\frac{3}{4}$ $\frac{2}{15}$ $13\frac{7}{9}$ $\frac{6}{11}$ $13\frac{1}{6}$ $\frac{2}{9}$ $\frac{2}{15}$ $1\frac{19}{40}$ $1\frac{1}{4}$

___ ___ ___   ___ ___ ___ ___ ___
$2\frac{1}{22}$ $1\frac{7}{10}$ $\frac{2}{15}$ $6\frac{1}{7}$ $1\frac{19}{40}$ $13\frac{7}{9}$ $2\frac{13}{15}$ $7\frac{2}{11}$

___ ___ ___ ___
$6\frac{1}{7}$ $1\frac{19}{40}$ $\frac{6}{11}$ $6\frac{1}{12}$


S $\frac{5}{9} - \frac{1}{3} =$
U $8\frac{1}{2} + 4\frac{2}{3} =$
R $7 - \frac{6}{7} =$
A $2 - 1\frac{5}{11} =$
K $5 - 2\frac{2}{15} =$
$8 - \frac{9}{11} =$ Y
D $13\frac{3}{4} - 7\frac{2}{3} =$

Practice

1. Complete each multiplication problem.

$\frac{2}{5} \times \frac{1}{3} =$ $\frac{3}{7} \times \frac{3}{4} =$ $\frac{2}{3} \times \frac{2}{5} =$ $\frac{7}{8} \times \frac{5}{9} =$

2. Complete each problem. Cancel before multiplying.

$\frac{10}{21} \times \frac{3}{5} =$ $\frac{3}{4} \times \frac{8}{9} =$ $\frac{12}{27} \times \frac{9}{24} =$

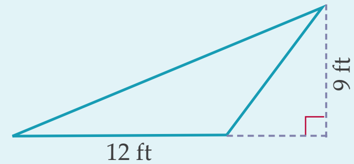
$\frac{21}{24} \times \frac{8}{14} =$ $\frac{8}{16} \times \frac{8}{32} =$ $\frac{10}{11} \times \frac{2}{15} =$

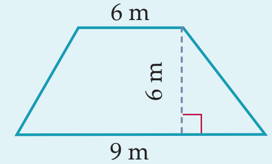
$\frac{2}{3} \times \frac{3}{5} \times \frac{1}{4} =$ $\frac{6}{11} \times \frac{5}{18} \times \frac{22}{25} =$ $\frac{4}{9} \times \frac{3}{8} \times \frac{2}{7} =$

Review

See the Reference Chart for area formulas.

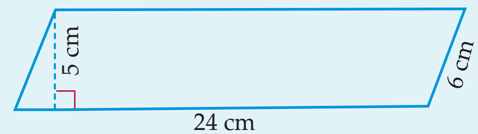
1. Find the areas of the triangle and trapezoid. Lessons 6 and 7





$A =$ ________ $A =$ ________

2. Find the perimeter and area of the parallelogram. Lesson 7



$P =$ ________ $A =$ ________

3. Find the LCM of the set of numbers by listing multiples of each number. Lesson 8

6: ________________________

9: ________________________

LCM of 6 and 9:____

4. Use prime factorization to find the LCM of the set of numbers. Lesson 8

Find the LCM of 21 and 15.

prime factorization of 21: ____ × ____

prime factorization of 15: ____ × ____

LCM of 21 and 15: ____ × ____ × ____ = _____

Lesson 13

MULTIPLYING DECIMAL NUMBERS

☐ Watch the video lesson and/or read the mini lesson.

Warm-Up

A family of three foxes was walking in the forest. They stumbled upon a big blueberry bush! If each fox ate 41 blueberries, how many blueberries did the fox family eat?

Video Lesson

Scan the QR code or watch the video lesson on goodandbeautiful.com/Math6.

8.35 hours = _____ hours _____ minutes

51×3.4815 ○ 51

9.25×0.467 ○ 9.25

Mental Math Checkup

1. Count by 80 from 0 to 800.
2. Divide each number by 1,000.

   370,000 ______ 74,000 ______ 9,000 ______

3. How many hours have passed from 11:00 AM to 4:00 PM?

   ______

Mini Lesson

Multiplying Decimal Numbers

Step 1

$$\begin{array}{r} 502.13 \\ \times \quad 4.21 \\ \hline \end{array}$$

Line up the factors on the right.

Factors are numbers that are multiplied together to form a product.

Step 2

$$\begin{array}{r} {\scriptstyle 1} \\ 502.13 \\ \times \quad 4.21 \\ \hline 50213 \\ 1004260 \\ +\ 20085200 \\ \hline 21139673 \end{array}$$

Multiply the factors, ignoring the decimal points.

Multiplication is often easier to perform when the top factor is the number with more digits.

Step 3

$$\begin{array}{r} {\scriptstyle 1} \\ 502.13 \\ \times \quad 4.21 \\ \hline 50213 \\ 1004260 \\ +\ 20085200 \\ \hline 21139673 \end{array}$$

Count the total number of decimal places (the digits to the right of the decimal point) in both factors.

Step 4

$$\begin{array}{r} {\scriptstyle 1} \\ 502.13 \\ \times \quad 4.21 \\ \hline 50213 \\ 1004260 \\ +\ 20085200 \\ \hline 2113.9673 \end{array}$$

Count the same number of decimal places in the product, starting on the right, and write a decimal point.

Additional Example

Zeros are written in front of the product when there are more decimal places in the factors than digits in the product.

$$\begin{array}{r} {\scriptstyle 1\ 1\quad 1} \\ 0.13404 \\ \times \quad 0.312 \\ \hline 26808 \\ 134040 \\ +\ 4021200 \\ \hline 0.04182048 \end{array}$$

The total number of decimal places is 8: 5 in the top factor and 3 in the bottom factor.

Round to Estimate a Product

Round factors to the nearest whole number (or to a number close in value that is easy to work with) to quickly estimate a product.

Example: 79.834×4.209

Estimated product: $80 \times 4 = 320$

Actual product: 336.021306

MATH TIP!

Multiplying a number by a decimal number **less than one** will result in a smaller number.

$36 \times 0.245 < 36$
$8.82 < 36$

$190 \times 0.01 < 190$
$1.9 < 190$

$8.954 \times 0.798 < 8.954$
$7.145292 < 8.954$

Multiplying a number by a decimal number **greater than one** will result in a larger number.

$45 \times 3.627 > 45$
$163.215 > 45$

$562 \times 10.4 > 562$
$5{,}844.8 > 562$

$18.493 \times 116.5 > 18.493$
$2{,}154.4345 > 18.493$

Practice

1. Multiply.

$4 \times 5 =$		$6 \times 6 =$	
$4 \times 0.5 =$		$6 \times 0.06 =$	
$0.4 \times 0.5 =$		$0.06 \times 0.006 =$	
$7 \times 8 =$		$15 \times 2 =$	
$7 \times 0.008 =$		$1.5 \times 0.2 =$	
$0.07 \times 8 =$		$15 \times 0.002 =$	

4. A family business sells tree seedlings at a discounted rate per seedling when they are purchased in bulk (large amounts). Use the chart to find the cost of each purchase. The first one is done for you.

35 seedlings: $50.75

18 seedlings: ____________

72 seedlings: ____________

109 seedlings: ____________

2. Match each problem with its estimated product by rounding each factor to the nearest whole number.

4.35×11.953	2,800
6.8042×0.742	363
121.3564×2.5	48
5.6312×199.701	1,200
39.7×70.35872	7

3. Estimate each product by rounding the factors to the nearest whole number and multiplying. Then find the actual product.

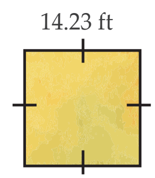
15.02×0.931 estimated product: ____________

actual product: ____________

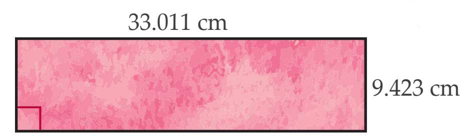
2.314×12.52 estimated product: ____________

actual product: ____________

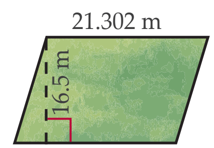
5. Find the area of each quadrilateral.



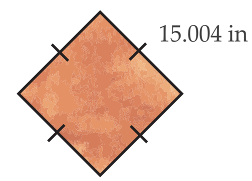
A = ____________



A = ____________



A = ____________



A = ____________

6. Complete these problems using mental math. Write < or > in each circle. Need help? Look at the end of the mini lesson.

284 × 0.035 ◯ 284	65 × 8.42 ◯ 65	4.9 × 1.002 ◯ 4.9
8,720 × 0.621 ◯ 8,720	0.523 × 7.18 ◯ 0.523	124.92 × 0.99 ◯ 124.92

Practice Continued

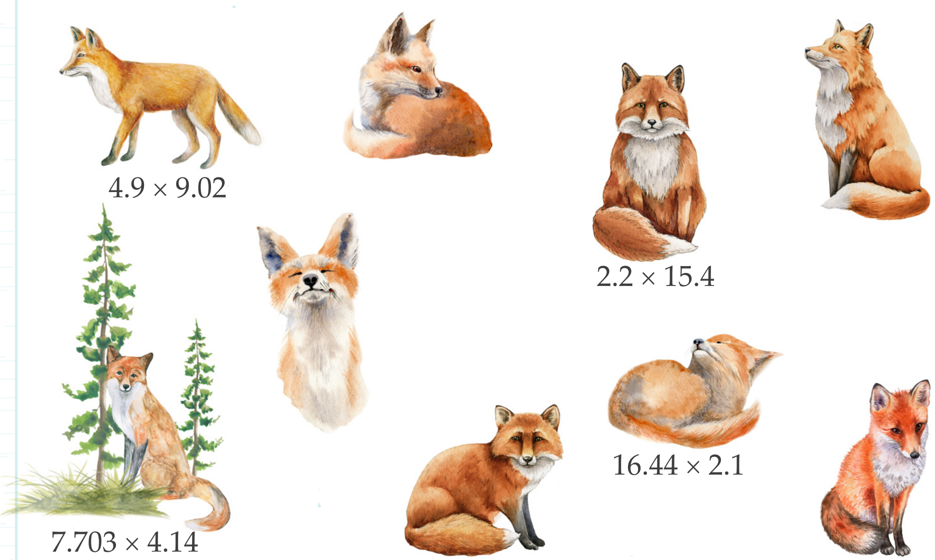
7. Complete the story problem.

Blueberries are a favorite treat for many foxes! Blueberries are one of the few naturally blue fruits, and they are a very nutritious snack! One cup of blueberries has 3.6 grams of fiber. How many grams of fiber are in 9.5 cups of blueberries?

Can you guess why blueberries were once called star berries?

8. Find and circle the only fox that has a product of 34.524.

Hint: Use estimation and what you've learned about decimal places.



Review

1. Write <, >, or = between each set of fractions. Lesson 4

$\frac{18}{43} \bigcirc \frac{18}{35}$ $\qquad$ $\frac{15}{30} \bigcirc \frac{35}{70}$ $\qquad$ $\frac{15}{24} \bigcirc \frac{15}{25}$

2. Cancel first, and then multiply the fractions. Lesson 9

$\frac{9}{15} \times \frac{6}{5} \times \frac{5}{9} =$ $\qquad$ $\frac{3}{5} \times \frac{1}{4} \times \frac{5}{6} \times \frac{8}{11} =$

3. Find each term. Lesson 10

What is the third term if the first term is 4 and the rule is $+\frac{1}{3}$? ________

What is the tenth term if the first term is $\frac{1}{2}$ and the rule is ×2? ________

What is the fourth term if the first term is –25 and the rule is +10? ________

4. Write the number below in standard form. Lesson 11

sixty and nine thousand eighteen millionths

____

5. Round 89.79648 to the place values below. Lesson 12

thousandths ________

ten thousandths ________

hundredths ________

Lesson 15

MUSEUM LOGIC

There is no video or review for this lesson.

Instructions

Welcome to the museum! Today you are taking a guided tour through the museum with your homeschool group. As your tour guide explains each exhibit, you are in awe of how much history there is to learn. Midway through the tour, your guide allows for a quick break to use the restroom and look around. You and a couple of friends head to the Egypt exhibit. You love exploring the hieroglyphics, and you lose track of the time. You and your friends finally find your way back to where the tour guide was, but she and your group are nowhere to be found. Pull out and cut apart the puzzle cards on the following pages. Then solve the puzzles to gather clues that will help you and your friends find the location of your group.

Map of the Museum

Riddle

Your tour group is in the

___ ___ ___   ___ ___ ___ ___ E ___ ___.

6 8 12   4 6 1 1 _ 8 5

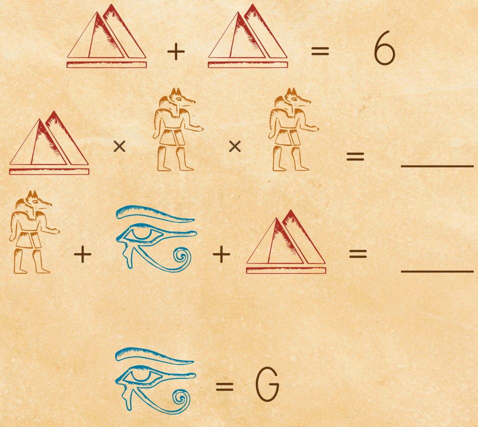

55
7
5
4
8
9
10
5
14
× × = 12
2
8
© Jenny Phillips

PUZZLE 1

Find the value of each image in this multiplication table. The sum of the values for each symbol is the clue for the riddle.

PUZZLE 2

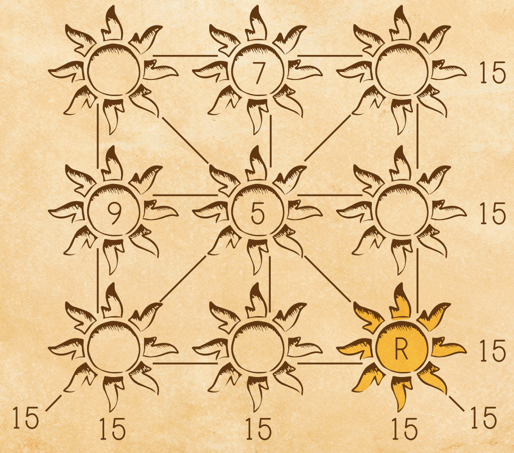
Some of the answers to the problems listed are lost in the museum. Search the museum for the missing answers and fill them in. Then solve for the unknown symbols. The value of the unknown symbol is the clue for the riddle.



PUZZLE 3

Place each of the digits below in one of the suns. The three numbers connected by lines need to add up to 15. The number found in the yellow sun is the clue for the riddle. Three numbers are already placed for you.

1 2 3 4 ~~5~~ 6 ~~7~~ 8 ~~9~~



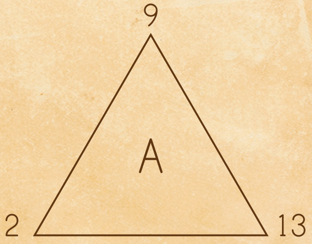
See the example problem and solution on the back of this card.

Pull this page out and cut apart the puzzle cards.

PUZZLE 4

In the museum, find the two pyramids with numbers and copy them on this card. <u>Start at the bottom right vertex.</u> As you travel around to each vertex, figure out which operations must be performed with the numbers to equal the number in the middle. Then use the same operations and travel in the same direction to find the answer to this puzzle. See the example on the back of this card. The value for the letter in the triangle is the clue for the riddle.

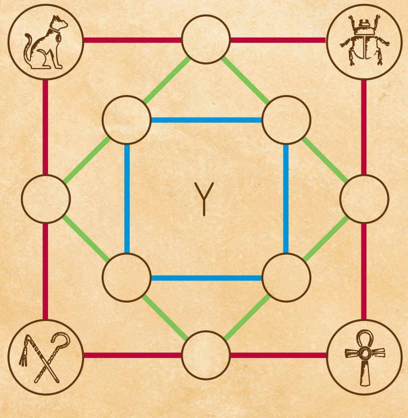
Copy pyramids here.



See the example problem and solution on the back of this card.

PUZZLE 5

Find the values for each of the symbols in the illustration. For each side of the red and green squares, write the difference between the corners in the circle on that side. The numbers at the corners of the blue square should be the same. That number is the value for the letter found in the center of the blue square and is the clue for the riddle.

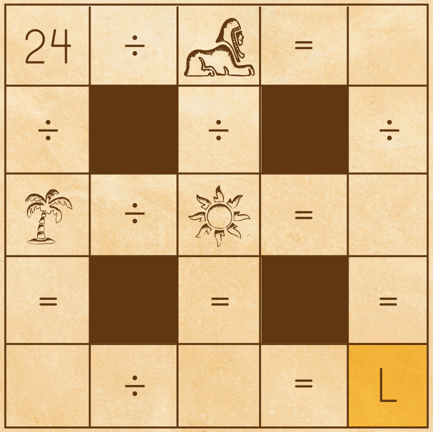


HINT: Subtract the smaller number from the larger number.

See the example problem and solution on the back of this card.

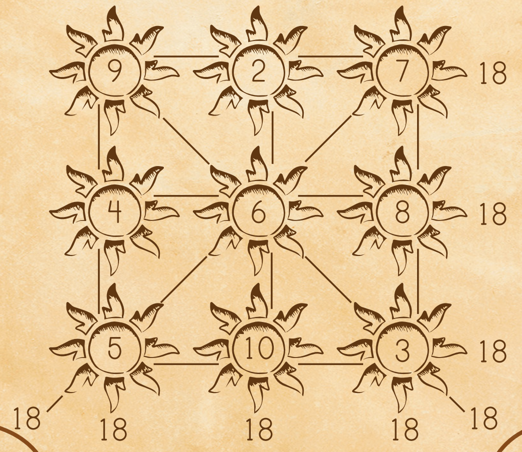
PUZZLE 6

Find the symbols in the illustration. Then complete each division problem. The number found in the yellow square is the clue for the riddle.

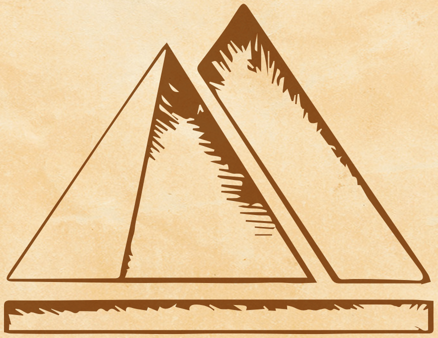


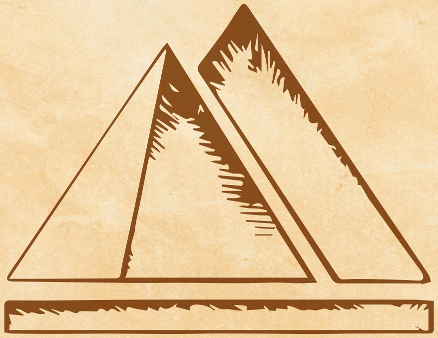
This example uses the numbers in the box to make sums of 18. All numbers in a horizontal, vertical, and diagonal line add up to 18.

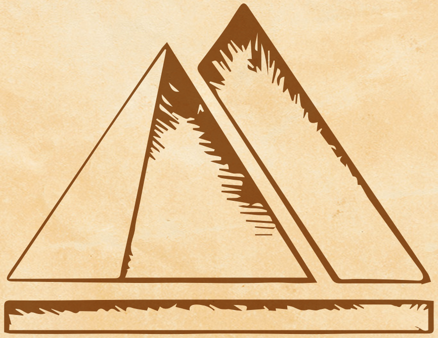
2 3 4 5 6 7 8 9 10



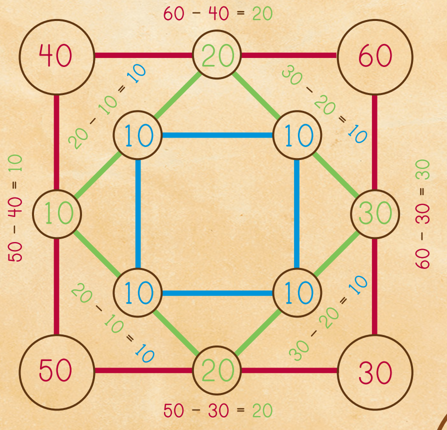
PUZZLE 3 EXAMPLE





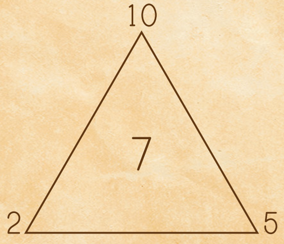


The difference between numbers at the corners of the red square equals the number in each corner of the green square. The difference between the numbers in the corners of the green square equals the number in each corner of the blue square. The numbers in the corners of the blue square are the same.



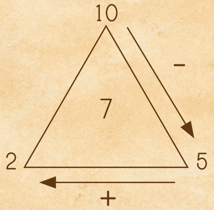
PUZZLE 5 EXAMPLE

Note: For this problem, start at the top vertex.

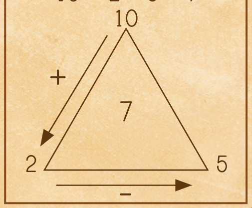


Possible Solutions

10 - 5 + 2 = 7



10 + 2 - 5 = 7



PUZZLE 4 EXAMPLE


60
+ + = 9
6
35
40

Lesson 22

SURFACE AREA AND NETS

Watch the video lesson and/or read the mini lesson.

Warm-Up

Write the area formula for each shape.

rectangle: ____________________

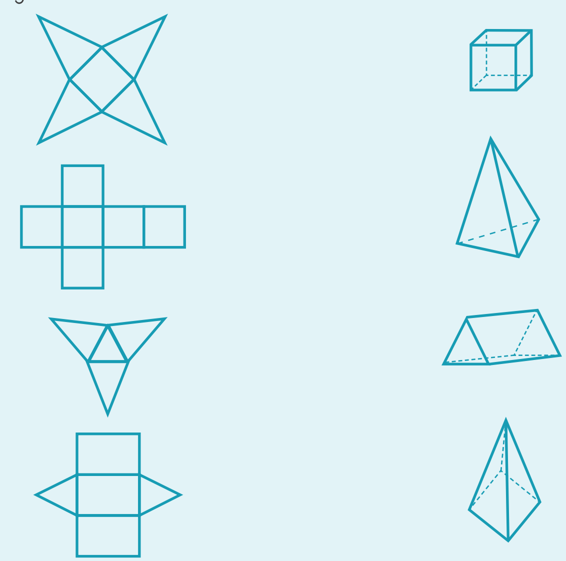
parallelogram: ____________________

triangle: ____________________

trapezoid: ____________________

Video Lesson

Scan the QR code or watch the video lesson on goodandbeautiful.com/Math6.



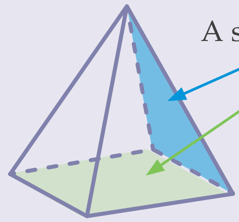
Mental Math Checkup

1. Count by 250 from 0 to 2,500.
2. Multiply each number by 700.

   5 ______ 10 ______ 12 ______
3. If today is Tuesday, what day will it be 10 days from now? ______

Mini Lesson

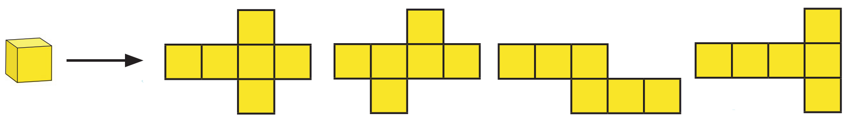
Area is the number of square units needed to cover a flat surface. A *face* is a flat surface on a solid. *Surface area* is the total area of the surface of an object.



A square pyramid has 5 faces. 4 triangles and 1 square make up the surface.

A *net* is a two-dimensional pattern of the surface of a three-dimensional figure. A net may be used to determine the surface area of an object. There are several ways to draw a net for a given figure.

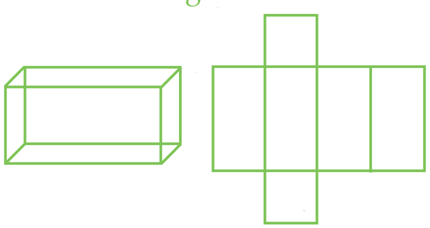
Four Examples of Nets for a Cube



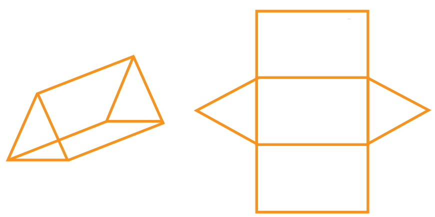
A *prism* is a solid with two congruent, parallel bases.

Examples of Prisms and Their Nets

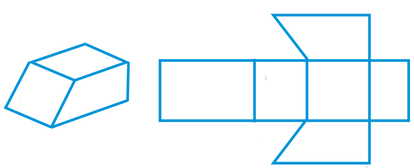
Rectangular Prism



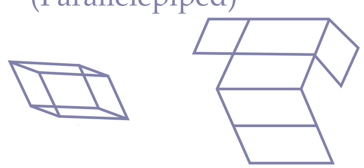
Triangular Prism



Trapezoidal Prism

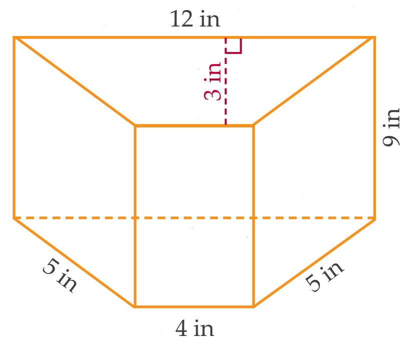


Parallelogram Prism (Parallelepiped)



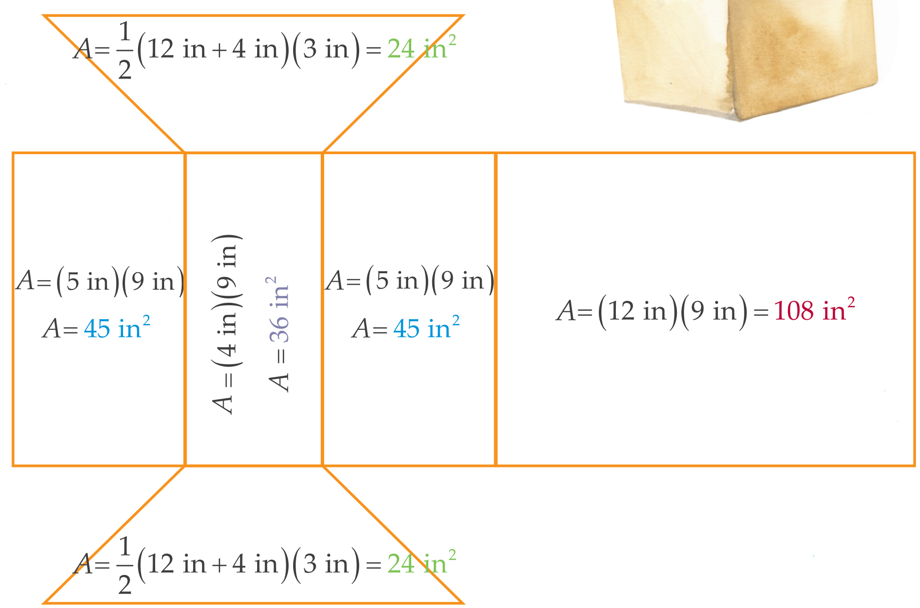
To find the surface area of a solid, find the area of each face and add the areas.

See Reference Chart for area formulas.



Example:

- Find the area of each face. A net is helpful to visualize the individual faces.
- Add the areas together to find the surface area.



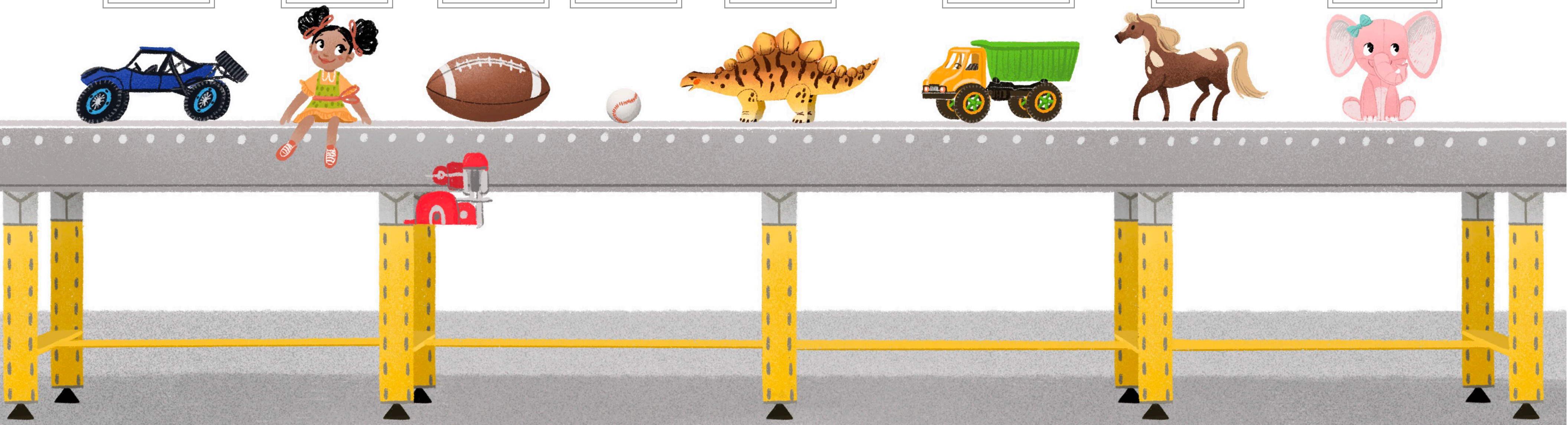
surface area $= 24\text{ in}^2 + 45\text{ in}^2 + 36\text{ in}^2 + 45\text{ in}^2 + 108\text{ in}^2 + 24\text{ in}^2 = 282\text{ in}^2$

Here is another way to write the surface area:

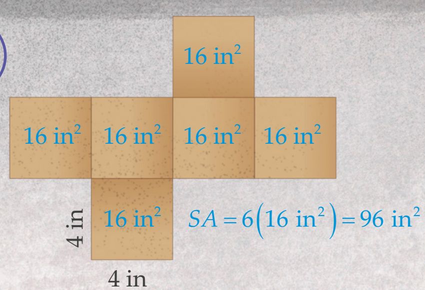
surface area $= 2(24\text{ in}^2) + 2(45\text{ in}^2) + 36\text{ in}^2 + 108\text{ in}^2 = 282\text{ in}^2$

TOY FACTORY Shipping

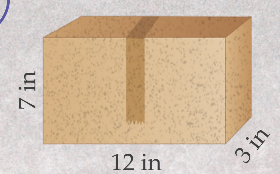
RC car 236 in^2	doll 180 in^2	football 295 in^2	baseball 96 in^2	dinosaur 170 in^2	dump truck 282 in^2	horse 212 in^2	elephant 161 in^2



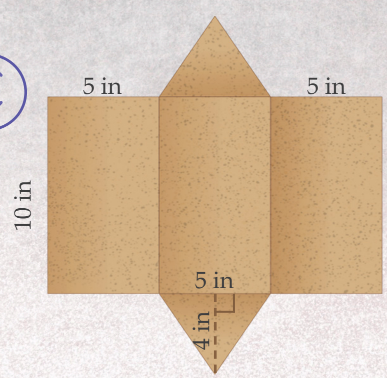
A



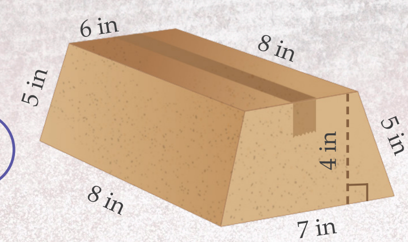
B



C



D



Practice

Each toy in the toy factory has a specific box it fits into. Find the surface area of the boxes in the illustration to find which box is for which toy. Write the name of the toy in the chart to match the box with the same surface area. Once you find the correct box for each toy, write the name of the prism in the table. Box A is given as an example.

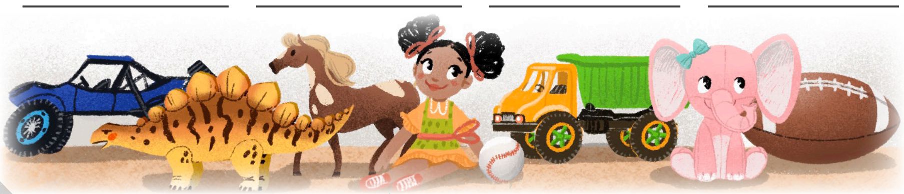
Box Letter	Toy Name	Type of Prism
A	baseball	cube
B		
C		
D		

Word Bank

rectangular prism
triangular prism
~~cube~~
trapezoidal prism

Four of the toys are missing boxes. List the four toys on the lines provided.

__________ __________ __________ __________



Review

1. Use prime factorization to find the LCM of 10 and 14. Lesson 8

prime factorization of 10: ____________________

prime factorization of 14: ____________________

LCM of 10 and 14: ________

2. Compare the numbers using <, >, or =. Lesson 11

7.1793 ◯ 7.1893　　　　0.0841 ◯ 0.0814

3. Evaluate each expression. Lesson 19

$\left(\frac{3}{4}\right)^2$　　　　$10^2 + 5^3$　　　　$\frac{4^3}{8}$

4. Evaluate each expression. Lesson 20

$15 + 5^2 - 4^2 + 108 \div 9$　　　　$200 - 11 \bullet 12 + 6^2 \div 4 + (14 - 9)$

Practice

1. Convert each fraction or mixed number to a decimal. Write repeating decimals with a bar.

Hint: Divide the numerator by the denominator.

$\frac{3}{8}$ = ________ $3\frac{2}{5}$ = ________ $\frac{5}{6}$ = ________

$16\frac{2}{9}$ = ________ $204\frac{3}{5}$ = ________ $8\frac{7}{16}$ = ________

2. Convert each fraction to a decimal. Then write all the decimal numbers in order from least to greatest.

$\frac{17}{20}, \frac{7}{8}, \frac{4}{5}, \frac{89}{100}, \frac{33}{40}$

________, ________, ________, ________, ________

3. Convert each decimal to a percent.

0.62 = ________ 5.04 = ________ 7.319 = ________

9 = ________ 86.1 = ________ 0.0324 = ________

4. Convert each fraction or mixed number to a percent.

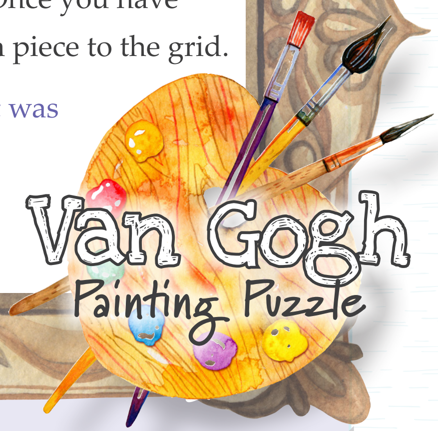
$\frac{23}{100}$ = ________ $\frac{17}{50}$ = ________ $\frac{9}{20}$ = ________

$\frac{5}{8}$ = ________ $\frac{3}{10}$ = ________ $\frac{16}{25}$ = ________

$1\frac{4}{5}$ = ________ $4\frac{1}{10}$ = ________ $3\frac{3}{8}$ = ________

One of Vincent van Gogh's paintings is scrambled. Convert each number on the back of the painting puzzle pieces according to the instructions. Then cut out the puzzle pieces and place each piece on top of the matching answer on the grid found on page 103. Once you have completed the puzzle, you can glue each piece to the grid.

The name of this painting is *Irises*, and it was painted in France in 1889.



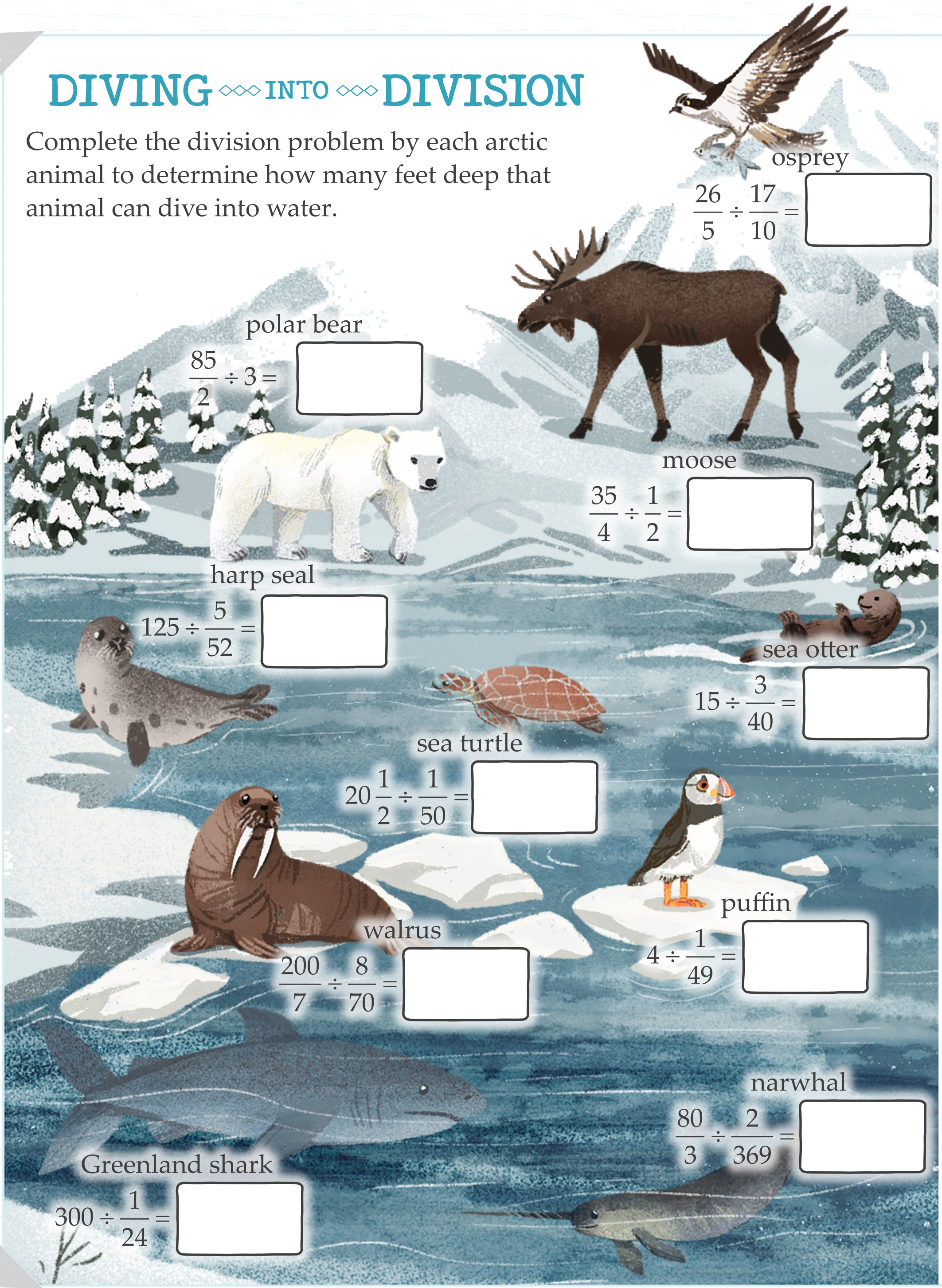
All done! No review.

Convert $\frac{37}{100}$ to a decimal. ______	Convert $\frac{37}{100}$ to a percent. ______	Convert 0.54 to a fraction. ______	Convert 0.54 to a percent. ______
Convert 28% to a fraction. ______	Convert 28% to a decimal. ______	Convert 2.05 to a fraction. ______	Convert 2.05 to a percent. ______
Convert $\frac{19}{5}$ to a decimal. ______	Convert $\frac{19}{5}$ to a percent. ______	Convert 0.425 to a fraction. ______	Convert 0.425 to a percent. ______
Convert 189% to a decimal. ______	Convert 189% to a fraction. ______	Convert 0.9 to a fraction. ______	Convert 0.9 to a percent. ______

90%	$2\frac{1}{20}$	0.37	0.28
3.8	42.5%	54%	$1\frac{89}{100}$
1.89	$\frac{27}{50}$	380%	$\frac{7}{25}$
$\frac{17}{40}$	205%	$\frac{9}{10}$	37%

DIVING INTO DIVISION

Complete the division problem by each arctic animal to determine how many feet deep that animal can dive into water.



osprey: $\frac{26}{5} \div \frac{17}{10} =$

polar bear: $\frac{85}{2} \div 3 =$

moose: $\frac{35}{4} \div \frac{1}{2} =$

harp seal: $125 \div \frac{5}{52} =$

sea otter: $15 \div \frac{3}{40} =$

sea turtle: $20\frac{1}{2} \div \frac{1}{50} =$

puffin: $4 \div \frac{1}{49} =$

walrus: $\frac{200}{7} \div \frac{8}{70} =$

narwhal: $\frac{80}{3} \div \frac{2}{369} =$

Greenland shark: $300 \div \frac{1}{24} =$

Review

1. Multiply. Lesson 9

$2\frac{1}{4} \times 4\frac{3}{5} =$ $\qquad$ $1\frac{4}{7} \times 3\frac{1}{3} =$

2. Add or subtract. Lesson 12

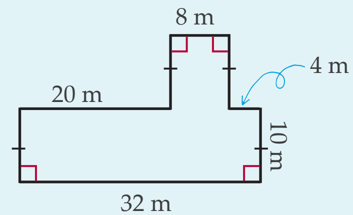
$\$185.57 + \$9.13 + \$25.98 =$

$\$9{,}435 - \$5{,}714.34 =$

3. Compare the following using <, >, or =. Lesson 20

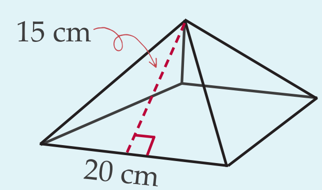
$12 \bullet 6 \div 3^2 - (3.5 - 2.5) + 5 \bigcirc \frac{2}{5} \bullet 35 - (4^2 - 6) + (21 \div 7)$

4. Find the area of the irregular figure. Lesson 21



$A =$ ____________

5. Find the surface area of the square pyramid. Lesson 22



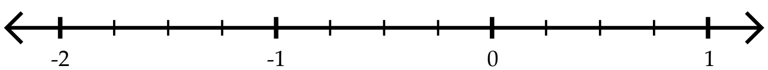
$SA =$ ____________

Lesson 28

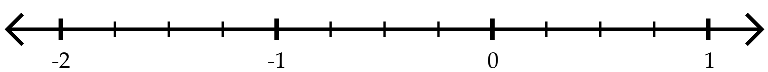
UNIT 1 REVIEW

Fractions, Decimals & Number Lines Lessons 4 & 14

1. Use fractions and mixed numbers to fill in the missing values on the number line.



2. Plot these points on the number line. Point A: -1.25 Point B: 0.75 Point C: -0.5



3. Write the fractions in order from least to greatest in simplest form.

$\frac{9}{13}, \frac{5}{11}, \frac{7}{14}$ ________________

Number Patterns & Properties Lessons 10 & 26

1. Determine the rule for each sequence. Then circle A if the sequence is arithmetic or G if it is geometric.

$-24, -12, -6, -3, -1\frac{1}{2}, \ldots$ rule: ____________ A or G

$11.3, 9, 6.7, 4.4, 2.1, \ldots$ rule: ____________ A or G

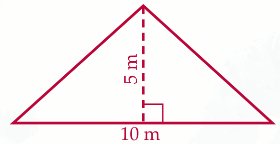
2. Match each example to the property it demonstrates.

$7(40-3) = 7 \bullet 40 - 7 \bullet 3$	Identity
$23 + 15 = 15 + 23$	Inverse
$58 \bullet 1 = 58$	Associative
$46 + (-46) = 0$	Commutative
$(5 \bullet 4)10 = 5(4 \bullet 10)$	Distributive

Nigeria is known for its monoliths, which are large blocks of stone. Zuma Rock is a natural monolith located outside the capital city.

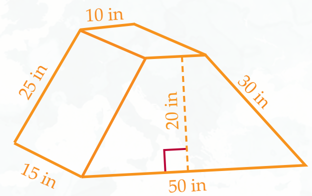
Area, Perimeter & Surface Area Lessons 6, 7 & 22

1. Find the area and/or perimeter of each shape.



A = ________ P = ________ A = ________

2. Find the surface area of the trapezoidal prism below.



SA = ______________

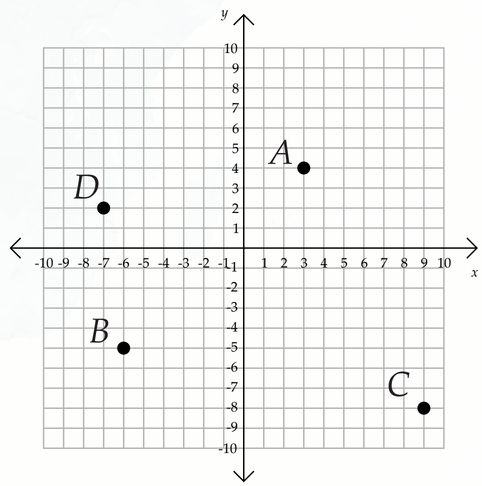
The northern region of Poland is an important breeding ground for white storks. White storks build very large nests, sometimes over 2 m (6.6 ft) across and weighing up to 250 kg (551.2 lb).

Coordinate Planes Lesson 27

Write the coordinates and quadrant for each point.

Point A: ________ Point B: ________ Point C: ________ Point D: ________

quadrant _____ quadrant _____ quadrant _____ quadrant _____



Spain is home to one of the most endangered cats: the Iberian lynx. There is a natural reserve for lynx in southern Spain.

UNIT ASSESSMENT

Instructions

- Unit assessments give you practice with the math concepts learned in this unit without having you overpractice concepts that you have mastered. These assessments also give you practice working on math problems for an extended period of time. This helps you to extend focus and attention span and to be better prepared for any type of testing you will have to do in the future. Here are some tips: First, always read the instructions carefully. Sometimes you can get answers wrong simply because you did not understand the instructions. Second, do not rush through exercises you think you already know. Instead, do your work carefully. Sometimes you can get answers wrong, even though you understand the concept, just because you rushed. Finally, if you feel you are having trouble focusing, take a quick break to do something else, like ten jumping jacks, and then come back. There are no videos, mini lessons, or practice problems for Lessons 29–30.
- **For Lesson 29,** complete all the exercises with purple headers only. You may cover the additional practice sections or fold the page to concentrate only on the purple sections. Have your parent or teacher correct the work. If there are mistakes in a section, your parent or teacher will check the orange "Additional Practice" checkbox for that section.
- **For Lesson 30,** complete all the orange sections that are checked. If you still make multiple mistakes, review those sections. All the principles will be reviewed again in upcoming units. If you have only a few or no orange sections to practice, you may move on to the next lesson.
- Parents/teachers may determine if the student may use the Reference Chart for the assessment. It is recommended that the student first try the assessment without the Reference Chart and then refer to it if needed.

Student

OPPOSITES & ABSOLUTE VALUE (LESSON 1)

Find the opposite of each number.

3 ____ $\quad -\frac{4}{5}$ ____ $\quad$ 6.2 ____

Find the absolute value of each number.

$|-8| =$ ____ $\quad |7.7| =$ ____ $\quad |-14| =$ ____

Compare the following using <, >, or =.

$|-26|$ ○ $|26|$ $\quad |-32|$ ○ $|-36|$

Additional Practice

OPPOSITES & ABSOLUTE VALUE

The numbers 5 and –5 are opposites.

Absolute values are never negative. $|-2| = 2$

Complete the chart.

Number	Opposite	Absolute Value
9		
$-\frac{3}{4}$		
–18.02		
$7\frac{1}{6}$		

DECIMAL ADDITION, SUBTRACTION, MULTIPLICATION & DIVISION & ROUNDING (LESSONS 12, 13, 16 & 17)

Round 2.835649 to the place values below.

ten thousandths: ________________

hundredths: ________________ ones: _____

Add or subtract.

$\$15.61 + \$802.48 =$

$25.7 + 0.09 + 16.132 =$

$94.35 - 26.0814 =$

Multiply or divide.

$4.5 \bullet 10.02 =$

$2.03 \bullet 0.6103 =$

$826.28 \div 9.08 =$

EXPANDED NOTATION WITH EXPONENTS (LESSONS 11 & 18)

Write 7.908 in expanded notation using . . .

fractions ____

decimals ____

Write $(3\times10^5)+(5\times10^3)+(2\times10^2)+(9\times10^1)+(8\times10^0)$ in standard form.

____

Additional Practice

DECIMAL ADDITION, SUBTRACTION, MULTIPLICATION & DIVISION & ROUNDING

If the digit to the right of the place value you are rounding to is less than 5, round down. If it is 5 or greater, round up.

Round 6.254893 to the place values below.

thousandths: ________________ tenths: ________

Line up the decimal points to add or subtract the numbers.

$\$90.42 + \$1,365.39 =$ $73.4 - 2.0738 =$

Multiply the numbers. Count the number of decimal places in both factors to know where to write a decimal point in the answer.

$9.1 \bullet 6.005 =$ $3.02 \bullet 0.501 =$

Move the decimal point in the divisor to make a whole number and move the decimal point in the dividend the same number of places to the right. Divide as usual.

$28.4 \div 0.32 =$ $217.875 \div 4.15 =$

Additional Practice

EXPANDED NOTATION WITH EXPONENTS

Below are examples of expanded notation for 45.062 with . . .

fractions: $(4\times10)+(5\times1)+\left(6\times\frac{1}{100}\right)+\left(2\times\frac{1}{1,000}\right)$

decimals: $(4\times10)+(5\times1)+(6\times0.01)+(2\times0.001)$

Here is 8,749 in expanded notation with exponents:
$(8\times10^3)+(7\times10^2)+(4\times10^1)+(9\times10^0)$

Write 53.0604 in expanded notation using . . .

fractions ____

decimals ____

Write $(7\times10^4)+(2\times10^3)+(6\times10^1)+(4\times10^0)$ in standard form.

____

UNIT 2 OVERVIEW

LESSONS 31–60

Extra Supplies Needed

- colored pencils
- protractor
- ruler

New Concepts Taught

- addition and subtraction of integers
- adjacent angles
- area and perimeter of a semicircle
- central angles
- coefficients, constants, terms, and variables in expressions
- complementary and supplementary angles
- complex fractions
- convert between turns and degrees
- cube roots
- decimal percentages
- distance between two points on a coordinate plane
- equations with decimals and fractions
- evaluate expressions with exponents, fractions, and negative numbers
- evaluate expressions with more than one variable
- factor an expression
- find the percent when the whole and a part are known
- find the whole when the percent and a part are known
- identify and combine like terms
- missing angle measures in triangles and quadrilaterals
- multiple transformations on a coordinate plane
- multiplication and division of integers
- names of quadrants on a coordinate plane
- one-step equations with addition and subtraction
- one-step equations with multiplication and division
- parts of a circle: central angles and chords
- percent problems with fractions
- sum of the interior angle measures of a quadrilateral
- sum of the interior angle measures of a triangle

Concepts Reviewed and Expanded Upon

- angle classification
- area and circumference of a circle
- check solutions
- differences between an equation and an expression
- distributive property
- graph in all four quadrants
- measure and construct angles using a protractor
- name geometric figures with symbols and letters
- percent of a number
- pi
- polygons and other geometric figures
- quadrilateral classification
- radius and diameter
- reflectional, translational, and rotational symmetry
- square roots
- transformations on a coordinate plane
- volume of a cube

Lesson 33

SQUARE AND CUBE ROOTS

Watch the video lesson and/or read the mini lesson.

Warm-Up

Evaluate the following.

$4^2 =$ ________

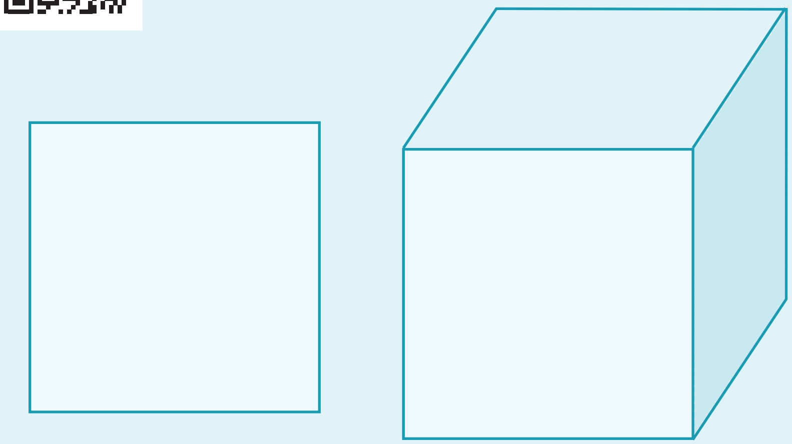
$8^2 =$ ________

$2^3 =$ ________

$3^3 =$ ________

Video Lesson

Scan the QR code or watch the video lesson on goodandbeautiful.com/Math6.



Mental Math Checkup

1. Evaluate the following.

$6^2 =$ ☐ $5^2 =$ ☐

2. What is $\frac{1}{4}$ of 16? ☐

3. Start at 25. Perform each operation in the following order:
−7, ÷6, ×5, +6, ÷3 ☐

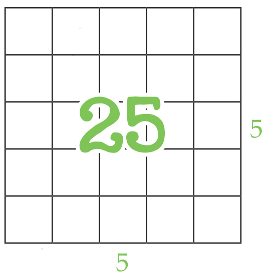
Mini Lesson

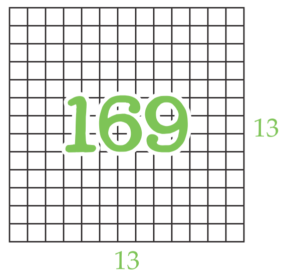
A ***perfect square*** is the product of an integer multiplied by itself. A ***square root*** is a factor of a number that, when multiplied by itself, equals the original number.

For positive numbers, squaring a number and finding the square root of that number are inverse operations—they undo each other.

Examples:

$5^2 = 25$ and $\sqrt{25} = 5$ $\qquad$ $13^2 = 169$ and $\sqrt{169} = 13$





To find a square root, ask yourself, "What number multiplied by itself equals the number under the square root symbol?"

Example:

$\sqrt{144}$

$\underline{\ ?\ } \bullet \underline{\ ?\ } = (\underline{\ ?\ })^2 = 144$

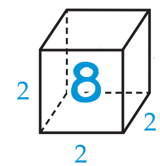
$12 \bullet 12 = 12^2 = 144$

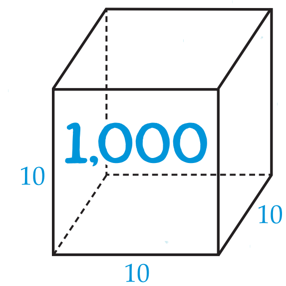
$\sqrt{144} = 12$

A ***perfect cube*** is the product of an integer multiplied three times. Finding the cube root of a number is the inverse operation of cubing a number. A cube (third) root symbol is written like this: $\sqrt[3]{\ }$.

Examples:

$2^3 = 8$ and $\sqrt[3]{8} = 2$ $\qquad$ $10^3 = 1{,}000$ and $\sqrt[3]{1{,}000} = 10$





To find a cube root, ask yourself, "What number multiplied three times equals the number under the cube root symbol?"

Example:

$\sqrt[3]{125}$

$\underline{\ ?\ } \bullet \underline{\ ?\ } \bullet \underline{\ ?\ } = (\underline{\ ?\ })^3 = 125$

$5 \bullet 5 \bullet 5 = 5^3 = 125$

$\sqrt[3]{125} = 5$

Practice

1. Find each square root.

$\sqrt{16} =$ $\sqrt{121} =$ $\sqrt{64} =$ $\sqrt{81} =$

$\sqrt{169} =$ $\sqrt{144} =$ $\sqrt{196} =$ $\sqrt{225} =$

2. Find each cube root.

$\sqrt[3]{27} =$ $\sqrt[3]{1,000} =$ $\sqrt[3]{64} =$ $\sqrt[3]{1} =$

$\sqrt[3]{125} =$ $\sqrt[3]{8} =$ $\sqrt[3]{216} =$ $\sqrt[3]{343} =$

3. Match the square roots and cube roots that have the same values.

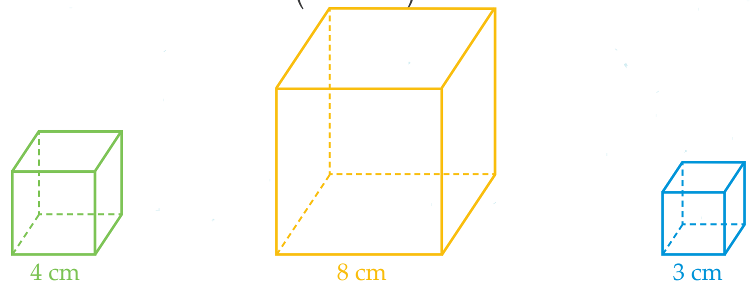
$\sqrt{1}$ $\sqrt{25}$ $\sqrt{100}$ $\sqrt{81}$ $\sqrt{64}$

$\sqrt[3]{125}$ $\sqrt[3]{1,000}$ $\sqrt[3]{729}$ $\sqrt[3]{1}$ $\sqrt[3]{512}$

For he shall be as a tree planted by the waters, and that spreadeth out her roots by the river, and shall not see when heat cometh, but her leaf shall be green; and shall not be careful in the year of drought, neither shall cease from yielding fruit.

Jeremiah 17:8

4. Find the volume and surface area of each cube. The volume of a cube is the side length cubed $(V = s^3)$, and the surface area is the area of one face times six $(SA = 6s^2)$.



$V =$ ____________ $V =$ ____________ $V =$ ____________

$SA =$ ____________ $SA =$ ____________ $SA =$ ____________

5. What number has a square root of . . .

12? ______ 15? ______ 13? ______

What number has a cube root of . . .

4? ______ 3? ______ 5? ______

6. Complete each problem.

$\sqrt{121} + \sqrt[3]{64} =$ $\dfrac{\sqrt{36}}{\sqrt[3]{27}} =$

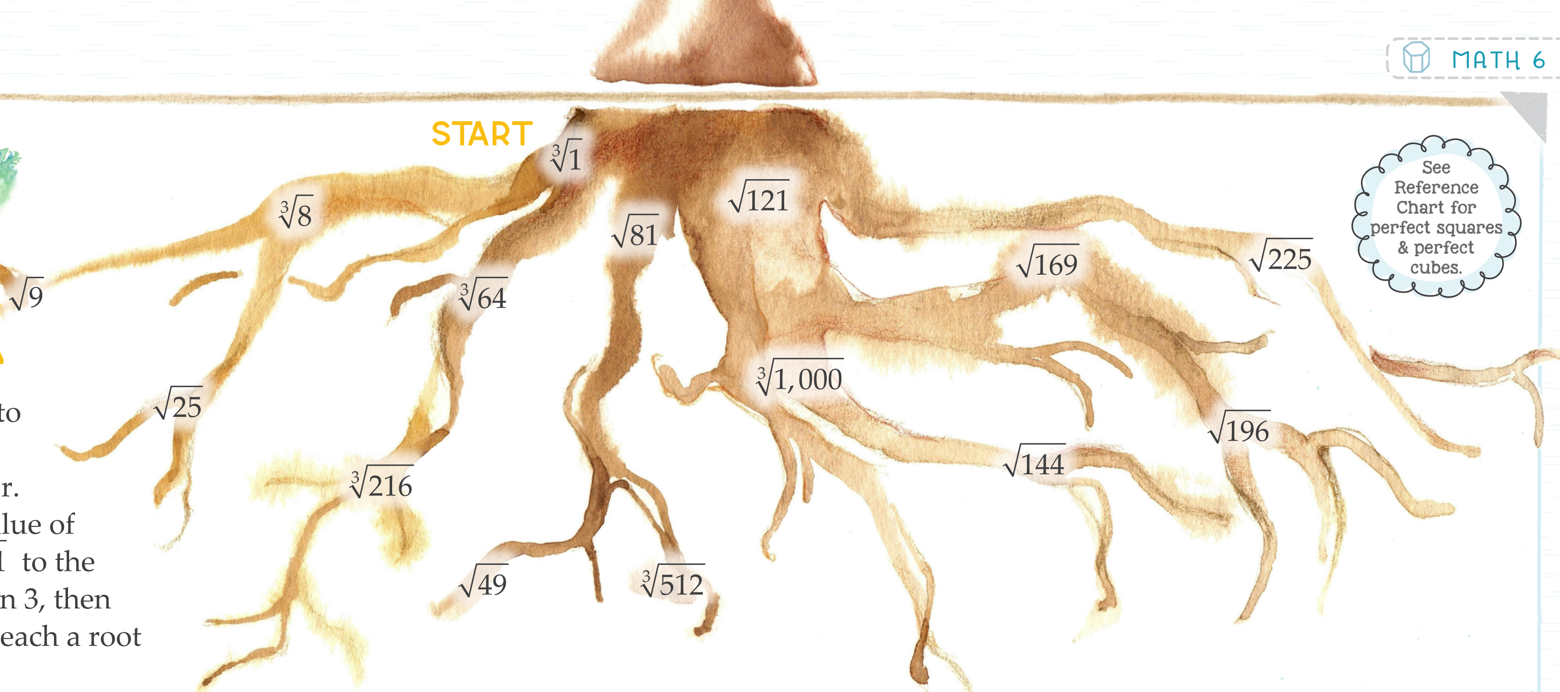
$\sqrt[3]{125} - \sqrt{49} =$ $\sqrt[3]{1,000} \bullet \sqrt{196} =$

7. Compare the expressions using <, >, or =.

$\sqrt[3]{216}$ ◯ $\sqrt{36}$ $\dfrac{\sqrt{225}}{3}$ ◯ $\sqrt[3]{216}$ $\sqrt{64} + \sqrt[3]{8}$ ◯ $\sqrt{100}$

Practice

Start at $\sqrt[3]{1}$. Draw a path to a root with a value that is one whole number greater. For example, $\sqrt[3]{1}$ has a value of 1, so draw a path from $\sqrt[3]{1}$ to the root with a value of 2, then 3, then 4, and so forth until you reach a root with a value of 15.



See Reference Chart for perfect squares & perfect cubes.

Review

1. Divide. Lesson 25

$8 \div \frac{4}{3} =$ $\qquad$ $\frac{1}{2} \div \frac{5}{8} =$ $\qquad$ $1\frac{3}{5} \div \frac{7}{10} =$

2. Determine the property shown by each statement. Then write the first letter(s) of that property on the line. Lesson 26

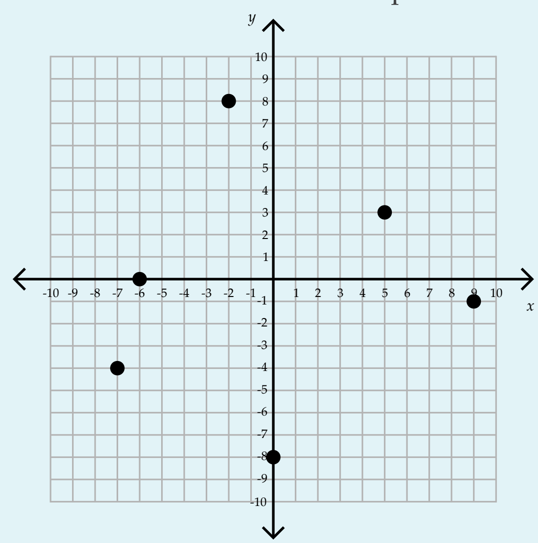
<u>A</u>ssociative property | <u>C</u>ommutative property | <u>D</u>istributive property | <u>ID</u>entity property | <u>IN</u>verse property

$65 \bullet 1 = 65$ ____ $\qquad$ $-9 + 9 = 0$ ____ $\qquad$ $2(9+3) = 2 \bullet 9 + 2 \bullet 3$ ____

3. Complete each problem. Lessons 31 & 32

$15 - (-10) =$ $\qquad$ $-2 + 19 =$ $\qquad$ $-3(-4) =$ $\qquad$ $-35 \div 5 =$

4. Write the coordinates of the point that is at each location. Lesson 27



Quadrant I: ______

Quadrant II: ______

Quadrant III: ______

Quadrant IV: ______

x-axis: ______

y-axis: ______

Lesson 34

EXPRESSIONS

Watch the video lesson and/or read the mini lesson.

Warm-Up

Complete the problems.

$3 \bullet 4 - 12$ ______

$5 \bullet 9 - 2 + 7$ ______

$32 \div 4 + 9 \bullet 2$ ______

Video Lesson

Scan the QR code or watch the video lesson on goodandbeautiful.com/Math6.

Number of terms: ______
Terms: ______
Variables: ______
Coefficients: ______
Constants: ______

Number of terms: ______
Terms: ______
Variables: ______
Coefficients: ______
Constants: ______

Mental Math Checkup

1. Evaluate the following.

   $4^2 - 5^2 =$ ☐

2. Fill in the missing operations that make the statement true.

   15 ☐ 5 = 2 ☐ 1

3. Start at 2. Perform each operation in the following order:

   ×12, −4, ÷5, +12, −5 ☐

Mini Lesson

An *expression* is a number, variable, or combination of numbers and/or variables joined by operations. It is a math phrase that can be simplified, but not solved. There is no equal sign, and different values for the variable(s) could be substituted into the expression.

Examples of expressions: $4 + 3$ $\quad x$ $\quad 2y$ $\quad 5a - 9 + b$

A ***term*** is one part of an expression, which may be a number, a variable, or a product of numbers and variables. Terms are separated by plus or minus signs.

$2x + 3$

terms

A ***variable*** is a symbol, often a letter, that represents an unknown value.

$2x + 3$

variable

A ***coefficient*** is a number that is multiplied by a variable or product of variables. All variables have a coefficient. If a variable has no number written with it, the coefficient is 1.

$2x + 3$

coefficient

A ***constant*** is a term with no variable. A constant is a term that is just a number.

$2x + 3$

constant

Variables in Expressions

A variable represents an unknown value in an expression.

Example: Mia read n nonfiction books and f fiction books. Write an expression for the total number of books she read.

- The variable n represents the unknown number of nonfiction books.
- The variable f represents the unknown number of fiction books.
- Add the variables to find the total number of books: $n + f$

To write an expression, look for words that show the operation(s) and use variables for unknown values. The chart below shows examples of phrases and expressions.

the sum of a number and 3 a number plus 3 add 3 to a number a number increased by 3 a number and 3 more the total of a number and 3	$n + 3$	the difference between a number and 4 a number minus 4 subtract 4 from a number 4 less than a number a number decreased by 4 4 fewer than a number	$n - 4$
the product of 5 and a number 5 times a number 5 multiplied by a number	$5n$ or $5 \cdot n$	the quotient of a number and 6 a number divided by 6	$\frac{n}{6}$ or $n \div 6$

Practice

1. For each expression, follow the instructions below.
   - Underline the coefficients.
   - Circle the variables.
   - Cross out the constants.

$3x + 8$ | 12 | $a + 3 + 8c$

$4t - 7 + 9d$ | $\frac{1}{5}m + n$ | $11k - 4 + p$

2. Write the coefficient of each term.

Term	Coefficient
$10p$	
$-5m$	
v	
$-t$	

3. Write the number of terms in each expression.

Expression	Number of Terms
$3x - y$	
$-2 - 5a + 3b - c + 7$	
$2 - m + n + p^2$	
x	

4. Circle the operation(s) found in each expression.

Expression	Operations
$3x$	addition, subtraction, multiplication, division
$6x - 5$	addition, subtraction, multiplication, division
$3(x + 2)$	addition, subtraction, multiplication, division
$8 - \frac{x}{2}$	addition, subtraction, multiplication, division

5. Use the information to write an expression. Use n for the variable.

the product of twenty-four and a number ______________

the sum of twelve and a number ______________

the difference between a number and thirty-five ______________

two more than the quotient of ten and a number ______________

twice a number plus three ______________

the sum of three times a number and forty-four ______________

6. Write T if the statement is true and F if the statement is false.

The coefficient in the expression $15x$ is 15. _____

The constant in $7p + 9 - 3s$ is -3. _____

The coefficients in the expression $g - 5 + 6r$ are 5 and 6. _____

The variables in the expression $ab + c$ are a, b, and c. _____

The coefficient in the expression $-qr$ is -1. _____

There are 5 terms in the expression $2d + 4 - h - k$. _____

Practice

7. Write an expression for each scenario using the variable given.

Domenic had 32 marbles. Then he received m marbles on his birthday. How many marbles does he have now?

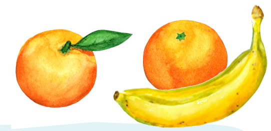
Belinda wants to give 3 mini muffins to each of the v volunteers at the park. What is the total number of muffins she will give to the volunteers?

Grayson's dad is d years old. Grayson is half the age of his dad. How old is Grayson?

Zara has r red ribbons and 12 fewer yellow ribbons. How many yellow ribbons does she have?

Bryant has c model cars and a model airplanes. How many model cars and airplanes does he have in all?

There are b bananas in a bag and t tangerines in a box. Marta bought 3 bags of bananas and 2 boxes of tangerines. How many pieces of fruit did she buy?



Review

1. Complete each division problem. Lessons 16 & 17

$56{,}315 \div 5 =$ $\quad$ $932 \div 3.2 =$ $\quad$ $0.054 \div 0.6 =$

2. Find the sum or difference. Lesson 31

$-25 - 9 =$ $\quad$ $81 - (-12) =$ $\quad$ $-32 + 15 =$

3. Find the product or quotient. Lesson 32

$-5(-12) =$ $\quad$ $95 \div (-5) =$ $\quad$ $-130 \div (-10) =$

4. Find each root. Lesson 33

$\sqrt[3]{8} =$ $\quad$ $\sqrt{144} =$ $\quad$ $\sqrt[3]{125} =$

Lesson 35

EVALUATING EXPRESSIONS

Watch the video lesson and/or read the mini lesson.

Warm-Up

Evaluate the following.

$(-2)^2$ ______

$9-(-5)$ ______

$4(-8)$ ______

$-12+(-7)$ ______

Video Lesson

Scan the QR code or watch the video lesson on goodandbeautiful.com/Math6.

$$30-m$$

Mental Math Checkup

Complete each division fact in your head, and then write the answer in the box.

$72 \div 8 =$	$60 \div 5 =$	$96 \div 12 =$
$42 \div 6 =$	$121 \div 11 =$	$108 \div 9 =$
$63 \div 9 =$	$56 \div 7 =$	$72 \div 9 =$
$24 \div 4 =$	$35 \div 5 =$	$48 \div 4 =$

Mini Lesson

To evaluate an expression means to substitute a given value in place of a variable and perform the operation(s). Remember to use the order of operations and math properties when evaluating expressions.

Expressions can be evaluated for different values of the variable.

Example: Evaluate $4x+1$ when . . .

$x=3$	$x=\frac{3}{4}$	$x=-2.5$
$4(3)+1$	$4\left(\frac{3}{4}\right)+1$	$4(-2.5)+1$
$12+1$	$3+1$	$-10+1$
13	4	-9

Evaluating Expressions with Multiple Variables

Evaluate the expression $a+b^2-3c+10$ when $a=5$, $b=-2$, and $c=\frac{1}{3}$.

$a+b^2-3c+10$

Substitute the values for the variables. Write negative numbers and fractions in parentheses.

$5+(-2)^2-3\left(\frac{1}{3}\right)+10$

Evaluate exponents. $(-2)^2=(-2)(-2)=4$

$5+4-3\left(\frac{1}{3}\right)+10$

Multiply. $3\left(\frac{1}{3}\right)=\left(\frac{\cancel{3}^{\,1}}{1}\right)\left(\frac{1}{\cancel{3}_{\,1}}\right)=1$

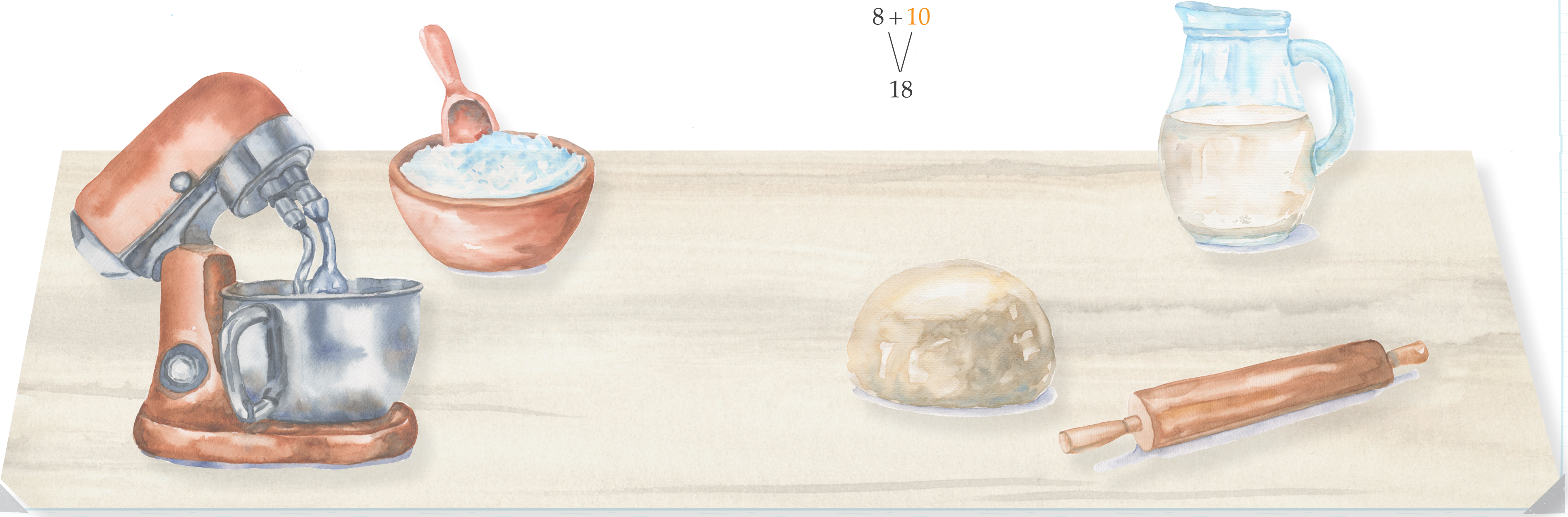
$5+4-1+10$

Add and subtract, working from left to right.

$9-1+10$

$8+10$

18



Practice

1. Evaluate each expression when $n = 10$.

$38 + n$ ______ $\quad -n + (-7)$ ______ $\quad 1.2n$ ______

$2n - 12$ ______ $\quad \frac{n}{40}$ ______ $\quad \frac{n}{5} + (-3)$ ______

2. Evaluate each expression with the values given. The first one is given as an example.

$20 - x$		$9y$	
$x = 5$	15	$y = 6$	______
$x = -4$	______	$y = \frac{1}{3}$	______
$x = 3.5$	______	$y = -3$	______

3. Write an expression with the information given. Then evaluate the expression using the value of the variable. The first one is given as an example.

the sum of a and 22	$a + 22$	$a = -10$	12
the difference between b and 3	______	$b = 10$	______
the quotient of c and 8	______	$c = 56$	______
the product of 40 and d	______	$d = \frac{1}{8}$	______

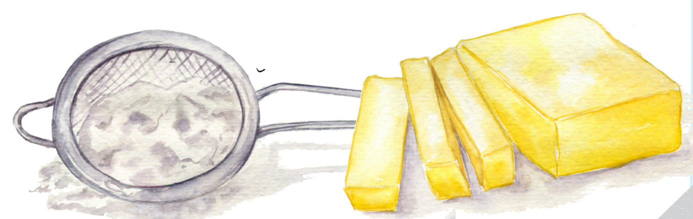
4. On the first line, substitute the values in place of the variables. On the second line, evaluate the expression. The first one is given as an example.

$r + s^2 - 2$	$r = 6,\ s = 4$	$6 + 4^2 - 2$	20
$4n - 2m + 1 - p$	$m = 4,\ n = 7,\ p = 2$	______	______
$\frac{x}{3} + 0.05 + y$	$x = 9,\ y = 5.25$	______	______

5. There are p peaches in a box and n nectarines in a bag. Ellie bought 2 boxes of peaches, 5 bags of nectarines, and 3 oranges. Write an expression to show how many pieces of fruit Ellie bought.

______

Evaluate the expression if $p = 10$ and $n = 8$. ______



Practice

6. Dragonflies are expert fliers that can fly forward, straight up and down, backward, or in a zigzag pattern. Follow the steps below to find out how fast a dragonfly can fly!

- ☐ Evaluate each expression using the following values:

  $a = -2,\ b = \frac{1}{3},\ c = 4.5,\ d = 10$

- ☐ After evaluating an expression, cross off the answer in the box.
- ☐ The product of the two leftover numbers is how fast (in miles per hour) a dragonfly can fly!

$6bd + b^0$ ______ $\frac{2c}{3} + 5$ ______ $2 + d + \frac{a}{-2}$ ______

$b^2 + d - \frac{1}{9}$ ______ $12.5 - c + a$ ______ $d - 2^3 + a$ ______

$c^2 - d - 1.25$ ______ $3a + c + 3 + 3c$ ______ $\frac{d - 25}{3}$ ______

$9b + d - 2 + 3b$ ______

15	7	6	9	0	13
8	10	−5	12	5	21

A dragonfly can fly ______ miles per hour!

Review

1. Complete the division problem. Lessons 16 & 17

$9.125 \div 0.05 =$

2. Find the product or quotient. Lesson 32

$-3(-15) =$ $-64 \div (-8) =$

3. Find each root. Lesson 33

$\sqrt{169} =$ $\sqrt[3]{64} =$ $\sqrt[3]{27} =$

4. Write the coefficient of each term. Lesson 34

Term	Coefficient
$-5k$	
$1.7m$	
z	
$-w$	

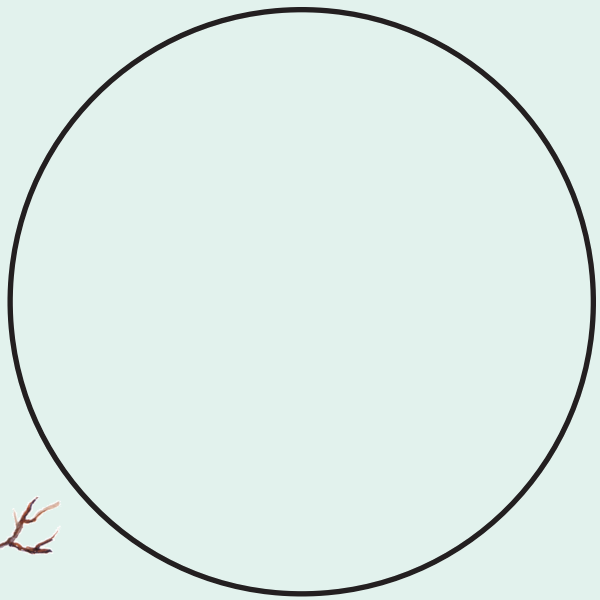
Lesson 42

AREA AND CIRCUMFERENCE OF CIRCLES AND SEMICIRCLES

Watch the video lesson and/or read the mini lesson.

Warm-Up

Draw a diameter and a radius on the circle below.



Video Lesson

Scan the QR code or watch the video lesson on goodandbeautiful.com/Math6.

Mental Math Checkup

1. Evaluate the following.

   $2^3 =$ ______ $3^3 =$ ______

2. What is $\frac{2}{3}$ of 12? ______

3. Start at 12. Perform each operation in the following order:

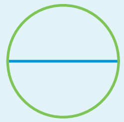
   ×3, ÷6, +5, +10, ÷7 ______

Mini Lesson

PI

Pi (π) is the ratio of the circumference of a circle (the distance around the circle) to its diameter (the distance across a circle through the center).

$$\pi = \frac{\text{circumference}}{\text{diameter}}$$



For any circle, the circumference divided by the diameter is the number pi. Pi has an infinite number of digits. Here is pi with the first 30 decimal place values:

3.141592653589793238462643383279...

An approximate decimal value of pi is 3.14. As a fraction, pi is approximately $\frac{22}{7}$. Substitute 3.14 for π in this course unless the directions say to use $\frac{22}{7}$.

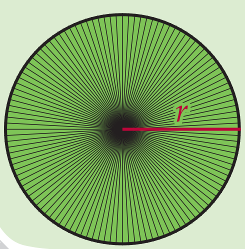
CIRCUMFERENCE OF A CIRCLE

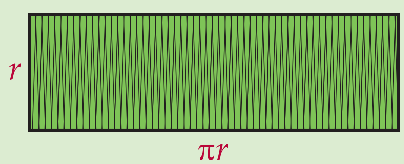
The definition of pi, $\pi = \frac{C}{d}$, could be rewritten as $C = \pi d$, which is the formula used to find the circumference of a circle. Because the diameter is twice the length of the radius, the formula could also be written like this: $C = 2\pi r$.

AREA OF A CIRCLE

If a circle is cut into many tiny sectors and those sectors are placed side by side, they form a rectangle with a height of r and a base of πr. To find the area of the rectangle, multiply the base by the height. $A = \pi r \bullet r = \pi r^2$

The area of the rectangle is πr^2, so the area of a circle is also πr^2. $A = \pi r^2$





(The circumference of the circle is $2\pi r$, so the length of the base of the rectangle is half of $2\pi r$, which is πr.)

CIRCLE FORMULAS

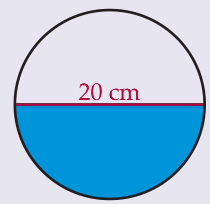
AREA	CIRCUMFERENCE
$A = \pi r^2$	$C = \pi d$ or $C = 2\pi r$

SEMICIRCLES

A ***semicircle*** is half of a circle. To find the area of a semicircle, find the area of the full circle and divide by 2. To find the perimeter of a semicircle, find the circumference of the circle, divide by 2, and then add the length of the diameter.

Example 1: Find the area of the blue semicircle.

Step 1: Find the area of the full circle. The diameter is 20 cm, so the radius is 10 cm.



$A = \pi r^2$

$A \approx 3.14(10 \text{ cm})^2$

$A \approx 3.14(100 \text{ cm}^2)$

$A \approx 314 \text{ cm}^2$

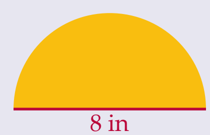
The symbol ≈ means "approximately equal to."

Step 2: Divide the area of the circle by 2. $314 \text{ cm}^2 \div 2 = 157 \text{ cm}^2$

The area of the blue semicircle is approximately 157 cm².

Example 2: Find the perimeter of the yellow semicircle.

Step 1: Find the circumference of a full circle with a diameter of 8 in.



$C = \pi d$

$C \approx 3.14(8 \text{ in})$

$C \approx 25.12 \text{ in}$

Step 2: Divide the circumference of the circle by 2.

$25.12 \text{ in} \div 2 = 12.56 \text{ in}$

Step 3: Add the length of the diameter. $12.56 \text{ in} + 8 \text{ in} = 20.56 \text{ in}$

The perimeter of the yellow semicircle is approximately 20.56 in.


Circles in the Snow
H
3 ft
G
30 cm
F
2 ft
E
10 cm
B
40 cm
A
32 in
C
4 ft
D
12 cm

Practice

Write the two formulas used to find the circumference of a circle. ________ and ________

Write the formula used to find the area of a circle. ________

Snowmen are created with three-dimensional balls of snow, but when you look at them on paper, the spheres look like circles! Using the information on the picture, fill in the blanks for each circle or semicircle.

Circle A

radius = ________

diameter = ________

circumference ≈ ________

Circle B

radius = ________

diameter = ________

area ≈ ________

Semicircle C

radius = ________

perimeter ≈ ________

area ≈ ________

Circle D

radius = ________

circumference ≈ ________

area ≈ ________

Circle E

diameter = ________

circumference ≈ ________

area ≈ ________

Semicircle F

diameter = ________

perimeter ≈ ________

area ≈ ________

Circle G

diameter = ________

area ≈ ________

circumference ≈ ________

Semicircle H

radius = ________

area ≈ ________

perimeter ≈ ________

Review

1. Convert each percent to a decimal. Lesson 23

0.32% = ________ 921.12% = ________ 9% = ________

2. Convert each fraction or mixed number to a percent. Lesson 24

$2\frac{3}{8}$ = ________ $\frac{7}{10}$ = ________ $\frac{13}{50}$ = ________

3. Find the missing angle measure for each triangle. Lesson 39

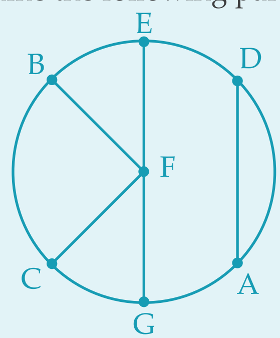
19°, 32°, ________ 41°, 124°, ________

4. Circle *yes* if the angles listed can form a quadrilateral and *no* if they cannot. Lesson 40

69°, 91°, 100°, 99° *yes* *no*

52°, 154°, 39°, 115° *yes* *no*

5. Name the following parts found on ⊙F. Lesson 41



1 diameter: ________

3 radii: ________

1 chord: ________

3 central angles:

____

Lesson 45

ARCHES National Park PUZZLES

There is no video or review for this lesson.

Complete the three puzzles.

Arches National Park is located in southeastern Utah, USA. There are more than 2,000 arches in the park. The exact number changes as new arches are discovered and others fall.

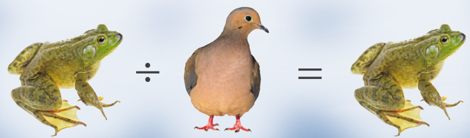
1 FOUR FAMILIES visited Arches National Park, and each family hiked a different trail. Find out which family hiked which trail and the distance they hiked by solving the logic puzzle on the right. Note that these hike distances are actual round-trip distances.

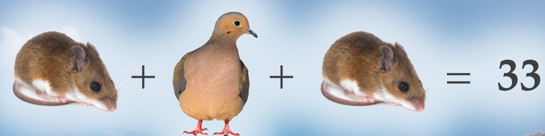
- ☐ The Taylor family did not hike to Tower Arch.
- ☐ The Wang family hiked the farthest.
- ☐ The Garcia family hiked farther than the Taylor family.
- ☐ The Hansen family includes a toddler, so they hiked less than one mile.
- ☐ The Park Avenue trail is one mile each way.
- ☐ The Tower Arch trail is shorter than the Delicate Arch trail but longer than the Park Avenue trail.

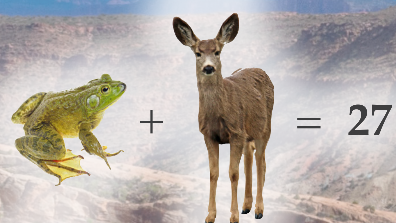
		Hike Distance				Trail			
		0.4 miles	2 miles	2.6 miles	3 miles	DELICATE ARCH	SKYLINE ARCH	PARK AVENUE	TOWER ARCH
Family	Taylor								
	Wang								
	Garcia								
	Hansen								
Trail	DELICATE ARCH								
	SKYLINE ARCH								
	PARK AVENUE								
	TOWER ARCH								

Hint: Put an X in a box if it can be ruled out and a ✓ in a box if you are sure of an answer.

2 FIND THE NUMERIC VALUE of each animal found in Arches National Park. Note that this puzzle may require some guess and check. Use what you know and keep trying different combinations of numbers!







You will know you are correct if your solutions make the following equation true.

3 THE MOHAMED FAMILY is fortunate to live within driving distance of Arches National Park. They have set aside three Saturdays in June for hiking in the park, and their goal is to hike 15 miles that month. Using the numbers 1–4 and 6–9 exactly once, complete the puzzle to find four combinations of three hike lengths that would total 15 miles. In other words, each line of numbers should add up to 15. The center number is given for you.

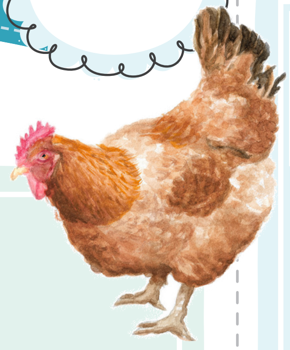
Lesson 46

COMBINING LIKE TERMS

Supplies
colored pencils

☐ Watch the video lesson and/or read the mini lesson.

Warm-Up



Complete the following problems.

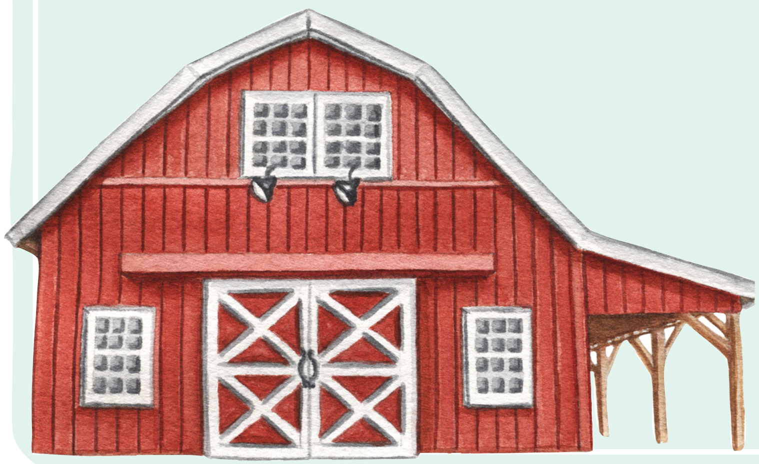
$2+(-3)=$ _____

$-8-4=$ _____

$-5+7=$ _____

$-6-(-10)=$ _____

$5+4-2-7=$ _____



Video Lesson

Scan the QR code or watch the video lesson on goodandbeautiful.com/Math6.

$5-3a+b+4a$

$-2m+10m+18$

Mental Math Checkup

Complete each division fact in your head, and then write the answer in the box.

$60 \div 5 =$ ☐	$132 \div 12 =$ ☐	$144 \div 12 =$ ☐
$96 \div 12 =$ ☐	$54 \div 6 =$ ☐	$81 \div 9 =$ ☐
$121 \div 11 =$ ☐	$72 \div 12 =$ ☐	$63 \div 9 =$ ☐
$72 \div 6 =$ ☐	$108 \div 12 =$ ☐	$56 \div 7 =$ ☐

Mini Lesson

Like Terms

Like terms are terms with the same variable raised to the same power.

Like Terms	Unlike Terms
$2a$ and $3a$ Both variables are a to the first power. Like terms can have different coefficients.	$7a$ and b The variables are different.
$4c$, c, and $-9c$ All variables are c to the first power.	$5c$ and 11 There is a variable and a constant.
$2d^2$ and $7d^2$ Both variables are d squared.	$3d^2$ and d^5 Both variables are d, but they are raised to different powers.

Combining Like Terms

Combining like terms is a way to simplify an expression, and often this makes it easier to solve an equation.

When combining like terms, it can be helpful to think of a variable as an object.

Example: Simplify the expression $2c+3c$.

Suppose c stands for cows.

2 cows plus 3 cows is 5 cows.

$2c+3c=5c$

It may also be helpful to write products as repeated addition.

Example: Simplify the expression $4s-s$.

$s+s+s+s-s$

$s+s+s+\cancel{s}-\cancel{s}=3s$

$4s-s=3s$

When a variable has no number written in front of it, the coefficient is 1.

Rewrite expressions so like terms are next to each other.

Example: Simplify the expression $5p+4c-2p$.

- Rearrange the terms.

$$5p-2p+4c$$

- Combine like terms.

Suppose p stands for pigs and c stands for chickens.

5 pigs − 2 pigs + 4 chickens =

3 pigs + 4 chickens

OR

$$p+p+p+p+p-p-p+c+c+c+c$$

$$p+p+p+\cancel{p}+\cancel{p}-\cancel{p}-\cancel{p}+c+c+c+c=$$

$$3p+4c$$

$$5p-2p+4c=4c+3p$$

Note: When writing answers with variables, it is best practice to write the variables in alphabetical order. If there is a constant, write it after the variable(s).

Like terms can be combined by adding or subtracting the coefficients.

Examples:

$7x+2x$ $=9x$	Since $7x$ and $2x$ are like terms, add 7 and 2. $7x+2x=9x$
$5y+3-y$ $=5y-y+3$ $=4y+3$	Rewrite the expression. Since $5y$ and y are like terms, subtract 1 from 5. $5y+3-y=4y+3$

List terms with variables in alphabetical order with constants at the end.

Practice

1. Color boxes with like terms in the same color. For example, use one color for like terms with the variable b and another color for like terms with the variable d.

$5a$	b	$8c$	$-b$	$3a$
$4c$	$-9d$	$3d$	d	c
$-3b$	$2d$	a	$-d$	$7b$
$2c$	$4d$	$-5d$	$6d$	$5c$
$4a$	$2b$	$-c$	$4b$	$-2a$

Hint: You'll use four different colors.

2. Combine like terms to simplify the expressions. The first is given as an example.

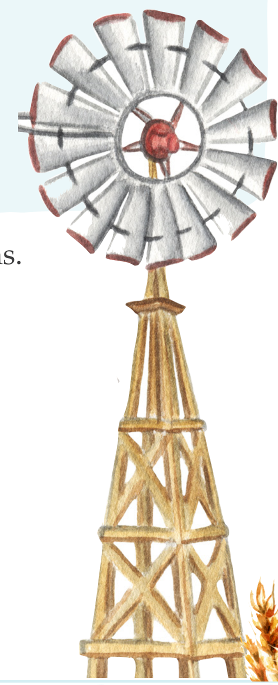
$a+a+a$ ___$3a$___

$g+g+g+g$ ______

$r+r+r+r+r+r$ ______

$m+m$ ______

$x+x+x+x+x$ ______



3. Draw lines to connect equivalent expressions.

$5n+3n$	$10n$
$4n-2n$	$8n$
$n+9n$	$4n$
$8n-2n$	$6n$
$3n+n$	n
$6n-5n$	$2n$

4. Simplify the expressions.

$8y+2y$ ______ $5x+3x$ ______

$-7v+12v+4$ ______ $6t+2+5t-3$ ______

$9z-4+8$ ______ $20u-19u-2$ ______

$w+3w+4w$ ______ $6+7p-4$ ______

5. Rewrite the expressions so like terms are next to each other. Then simplify the expressions. The first one is given as an example.

$3x+4y+5x=$ ___$3x+5x+4y$___ $=$ ___$8x+4y$___

$a+3b+2a-b=$ ______ $=$ ______

$8d+9c-3d=$ ______ $=$ ______

$11p+4s-s+p=$ ______ $=$ ______

$7-6h+g+2h=$ ______ $=$ ______

$4k+r+3k-2k=$ ______ $=$ ______

6. Fill in the blanks to make equivalent expressions.

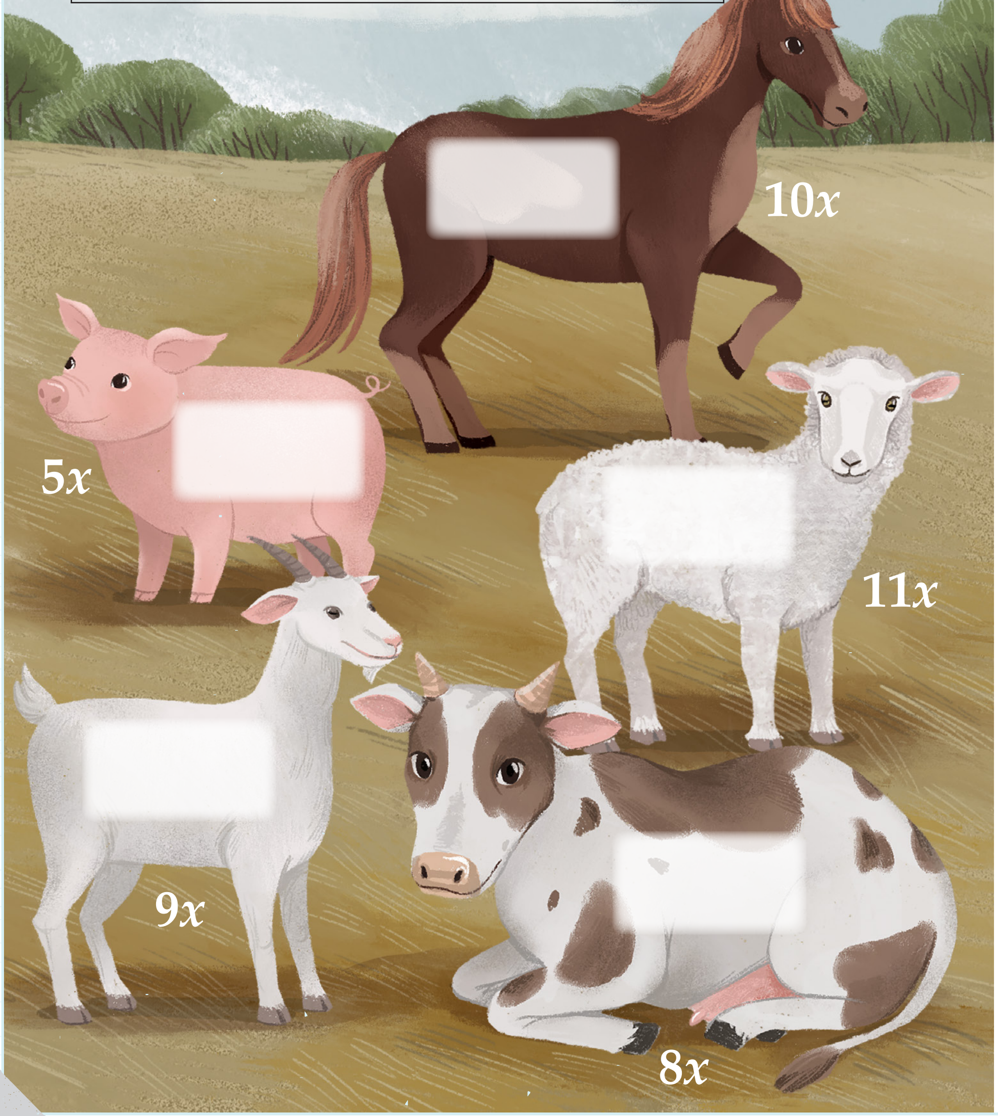
$2t+$ ____ $=6t$ $-3s+5+$ ____ $=4s+5$

$4p+5p+$ ____ $=12p$ $q+7r-$ ____ $+2q=3q+6r$

Practice

7. Use terms from the box and addition or subtraction to create TWO expressions that are equivalent to the expression listed by each animal. Write the expressions on each animal. For example, if the expression by the animal was $7x$, you could write $10x - 3x$ and $5x + 2x$ on the animal. For an extra challenge, try to write expressions with three terms on some of the animals.

$5x$	$2x$	$-3x$	x	$10x$	$12x$	$-2x$	$-x$	$6x$	$4x$	$7x$	$3x$



Review

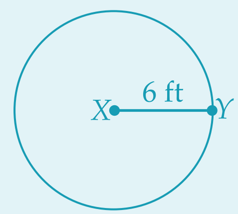
1. Complete each problem. Lesson 20

$14 - 3(4) + 5^2 =$ $\qquad$ $56 \div 7 + 2^3 - 11 =$

2. Simplify each expression. Lesson 20

$\dfrac{\sqrt[3]{27}}{2^3 + 1} =$ $\qquad$ $\dfrac{2^4 \div 8}{\sqrt[3]{125} - 4} =$

3. Use $\odot X$ to fill in the information. Lesson 42



radius = ____________________

diameter = __________________

area ≈ _____________________

circumference ≈ ______________

4. Write *yes* or *no* on each line. Lesson 43

Is $a = 18$ a solution to the equation $a \div 3 = 9$? ______

Is $b = 2.3$ a solution to the equation $5 - b = 2.7$? ______

5. Find the percent of each number. Lesson 44

What is 25% of 120? ________

What is 15% of 75? ________

What is 90% of 8? ________

Lesson 51

SOLVING EQUATIONS WITH DECIMALS & FRACTIONS

Watch the video lesson and/or read the mini lesson.

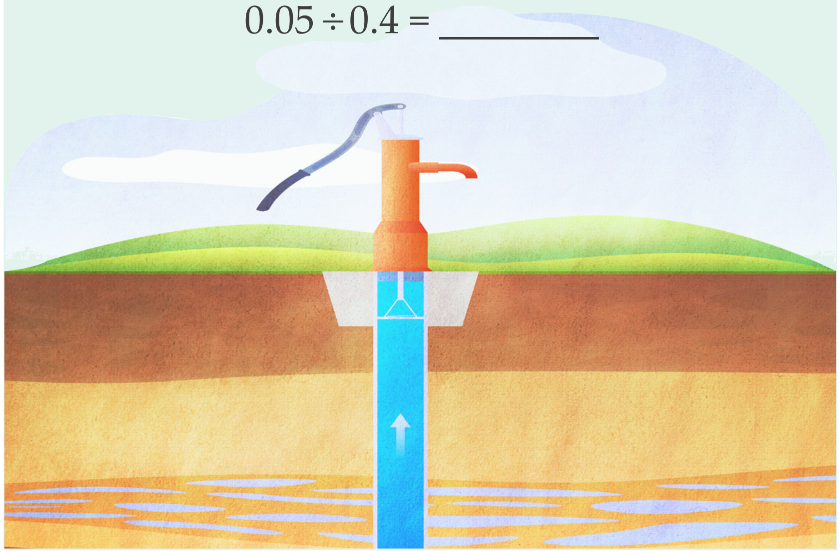
Warm-Up

Complete the following problems.

$0.05 + 0.4 =$ ________

$0.05 \bullet 0.4 =$ ________

$0.05 \div 0.4 =$ ________



Video Lesson

Scan the QR code or watch the video lesson on goodandbeautiful.com/Math6.

Mental Math Checkup

1. Evaluate the following.

   $\sqrt{81} = \square$ $\sqrt{16} = \square$

2. Fill in the missing operations that make the equation true.

   $3 \square 8 = 6 \square 4$

3. Start at 0. Perform each operation in the following order:

   ×12, +9, ×3, +3, ÷5 $\square$

Mini Lesson

Solving Equations with Decimals

Solving equations with decimals is similar to solving equations with whole numbers. Just remember a few decimal rules:

Add/Subtract	Multiply	Divide
line up the decimal points	multiply, then count decimal places	move the decimal point in the divisor & dividend
$\begin{array}{r} 0.03 \\ +\,0.20 \\ \hline 0.23 \end{array}$	$\begin{array}{r} 0.03 \\ \times\,0.2 \\ \hline 0.006 \end{array}$	$0.2\overline{)0.03} \rightarrow 2\overline{)0.30}$ = 0.15

Examples of Equations with Decimals

$x + 4.2 = 5$

$$x + \cancel{4.2} = \overset{4}{\cancel{5}}.{}^{1}0$$
$$-\cancel{4.2} \quad -4.2$$
$$x = 0.8$$

$5.6 + x = 8.72$

$$\cancel{5.6} + x = 8.72$$
$$-\cancel{5.6} \quad -5.60$$
$$x = 3.12$$

$3.2x = 4$

$$\frac{\cancel{3.2}x}{\cancel{3.2}} = \frac{4}{3.2}$$

scratch work

$3.2\overline{)4.0}$

$32\overline{)40.00}$ = 1.25

$x = 1.25$

$5x = 4.5$

$$\frac{\cancel{5}x}{\cancel{5}} = \frac{4.5}{5}$$

scratch work

$5\overline{)4.5}$ = 0.9

$x = 0.9$

$\frac{x}{1.2} = 8$

$$\cancel{1.2} \cdot \frac{x}{\cancel{1.2}} = 8 \cdot 1.2$$

scratch work

$\begin{array}{r} {}^{1} \\ 1.2 \\ \times\ 8 \\ \hline 9.6 \end{array}$

$x = 9.6$

Solving Equations with Fractions

When a coefficient is a fraction, multiply the coefficient by its reciprocal to isolate the variable. Then multiply the other side by the same number.

Example:

$$\frac{2}{3}x = 4$$

Multiply by the reciprocal of the coefficient.

$$\frac{\cancel{3}}{\cancel{2}} \cdot \frac{\cancel{2}}{\cancel{3}}x = \frac{\overset{2}{\cancel{4}}}{1} \cdot \frac{3}{\underset{1}{\cancel{2}}}$$

Cancel first; then multiply.

$$x = \frac{6}{1}$$

Simplify the fraction.

$$x = 6$$

A number multiplied by its reciprocal is 1.

Additional Examples of Equations with Fractions

$x + \frac{1}{4} = \frac{2}{3}$

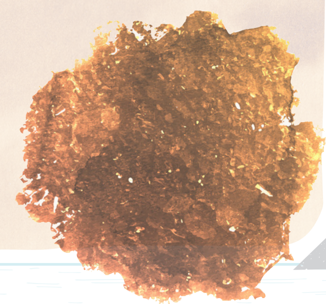
$$x + \cancel{\frac{1}{4}} = \frac{2}{3}$$
$$-\cancel{\frac{1}{4}} \quad -\frac{1}{4}$$
$$x = \frac{2}{3} - \frac{1}{4}$$
$$x = \frac{8}{12} - \frac{3}{12}$$
$$x = \frac{5}{12}$$

$x - 6 = \frac{3}{5}$

$$x \cancel{-6} = \frac{3}{5}$$
$$+\cancel{6} \quad +6$$
$$x = \frac{3}{5} + 6$$
$$x = 6\frac{3}{5}$$

$\frac{3}{4}x = \frac{5}{8}$

$$\frac{\cancel{4}}{\cancel{3}} \cdot \frac{\cancel{3}}{\cancel{4}}x = \frac{5}{\underset{2}{\cancel{8}}} \cdot \frac{\overset{1}{\cancel{4}}}{3}$$
$$x = \frac{5}{6}$$



DEEP DECIMALS

Find the value of each variable.

$h - 1.4 = 3$ $h =$ _____	$3.1 + f = 4.5$ $f =$ _____	$8.02 = g + 7.3$ $g =$ _____	$j - 1.63 = 7$ $j =$ _____
$2c = 5$ $c =$ _____	$4b = 5.28$ $b =$ _____	$20 = 2.5d$ $d =$ _____	$12 = 0.8a$ $a =$ _____
$\frac{p}{5} = 1.4$ $p =$ _____	$10 = \frac{m}{2.2}$ $m =$ _____	$\frac{n}{6} = 3.6$ $n =$ _____	$\frac{q}{4.2} = 2.5$ $q =$ _____
$\frac{3}{4}w = 6$ $w =$ _____	$\frac{2}{3}z = \frac{1}{3}$ $z =$ _____	$2 = \frac{4}{5}x$ $x =$ _____	$\frac{7}{9}y = \frac{14}{3}$ $y =$ _____
$s - \frac{5}{8} = 9$ $s =$ _____	$u + \frac{1}{3} = \frac{7}{6}$ $u =$ _____	$t - 4 = \frac{2}{9}$ $t =$ _____	$\frac{2}{3} + v = \frac{4}{5}$ $v =$ _____

Rock Equations

Practice

The earth's crust is thickest beneath mountains in the Himalayas and thinnest in the ocean. Solve the equations on the rocks to find the average thickness of the crust below land and below the ocean.

$3s = 30$
$s =$ ______

$m + 5 = 30$
$m =$ ______

$s - 4 = 4$
$s =$ ______

$m - 2 = 17$
$m =$ ______

$8 = s + 2$
$s =$ ______

$1 = \frac{s}{7}$
$s =$ ______

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

$4s = 36$
$s =$ ______

The crust below land is about ________ km (________ mi) thick.
largest value of m smallest value of m

The crust below the ocean is about ________ km (________ mi) thick.
largest value of s smallest value of s

Review

1. Nico had 54 baseball trading cards. He was given c trading cards for Christmas. Write an expression that shows how many trading cards Nico has now. Lesson 34

2. On the first line, substitute the given values in place of the variables. On the second line, evaluate the expression. Lesson 35

   $a^2 - 2b + 7$ $a = 5, b = 11$ ____________________ ______

3. Factor each expression. Lesson 48

   $8 + 12 =$ $10 + 75 =$

4. Lola made n cupcakes for a bake sale. She sold 19 cupcakes and has 16 left to sell. Write and solve an equation to find the number of cupcakes Lola made. Lesson 49

5. Solve each equation. Lesson 50

   $9a = 81$ $11b = 132$ $65 = 5c$

   $a =$ ______ $b =$ ______ $c =$ ______

Lesson 56

COMPLEX FRACTIONS

Watch the video lesson and/or read the mini lesson.

Warm-Up

Convert the mixed numbers to improper fractions.

$3\frac{1}{4} =$

$5\frac{4}{7} =$

$10\frac{2}{3} =$

$4\frac{6}{11} =$

Video Lesson

Scan the QR code or watch the video lesson on goodandbeautiful.com/Math6.

Mental Math Checkup

1. Evaluate the following.

$\sqrt[3]{125} =$ $\sqrt[3]{216} =$

2. What is $\frac{1}{7}$ of 21?

3. Start at 5. Perform each operation in the order given:

+3, ×2, ÷4, −3, ×6

Mini Lesson

A fraction represents division. In a fraction the numerator is the dividend, and the denominator is the divisor. This means the numerator is divided by the denominator.

Examples:

$\frac{3}{7} = 3 \div 7$ $\qquad \frac{8}{5} = 8 \div 5$ $\qquad \frac{24}{6} = 24 \div 6$

Complex Fractions

A ***complex fraction*** is a fraction that has at least one fraction in its numerator and/or denominator.

The fractions below are complex fractions.

$\frac{\frac{1}{6}}{4}$ The numerator is a fraction.

$\frac{20}{\frac{4}{5}}$ The denominator is a fraction.

$\frac{\frac{7}{8}}{\frac{11}{16}}$ The numerator and denominator are fractions.

Simplifying a Complex Fraction

To simplify a complex fraction, divide the numerator by the denominator. Remember, dividing by a number is the same as multiplying by the reciprocal of that number.

Examples:

$$\frac{\frac{1}{6}}{4} = \frac{1}{6} \div 4 = \frac{1}{6} \bullet \frac{1}{4} = \frac{1}{24}$$

$$\frac{20}{\frac{4}{5}} = 20 \div \frac{4}{5} = \frac{\overset{5}{\cancel{20}}}{1} \bullet \frac{5}{\underset{1}{\cancel{4}}} = \frac{25}{1} = 25$$

$$\frac{\frac{7}{8}}{\frac{11}{16}} = \frac{7}{8} \div \frac{11}{16} = \frac{7}{\underset{1}{\cancel{8}}} \bullet \frac{\overset{2}{\cancel{16}}}{11} = \frac{14}{11} = 1\frac{3}{11}$$

Mixed Numbers with Complex Fractions

If there is a mixed number in the numerator or denominator of a fraction, convert the mixed number to an improper fraction before dividing.

Examples:

$$\frac{2\frac{2}{9}}{\frac{5}{3}} = \frac{\frac{20}{9}}{\frac{5}{3}} = \frac{20}{9} \div \frac{5}{3} = \frac{\overset{4}{\cancel{20}}}{\underset{3}{\cancel{9}}} \bullet \frac{\overset{1}{\cancel{3}}}{\underset{1}{\cancel{5}}} = \frac{4}{3} = 1\frac{1}{3}$$

$$\frac{10}{1\frac{2}{3}} = \frac{10}{\frac{5}{3}} = 10 \div \frac{5}{3} = \frac{\overset{2}{\cancel{10}}}{1} \bullet \frac{3}{\underset{1}{\cancel{5}}} = \frac{6}{1} = 6$$

REMINDER

To convert a mixed number to an improper fraction, follow these steps:

1. Multiply the denominator by the whole number.
2. Add the product to the numerator.
3. Write the sum over the denominator.

Example:

$$5\frac{3}{4} = \frac{23}{4}$$

Practice

1. Write the fractions as division problems. The first one is given as an example.

$\frac{6}{7} = 6 \div 7$

$\frac{4}{9} =$

$\frac{10}{3} =$

$\frac{5}{8} =$

2. Write the complex fractions as division problems.

$\frac{\frac{7}{8}}{15} =$

$\frac{9}{\frac{3}{7}} =$

$\frac{\frac{10}{7}}{\frac{2}{5}} =$

$\frac{\frac{12}{11}}{\frac{2}{9}} =$

3. Fill in the blank spaces to simplify the complex fractions. The first one is given as an example.

$\frac{\frac{10}{3}}{2} = \frac{10}{3} \div 2$

$= \frac{\cancel{10}^{5}}{3} \bullet \frac{1}{\cancel{2}_{1}}$

$= \frac{5}{3}$

$= 1\frac{2}{3}$

$\frac{\frac{3}{5}}{9} = \boxed{} \div \boxed{}$

$= \boxed{} \bullet \boxed{}$

$= \boxed{}$

$\frac{8}{\frac{2}{3}} = \boxed{} \div \boxed{}$

$= \boxed{} \bullet \boxed{}$

$= \boxed{}$

$= \boxed{}$

$\frac{\frac{5}{6}}{\frac{5}{8}} = \boxed{} \div \boxed{}$

$= \boxed{} \bullet \boxed{}$

$= \boxed{}$

$= \boxed{}$

4. Simplify the complex fractions.

Hint: First convert the mixed numbers to improper fractions.

$\frac{3\frac{3}{4}}{\frac{5}{8}} =$

$\frac{\frac{4}{7}}{5\frac{1}{3}} =$

$\frac{2\frac{1}{4}}{1\frac{4}{5}} =$

$\frac{7\frac{1}{3}}{11} =$

Practice

5. Fill in the missing measurements for four different rectangles. If the length is missing, divide the area by the width. If the width is missing, divide the area by the length.

Length	Width	Area
$\frac{3}{4}$ ft	$\frac{1}{2}$ ft	
	$\frac{4}{5}$ cm	2 cm^2
$4\frac{2}{3}$ in		$1\frac{5}{9}$ in^2
	3 m	$8\frac{1}{4}$ m^2

6. There are many chrysanthemums growing in the garden. Choose a chrysanthemum that is NOT yellow and divide its number by the number on a yellow flower. When you find and circle a pair of flowers that has a quotient of 5, YOU WIN and can move on to the review section. If the quotient isn't 5, try again. For an extra challenge, find TWO pairs of flowers with a quotient of 5.

Review

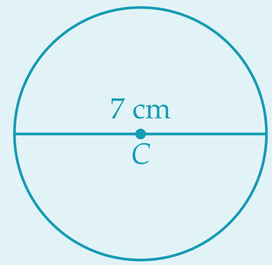
1. Find the missing angle measure for each triangle. Lesson 39

26°, 42°, _____ 50°, 45°, _____

2. Find the missing angle measure for each quadrilateral. Lesson 40

30°, 100°, 45°, _____ 122°, 75°, 105°, _____

3. Using ⊙C, fill in the blanks below. Lessons 41 & 42



radius = __________

diameter = __________

circumference ≈ __________

area ≈ __________

4. Find the percent of each number. Lesson 53

What is 50% of 1.3? What is 8% of 24.8?

5. Allison plays on a soccer team. On the team, 20% of the players are goalies. There are 3 goalies. How many players are on the team? Lesson 54

6. Write and solve an equation for each question. Lesson 55

What percent of 125 is 40? 14 is what percent of 20?

Lesson 58

UNIT 2 REVIEW

Poetry can be a beautiful representation of many parts of life. Robert Frost wrote a poem titled "The Road Not Taken" in 1915. Follow the roads and complete the problems to review the concepts taught in Unit 2. Then enjoy the poem at the end!

PERCENTS Lessons 44, 52–55

Find the percent of each number.

What is 20% of 40? _____

What is 125% of 8? _____

What is 30% of 7.5? _____

What is 60% of $\frac{3}{4}$? _____

Find each whole.

30% of what number is 15? _____

55 is 20% of what number? _____

Find each percent.

What percent of 82 is 41? _____

45 is what percent of 150? _____

SOLVING EQUATIONS Lessons 43, 49–51

Solve each equation.

$a - 2.5 = 4.25$ $\quad$ $22 = b + 5$ $\quad$ $3c = 36$ $\quad$ $\frac{2}{5}d = 8$

See Reference Chart for rules for operations with integers.

ADDITION, SUBTRACTION, MULTIPLICATION & DIVISION OF INTEGERS

Lessons 31 & 32

Complete each problem.

$15 - (-3) =$ _____

$-21 + 7 =$ _____

$5(-6) =$ _____

$-72 \div 9 =$ _____

EXPRESSIONS Lesson 35

Evaluate each expression using the values given.

$a = 3,\ b = \frac{3}{4},\ c = 4.2$

$a^2 - 4b + c$ _____

$3c + a - 8b$ _____

COMPLEX FRACTIONS Lesson 56

Simplify the complex fractions.

$\dfrac{1\frac{3}{4}}{\frac{1}{2}} =$ $\dfrac{\frac{2}{3}}{4} =$ $\dfrac{\frac{1}{4}}{\frac{5}{8}} =$

DISTRIBUTIVE PROPERTY & FACTORING Lessons 47 & 48

Write the second factor in expanded form, and then use the distributive property to multiply.

$3 \bullet 821 =$ $7 \bullet 1{,}028 =$

Factor each expression.

$9+63 =$ $24+18 =$ $75+15 =$

COMPLEMENTARY & SUPPLEMENTARY ANGLES Lesson 38

Find the complementary angle measures.

63° _____ 18° _____

Find the supplementary angle measures.

20° _____ 145° _____

SQUARE ROOTS, CUBE ROOTS & COMBINING LIKE TERMS Lessons 33 & 46

Complete each problem.

$\sqrt{144} - \sqrt[3]{64} =$ _____ $\sqrt[3]{125} + \sqrt{100} =$ _____ $\sqrt{121} \bullet \sqrt[3]{8} =$ _____

Cross out the statements that are not true.

$3a+8b+2a = 5a+8b$ $4x-y = 3xy$

$2r+4r^2 = 6r$ $5m+4n-n = 5m+3n$

LESSONS 59–60

UNIT ASSESSMENT

Instructions

Unit assessments give you practice with the math concepts learned in this unit without having you overpractice concepts that you have mastered. These assessments also give you practice working on math problems for an extended period of time. This helps you to extend focus and attention span and to be better prepared for any type of testing you will have to do in the future. Here are some tips: First, always read the instructions carefully. Sometimes you can get answers wrong simply because you did not understand the instructions. Second, do not rush through exercises you think you already know. Instead, do your work carefully. Sometimes you can get answers wrong, even though you understand the concept, just because you rushed. Finally, if you feel you are having trouble focusing, take a quick break to do something else, like ten jumping jacks, and then come back. There are no videos, mini lessons, or practice problems for Lessons 59–60.

Supplies
- protractor
- colored pencils (optional)

For Lesson 59, complete all the exercises with purple headers only. You may cover the additional practice sections or fold the page to concentrate only on the purple sections. Have your parent or teacher correct the work. If there are mistakes in a section, your parent or teacher will check the orange "Additional Practice" checkbox for that section.

For Lesson 60, complete all the orange sections that are checked. If you still make multiple mistakes, review those sections. All the principles will be reviewed again in upcoming units. If you have only a few or no orange sections to practice, you may move on to the next lesson.

Parents/teachers may determine if the student may use the Reference Chart for the assessment. It is recommended that the student first try the assessment without the Reference Chart and then refer to it if needed.

Student

ADDITION, SUBTRACTION, MULTIPLICATION & DIVISION OF INTEGERS (LESSONS 31 & 32)

Complete each problem.

$5-8=$ _____ $\quad -6-(-7)=$ _____ $\quad -11+4=$ _____

$-3(9)=$ _____ $\quad 48\div(-12)=$ _____ $\quad -81\div(-9)=$ _____

SQUARE & CUBE ROOTS (LESSON 33)

Complete each problem.

$\sqrt{144}+\sqrt[3]{8}=$ _____ $\quad \sqrt[3]{125}\bullet\sqrt{225}=$ _____ $\quad \sqrt[3]{1{,}000}-\sqrt{64}=$ _____

☐ Additional Practice

ADDITION, SUBTRACTION, MULTIPLICATION & DIVISION OF INTEGERS

Complete each problem. See Reference Chart to review operations with integers.

$-14+5=$ _____ $\quad -7-4=$ _____ $\quad 3-(-9)=$ _____

$11(-6)=$ _____ $\quad -45\div 9=$ _____ $\quad -12(-5)=$ _____

☐ Additional Practice

SQUARE & CUBE ROOTS

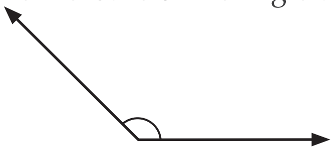
square root: "What number multiplied by itself equals the number under the square root symbol?"

cube root: "What number multiplied three times equals the number under the cube root symbol?"

$\sqrt{100}-\sqrt[3]{27}=$ _____ $\quad \sqrt{121}\bullet\sqrt[3]{64}=$ _____ $\quad \dfrac{\sqrt{36}}{\sqrt[3]{8}}=$ _____

ANGLES
(LESSON 38)

Find the measure of the angle below.



____

Draw an angle that measures 70°.

Find the complementary angle measures.

50° ______ 86° ______

Find the supplementary angle measures.

20° ______ 145° ______

EXPRESSIONS & COMBINING LIKE TERMS (LESSONS 34, 35 & 46)

Use the information to write each expression.

the sum of a number and twelve __________________

the product of thirty-four and a number __________________

Evaluate the expressions when $a = 2$, $b = \frac{1}{2}$, and $c = 3.5$.

$a^3 + 2b - c$ $2c + a - 4b$

______ ______

Simplify the expressions by combining like terms.

$4a + 5b - a + b =$ $9 - 5d + c + 2d =$

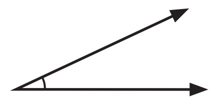
Additional Practice

ANGLES

complementary angles: two angles whose sum is 90°

supplementary angles: two angles whose sum is 180°

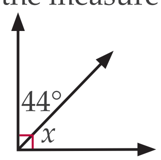
Find the measure of the angle below.



____

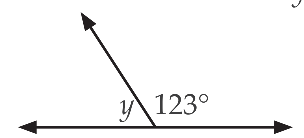
Draw an angle that measures 155°.

Find the measure of $\angle x$.



$m\angle x =$ ______

Find the measure of $\angle y$.



$m\angle y =$ ______

Additional Practice

EXPRESSIONS & COMBINING LIKE TERMS

like terms: terms with the same variables raised to the same power

Use the information to write each expression.

twice a number plus five __________________

the difference between a number and two __________________

Evaluate the expressions when $x = \frac{1}{4}$, $y = 5$, and $z = 2.5$.

$4x + y - z$ $\frac{2z}{y}$

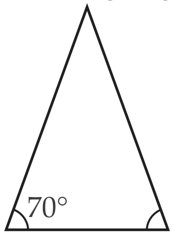
______ ______

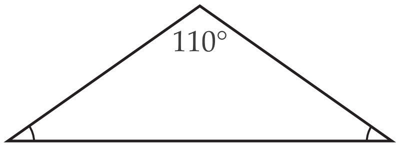
Fill in the blanks to make equivalent expressions.

$3g +$ ______ $= 11g$ $k - 5m +$ _____ $- m = 4k - 6m$

INTERIOR ANGLES OF TRIANGLES & QUADRILATERALS (LESSONS 39 & 40)

Write the missing angle measures on each isosceles triangle.





Find the missing angle measures needed to form quadrilaterals.

60°, 130°, 70°, _____ 102°, 102°, 78°, _____

SOLVING EQUATIONS (LESSONS 43 & 49–51)

Solve each equation.

$a + 12 = 15.5$ $10 = b - 7$ $8c = 48$ $\frac{3}{4}d = 9$

DISTRIBUTIVE PROPERTY (LESSON 47)

Use the distributive property to multiply.

$7(8 + 3 - 5) =$ $11(12 - 2 - 5) =$

Write the second factor in expanded form, and then use the distributive property to multiply.

$9 \bullet 326 =$ $8 \bullet 5{,}021 =$

Additional Practice

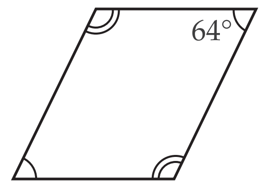
INTERIOR ANGLES OF TRIANGLES & QUADRILATERALS

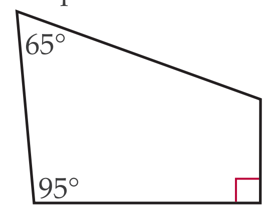
The sum of the interior angle measures of a triangle is 180°.
The sum of the interior angle measures of a quadrilateral is 360°.

Find the missing angle measures needed to form triangles.

45°, 90°, _____ 20°, 100°, _____

Write the missing angle measures on each quadrilateral.





Additional Practice

SOLVING EQUATIONS

Isolate the variable on one side of the equation. Any changes made to one side of an equation must be made to the other side.
Solve each equation.

$16 = a - 2.9$ $7b = 49$ $\frac{c}{8} = 4$ $d + \frac{1}{4} = \frac{2}{3}$

Additional Practice

DISTRIBUTIVE PROPERTY

Distribute the factor outside the parentheses to each value inside the parentheses. Pay close attention to the signs.
Use the distributive property to multiply.

$6(9 + 4 - 7) =$ $12(10 - 5 + 12) =$

Write the second factor in expanded form, and then use the distributive property to multiply.

$7 \bullet 1{,}208 =$ $11 \bullet 419 =$

REFERENCE CHART

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REFERENCE CHART

DIVISIBILITY RULES

A number is divisible by . . .

- **2** if it is an even number.
- **3** if the sum of the digits is divisible by 3.
- **4** if the last two digits of the number are divisible by 4.
- **5** if it ends in either 0 or 5.
- **6** if it is divisible by both 2 and 3.
- **9** if the sum of the digits is divisible by 9.
- **10** if the number ends in 0.

Order of Operations

Step 1: Perform all operations inside **parentheses**.

Step 2: Evaluate all **exponents**.

Step 3: Perform all **multiplication** and **division**, working from left to right.

Step 4: Perform all **addition** and **subtraction**, working from left to right.

Fraction $\frac{9}{20}$ → Divide the numerator by the denominator. → Decimal 0.45 → Move the decimal point two places to the right and write a percent sign. → Percent 45%

Write an equivalent fraction with a denominator of 100. The numerator is the percent.

Percent 85% → Move the decimal point two places to the left and don't write a percent sign. → Decimal 0.85 → The digits to the right of the decimal point are the numerator; the place value of the last digit is the denominator. → Fraction $\frac{85}{100} = \frac{17}{20}$

Write the percent over one hundred.

Formulas

Area

rectangle: $A = bh$

square: $A = s^2$

parallelogram: $A = bh$

trapezoid: $A = \frac{1}{2}(b_1 + b_2)h$

triangle: $A = \frac{1}{2}bh$

Volume

volume of prisms and cylinders:
V = area of base • height

Temperature

temperature conversion formulas:

$F = \frac{9}{5}C + 32$ $\quad C = \frac{5}{9}(F - 32)$

Circles and Semicircles

circumference of a circle: $C = 2\pi r$ or $C = \pi d$

area of a circle: $A = \pi r^2$

area of semicircle: A = area of full circle ÷ 2

perimeter of semicircle: P = circumference ÷ 2 + diameter

Percent Equation: percent • whole = part

Common Conversions

$\frac{1}{2} = 0.5 = 50\%$

$\frac{1}{4} = 0.25 = 25\%$

$\frac{1}{3} = 0.\overline{3} = 33.\overline{3}\%$

$\frac{3}{4} = 0.75 = 75\%$

$\frac{2}{3} = 0.\overline{6} = 66.\overline{6}\%$

$\frac{1}{5} = 0.2 = 20\%$

$\frac{1}{8} = 0.125 = 12.5\%$

Measures of Central Tendency

mean
add then divide

median
in the middle

mode
most often

REFERENCE CHART

PROPERTIES

ASSOCIATIVE PROPERTY

Addition

$(a+b)+c=a+(b+c)$

Multiplication

$(ab)c=a(bc)$

COMMUTATIVE PROPERTY

Addition

$a+b=b+a$

Multiplication

$ab=ba$

DISTRIBUTIVE PROPERTY

Addition

$a(b+c)=ab+ac$

Subtraction

$a(b-c)=ab-ac$

IDENTITY PROPERTY

Addition

$a+0=a$

Multiplication

$a \bullet 1=a$

INVERSE PROPERTY

Addition

$a+(-a)=0$

Multiplication

$a \bullet \frac{1}{a}=1$

Perfect Squares and Cubes

x	x^2	x^3
1	1	1
2	4	8
3	9	27
4	16	64
5	25	125
6	36	216
7	49	343
8	64	512
9	81	729
10	100	1,000
11	121	
12	144	
13	169	
14	196	
15	225	

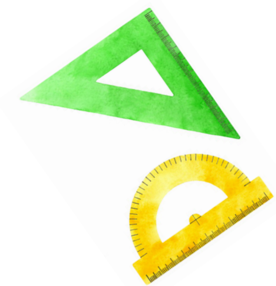
Rules for Adding and Subtracting Two Integers

Addition	
Same Signs	Different Signs
Add the numbers and keep the sign. $5+2=7$ $-5+(-2)=-7$	Subtract the numbers. Use the sign of the greater absolute value. $-2+6=4$ $2+(-6)=-4$

Subtraction
Add the opposite. Follow the addition rules. $7-(-4)=7+4=11$ $-3-8=-3+(-8)=-11$

Rules for Multiplying and Dividing Two Integers

Multiplication & Division	
Same Signs	Different Signs
Answer is positive. $5 \bullet 2=10$ $(-5) \bullet (-2)=10$ $12 \div 4=3$ $(-12) \div (-4)=3$	Answer is negative. $3 \bullet (-6)=-18$ $(-3) \bullet 6=-18$ $8 \div (-2)=-4$ $(-8) \div 2=-4$



CONVERSIONS

Weight

1 lb = 16 oz
1 tn = 2,000 lb

Length

1 ft = 12 in
1 yd = 3 ft = 36 in
1 mi = 1,760 yd = 5,280 ft = 63,360 in

Capacity

1 Tbsp = 3 tsp
1 c = 16 Tbsp
1 c = 8 fl oz
1 pt = 2 c
1 qt = 2 pt
1 gal = 4 qt

Metric Prefixes

kilo-	hecto-	deka-	base unit	deci-	centi-	milli-
1,000	100	10	1	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1,000}$

base unit → gram (mass), meter (length), liter (capacity)

BOOK 2

Simply Good and Beautiful MATH 6

COURSE BOOK

The Good and the Beautiful CURRICULUM

Simply Good and Beautiful MATH 6

COURSE BOOK 2

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The Good and the Beautiful Curriculum

Book 2 Table of Contents

Mini Lesson

Sales tax is money paid to a government on the sale of goods or services. The tax rate varies by location, but it is always a percent of the price of the item.

Finding Tax

To find the amount of tax, use the percent equation.

percent • whole = part

Convert the tax rate (percent) to a decimal and multiply it by the price of the item (whole). Use a variable to represent the sales tax (part).

Example: A ball costs $5, and the tax rate is 3%. What is the sales tax?

Find the amount of tax using percent • whole = part.

$3\% \bullet 5 = t$ Convert 3% to a decimal.

$0.03 \bullet 5 = t$ Multiply.

$t = 0.15$

The tax is $0.15.

Finding the Total Cost

To find the total cost of an item, add the tax to the price of the item.

price of item + tax amount = total cost

Example: What is the total cost of the item from the first example?

$5.00 + $0.15 = $5.15 The total cost is $5.15.

Rounding Sales Tax

When it is necessary to round sales tax, round to the nearest cent, which is the hundredths place.

Example: A book costs $6.99, and the tax rate is 6%. What is the amount of tax and the final cost of the book?

First find the amount of tax.

$6\% \bullet 6.99 = t$ Convert 6% to a decimal.

$0.06 \bullet 6.99 = t$ Multiply.

$t = 0.4194$ The digit in the thousandths place is greater than five, so round up.

The tax is $0.42.

To find the total cost, add the tax to the price of the item.

$6.99 + $0.42 = $7.41 The total cost is $7.41.

If the digit to the right of the place value you are rounding to is less than 5, round down.

If the digit is 5 or more, round up.

Practice

1. Convert each percent to a decimal.

22% = ______ 5% = ______ 17% = ______

18% = ______ 30% = ______ 95% = ______

2. Round to the nearest cent.

$5.3782 ______ $86.095 ______ $100.16493 ______

$19.4571 ______ $3.99602 ______ $62.8435 ______

3. Find the amount of tax for each item. The first row is given as an example.

Price of Item	Tax Rate	Equation	Amount of Tax
$5.25	8%	$0.08 \cdot 5.25 = x$	$0.42
$16	4%		
$28.50	6%		
$4.80	15%		
$9.75	20%		

4. Find the total cost of each item. Round the amount of tax to the nearest cent. Circle the total cost. The first one is given as an example.

price: $12.40
tax rate: 7%
equation to find the tax: $0.07 \cdot 12.4 = t$ $t = 0.868$

amount of tax rounded to the nearest cent: $0.87

equation for the total cost: $\$12.40 + \$0.87 = c$ $c = \$13.27$

price: $10.50
tax rate: 9%
equation to find the tax:

amount of tax rounded to the nearest cent:

equation for the total cost:

price: $31.05
tax rate: 12%
equation to find the tax:

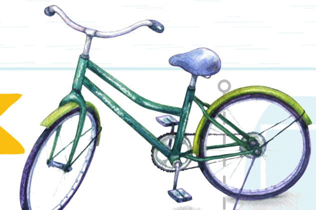
amount of tax rounded to the nearest cent:

equation for the total cost:

price: $15.81
tax rate: 3%
equation to find the tax:

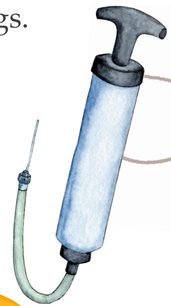
amount of tax rounded to the nearest cent:

equation for the total cost:



Practice

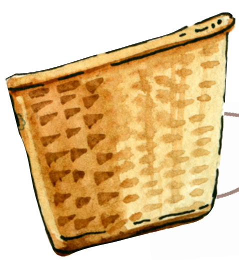
5. Write the total cost on each price tag. If needed, round the amount of tax to the nearest cent. Then number the items from 1 (least expensive) to 4 (most expensive) on the price tags.



price: $16.50
tax rate: 9%
total cost:

price: $14.90
tax rate: 21%
total cost:

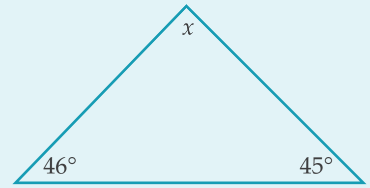
price: $15.91
tax rate: 13%
total cost:



price: $16.23
tax rate: 11%
total cost:

Review

1. Find the missing angle and classify the triangle. Lessons 6 & 39



$x =$ ______

This is a(n) __________

__________ triangle.

2. Find the two whole numbers each square root is between. Lesson 63

$\sqrt{155}$ $\qquad$ $\sqrt{46}$ $\qquad$ $\sqrt{3.2}$

$\sqrt{155}$ is between ___ and ___.

$\sqrt{46}$ is between ___ and ___.

$\sqrt{3.2}$ is between ___ and ___.

3. Find all solutions to the equations. Lessons 61 & 62

$x^2 = 64$ $\qquad$ $\sqrt{x} = \frac{2}{3}$ $\qquad$ $x^3 = -64$ $\qquad$ $\sqrt[3]{x} = 1.2$

4. Simplify each expression. Lesson 46

$1.5a + 16 + 2.7a + 6b - 21$ $\qquad$ $\frac{3}{4}x - 8y + \frac{1}{16}x + 23 - 4y$

5. Multiply or divide. Lessons 9 & 25

$\frac{1}{3} \div 4 =$ $\qquad$ $4 \div \frac{1}{3} =$ $\qquad$ $6\frac{5}{8} \bullet \frac{2}{3} =$ $\qquad$ $16 \bullet 1\frac{1}{2} =$

Lesson 76

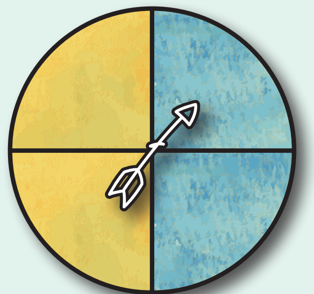
PROBABILITY

Supplies
colored pencils

Watch the video lesson and/or read the mini lesson.

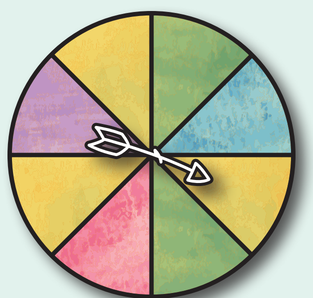
Warm-Up

Answer the questions based on the spinners below.



What fraction of the spinner is blue? _____

What percent of the spinner is blue? _____



What fraction of the spinner is *not* green? _____

What percent of the spinner is pink? _____

Video Lesson

Scan the QR code or watch the video lesson on goodandbeautiful.com/Math6.

Probability of drawing a name with green eyes: _____

Likelihood: _________

Probability of NOT brown or green eyes: _____

Mental Math Checkup

1. Count by 12 from −48 to 60.

   ___, ___, ___, ___, ___, ___, ___, ___, ___, ___

2. Find each percent.

   What is 25% of 120? ___   What is 75% of 200? ___

3. Multiply or divide.

   1,200 ÷ 40 = ___   21 • 400 = ___

Mini Lesson

Probability is the likelihood that an event will happen.
Simple probability is the probability of one event occurring.
Outcomes are the possible results of a probability experiment.

Ways to Express Probability

Probability can be expressed as 0, 1, or fractions between 0 and 1.

Probability can also be expressed as a percent. When probability is called "chance," it is often written as a percent.

Outcomes can be classified using the following terms.

Impossible: 0 or 0%

Unlikely: fractions between 0 and $\frac{1}{2}$ or percents between 0% and 50%

Equally Likely to Happen or Not Happen: $\frac{1}{2}$ or 50%

Likely: fractions between $\frac{1}{2}$ and 1 or percents between 50% and 100%

Certain: 1 or 100%

Probability Scale

0 or 0%		$\frac{1}{2}$ or 50%		1 or 100%
Impossible (will never happen)	**Unlikely** (probably won't happen)	**Equally Likely** (an equal chance of happening or not happening)	**Likely** (probably will happen)	**Certain** (will always happen)

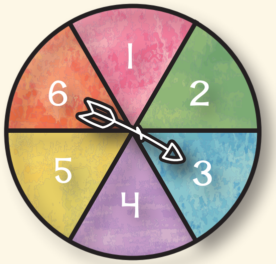
Probability can be used to predict how many times an outcome will occur, such as how many times a die will land on 2 when it is rolled 10 times. The likelihood of something happening and the actual result of an experiment may be different. The more times the experiment is performed, however, the closer the results will get to the true probability.

Writing a Fraction to Show Probability

To write a fraction to show probability, the number of desired outcomes is the numerator, and the number of possible outcomes is the denominator.

$$\frac{\text{number of desired outcomes}}{\text{number of possible outcomes}}$$

Example: What is the probability that the spinner will land on a space with an even number if all sections are the same size?



There are 3 sections with even numbers (2, 4, and 6). Write 3 in the numerator. $\frac{3}{\square}$

There are 6 possible sections the spinner could land on. Write 6 in the denominator. $\frac{3}{6}$

Simplify the fraction. $\frac{3}{6} = \frac{1}{2}$

The probability of landing on a section with an even number is $\frac{1}{2}$.

The probability could also be written as a percent. $\frac{1}{2} = 50\%$

Outcomes Add Up to 1 or 100%

In experiments that involve probability, the probabilities of the outcomes always add up to 1 or 100%.

Examples (with a standard die):

The probability of the die landing on 5 is $\frac{1}{6}$. To find the probability of a die NOT landing on 5, subtract $\frac{1}{6}$ from 1.

$$1 - \frac{1}{6} = \frac{5}{6}$$

There is a $\frac{5}{6}$ probability that the die will NOT land on 5.

The probability of the die landing on 1, 2, or 3 is 50%. To find the probability of the die landing on 4, 5, or 6, subtract 50% from 100%.

$$100\% - 50\% = 50\%$$

There is a 50% probability that the die will land on 4, 5, or 6.

Practice

1. Fill in the blanks to complete the statements.

a. Probability is the ______________ that an ____________ will happen.

b. ___________ _______________ is the probability of one event occurring.

c. Outcomes are the ______________ ______________ of a probability _________________.

d. Probability can be expressed as ____, ____, or fractions between ____ and ____.

2. Color-code the boxes to show the likelihood of the events.

Color	Likelihood
red	impossible
orange	unlikely
blue	equally likely to happen or not happen
yellow	likely
green	certain

How likely is it that your birthday will be on a weekday (Monday–Friday)?

How likely is rolling an 8 on a standard die?

If a coin is flipped, how likely is it to land on heads?

If today is Tuesday, how likely is it that tomorrow will be Wednesday?

There is a 10% chance of rain today. How likely is it to rain today?

3. Write each probability as a fraction or percent.

a. If there is a 25% chance it will rain today, what is the probability that it will NOT rain? _______ (percent)

b. If the probability of rolling a composite number on a standard die is $\frac{1}{3}$, what is the probability of NOT rolling a composite number? ______ (fraction)

c. A number from 1 to 25 is chosen at random. What is the probability that the number will be greater than 15?

_______ (percent) ______ (fraction)

d. A game spinner has 8 equal sections, and exactly 2 of the sections are blue. What is the probability that the spinner will land on blue? ______ (percent)

4. The contents of a bag of marbles are shown below. Use the marbles to answer the questions. Express the answers as fractions.

If you reach into the bag and draw a marble without looking, what is the probability that . . .

a. you will draw a red marble? ______

b. you will draw a yellow marble? _____

c. you will NOT draw a blue marble? _____

Practice

5. Color each event and its probability the same color, and then connect them without crossing any other paths. Use a different color for each path. Use the spinner on the right for all events involving a spinner. The first one is given as an example.

flipping tails on a coin toss	rolling a 6 on a standard die				$\frac{1}{3}$
					$\frac{3}{8}$
		rolling less than 3 on a standard die	spinning green on the spinner	50%	
				$\frac{1}{6}$	
	spinning yellow on the spinner			25%	

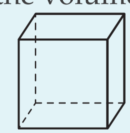
Review

1. Write an expression for each scenario below. Lesson 34

Mechanical pencils come in packs of 8, and wooden pencils come in packs of 12. Karl bought m packs of mechanical pencils and w packs of wooden pencils. How many pencils did he buy?

Nick owns s pairs of shoes, and his sister Courtney owns 3 times as many as Nick does. How many pairs of shoes does Courtney own?

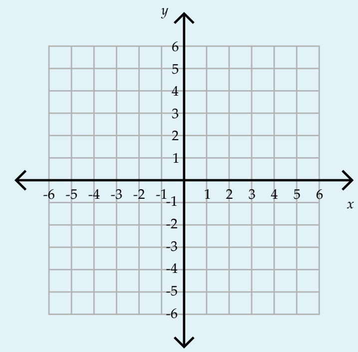
2. Find the volume of the cube. Lesson 73



35 mm

$V =$ ____________________

3. Plot and connect the points P (5, 3) and Q (−3, 3). Then plot a third point, R, in quadrant IV to create an isosceles triangle with a height of 5 units. Find the area of the triangle.
Lessons 6 & 27



$A =$ ____________________

4. Compare the following using <, >, or =. Lessons 32 & 33

$\sqrt[3]{64}(-5)(-2)$ ◯ 40

$-6\left(\sqrt[3]{-8}\right)(-3)$ ◯ $-1(-2)(18)$

$\sqrt{121}(-4)(-2)$ ◯ $\sqrt{400}$

Lesson 86

PROPORTIONS ON A GRAPH

Watch the video lesson and/or read the mini lesson.

Warm-Up

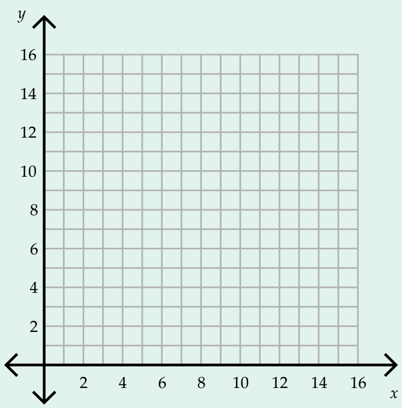
Use the equations to complete the tables. Then use the ordered pairs from each table to graph a line in the first quadrant. Finally, compare and contrast the two graphs by writing one way they are similar and one way they are different.

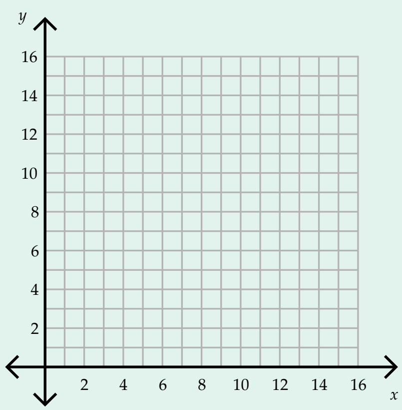
$y = x + 5$

x	0	1	2	3
y				

$y = 5x$

x	0	1	2	3
y				





one similarity: ______________________

one difference: ______________________

Video Lesson

Scan the QR code or watch the video lesson on goodandbeautiful.com/Math6.

a	d
15	20
20	25
25	30

simplified ratios

pounds of rice	cost in dollars
2	5
4	
6	

____

Mental Math Checkup

1. Count down by 9 from 18 to –63.

   ___, ___, ___, ___, ___, ___, ___, ___, ___, ___

2. Find each percent.

   What is 500% of 20? ___ What is 500% of 12? ___

3. Multiply or divide.

   $1{,}200 \div 40 =$ ___ $24 \bullet 20 =$ ___

Mini Lesson

Identifying Proportional Relationships from a Table

Tables can be used to identify proportional relationships. If all ratios in a table are equivalent, there is a proportional relationship between the variables.

Example 1: Is there a proportional relationship between x and y?

x	3	6	9	12
y	7	14	21	28

Simplify all ratios to see if they are equal.

simplified ratio	$\frac{3}{7}$	$\frac{6}{14} = \frac{3}{7}$	$\frac{9}{21} = \frac{3}{7}$	$\frac{12}{28} = \frac{3}{7}$

Since each ratio simplifies to $\frac{3}{7}$, there is a proportional relationship between x and y.

$$\frac{3}{7} = \frac{6}{14} = \frac{9}{21} = \frac{12}{28}$$

Any two ratios from the table can be used to create a proportion. For example, $\frac{6}{14} = \frac{9}{21}$ is a proportion because the ratios are equal. The ratio that describes the relationship in the table is 3 : 7.

Example 2: Is there a proportional relationship between r and s?

r	2	4	6	8
s	10	12	14	16

Simplify all ratios to see if they are equal.

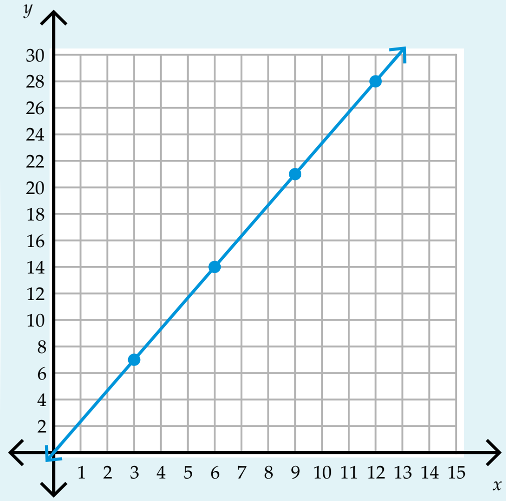
simplified ratio	$\frac{2}{10} = \frac{1}{5}$	$\frac{4}{12} = \frac{1}{3}$	$\frac{6}{14} = \frac{3}{7}$	$\frac{8}{16} = \frac{1}{2}$

Since the ratios do not all simplify to the same fraction, there is NOT a proportional relationship between r and s.

$$\frac{2}{10} \neq \frac{4}{12} \neq \frac{6}{14} \neq \frac{8}{16}$$

Identifying Proportional Relationships from a Graph

When graphed, proportional relationships form a line that goes through the origin.

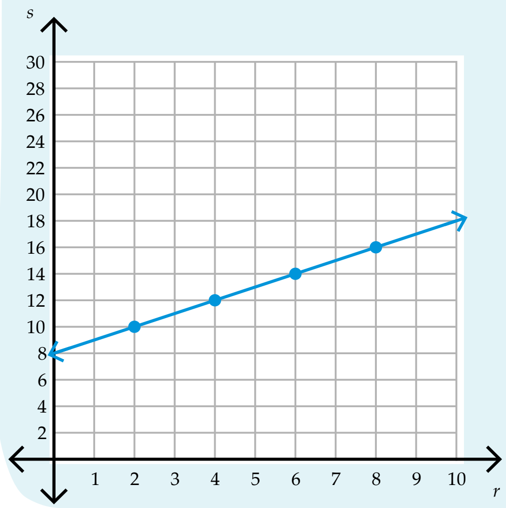


This is a graph of the points from the top table at the left.

The points form a line that goes through the origin, (0, 0).

This graph represents a proportional relationship.

A graph that does not form a line, or one that forms a line but doesn't go through the origin, does not show a proportional relationship between the variables.



This is a graph of the points from the bottom table at the left.

The points form a line, but the line does not go through the origin.

This graph does not represent a proportional relationship.

Practice

1. Put an X through the tables in which the variables do NOT have a proportional relationship.

x	6	9	12	15
y	8	11	14	17

a	6	9	12	15
b	8	12	16	20

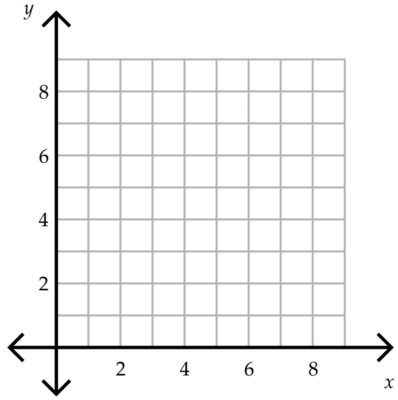
c	5	10	15	20
d	16	32	48	64

e	6	7	8	9
f	6	7	8	9

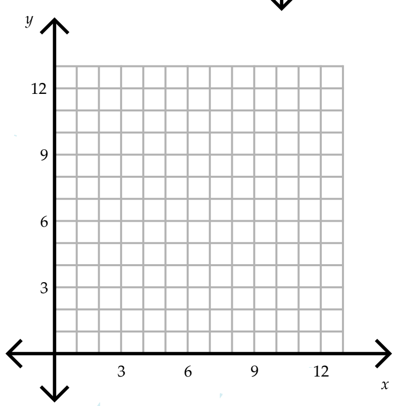
g	2	3	4	5
h	3	4	5	6

2. Fill in the missing values in each table to create a proportional relationship. Then use the ordered pairs from the table to graph a line representing the relationship.

x	y
1	2
2	
3	
4	



x	y
1	3
2	
3	
4	

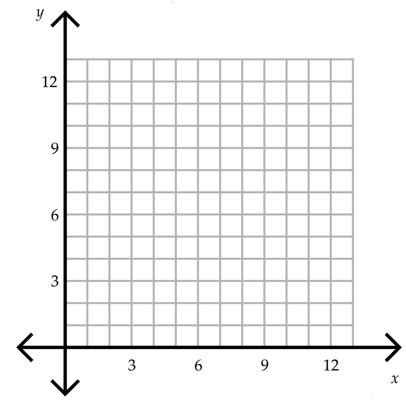


3. Create a ratio table and graph for each scenario and use the table or graph to answer each question.

If 4 bananas cost $1, how much do 12 bananas cost?

______

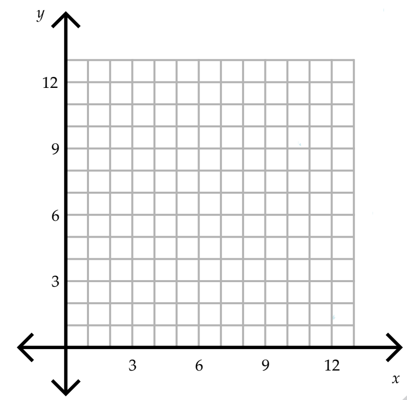
x	y
0	
4	1
8	
12	



If a trail mix has 3 lb of nuts for every 1 lb of dried fruit, how many pounds of dried fruit would be added to 9 lb of nuts?

______

x	y
3	1
6	
9	
12	



ROCK, PAPER, SCISSORS

Before reading the rest of the instructions, write one of the following words in each of the three boxes below: rock, paper, scissors.

a.	b.	c.

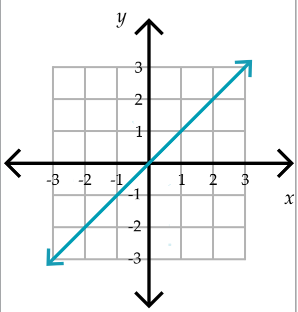
Then, for each graph, circle *yes* if the graph shows a proportional relationship or *no* if it does not.

Finally, find the graph in each row that shows a proportional relationship. If what you wrote in that letter's box beats the graph's title, you win!

Hint: Rock beats scissors, scissors beat paper, and paper beats rock.

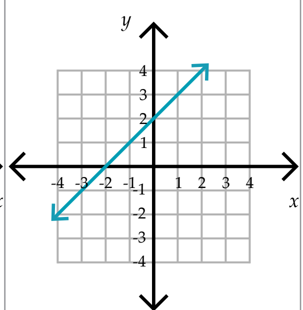
a.

Rock



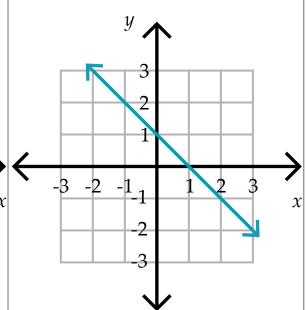
yes no

Paper



yes no

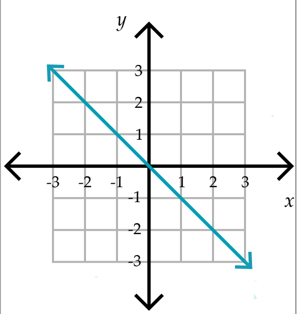
Scissors



yes no

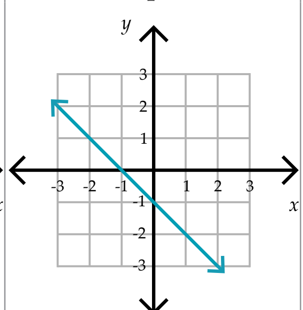
b.

Rock



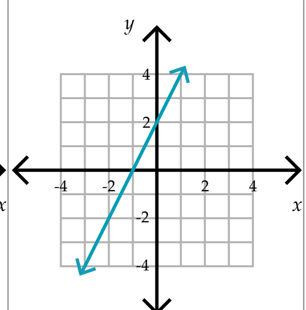
yes no

Paper



yes no

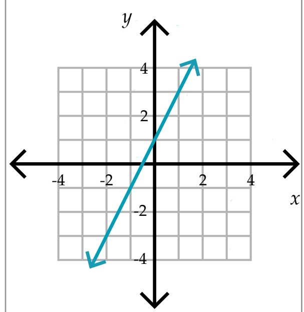
Scissors



yes no

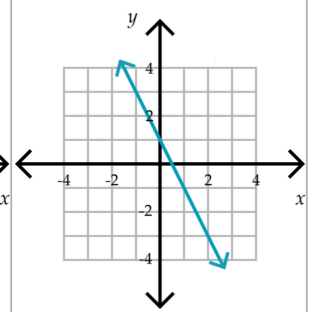
c.

Rock



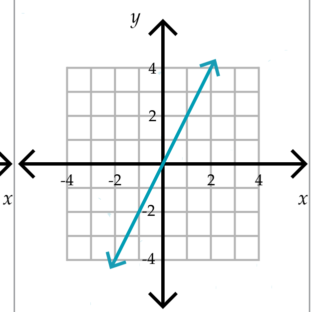
yes no

Paper



yes no

Scissors



yes no

Review

1. Complete the table. Lesson 24

Fraction	Decimal	Percent
$\frac{5}{6}$		
	0.6	
		44%

2. Write the proportion in word form. Lesson 85

9 : 10 = 54 : 60 ______________________________

3. Write and solve an equation for each question. Use n for the variable. Write the percent as a fraction or whole number in simplest form. Lesson 52

What is 200% of 53? equation: ______________

n = ______

What is 28% of 75? equation: ______________

n = ______

CONVERSION: MASS, WEIGHT, LENGTH & CAPACITY (LESSONS 67–69)

Use unit multipliers to convert between units.

8 yd → feet → inches ____________

5,000 mL → deciliters → liters ____________

Add or subtract.

4 lb 9 oz + 2 lb 10 oz = ____________

7 gal 2 qt − 3 gal 3 qt = ____________

FRACTIONS OF A GROUP (LESSON 70)

Write and solve an equation for each question.

What is $\frac{5}{6}$ of 42? ______

What fraction of 50 is 15? ______

40 is $\frac{4}{9}$ of what number? ______

SOLVING TWO-STEP EQUATIONS (LESSON 72)

Solve each equation.

$9p - 4 = 14$ ____________

$\frac{k}{8} + 2 = 7$ ____________

Additional Practice

See Reference Chart for conversions.

CONVERSION: MASS, WEIGHT, LENGTH & CAPACITY

Choose a unit multiplier with the old unit in the denominator. Use unit multipliers to convert between units.

$$\text{old unit} \bullet \frac{\text{new unit}}{\text{old unit}} = \text{new unit}$$

6 kg → grams → milligrams ____________

12,000 cm → meters → hectometers ____________

Add or subtract. Start with the smallest units. Regroup if necessary.

5 Tbsp 1 tsp − 3 Tbsp 2 tsp = ____________

9 yd 1 ft + 3 yd 2 ft = ____________

Additional Practice

FRACTIONS OF A GROUP

The word *of* means *multiply*, and the word *is* means *equals*.

fraction • whole = part

Write and solve an equation for each question.

What fraction of 44 is 8? ______

36 is $\frac{3}{4}$ of what number? ______

What is $\frac{7}{9}$ of 54? ______

Additional Practice

SOLVING TWO-STEP EQUATIONS

First isolate the term with the variable (add or subtract on both sides). Then isolate the variable (multiply or divide on both sides).

Solve each equation.

$8 + 5w = 28$ ____________

$\frac{y}{3} - 6 = 7$ ____________

UNIT 4 OVERVIEW

LESSONS 91–120

Extra Supplies Needed

- colored pencils
- ruler
- scissors
- glue or tape
- protractor
- paper
- tape measure

New Concepts Taught

- solve proportions given part to whole ratios
- solve proportions given part to part ratios
- percent problems with proportions
- unit rates
- corresponding parts of congruent and similar figures
- missing side lengths in similar figures
- parallel lines cut by a transversal
- corresponding angles, alternate interior angles, alternate exterior angles
- polyhedrons and Platonic solids
- statistical questions and surveys
- qualitative and quantitative data
- create circle graphs
- create and interpret line plots with decimal values
- convert square units of area
- conversions using multiple unit multipliers
- calculate measures of central tendency
- interpret and choose measures of central tendency
- create and interpret box plots
- identify first, second, and third quartiles in box plots
- interpret and analyze data displayed graphically
- base 2
- scientific notation
- understand calculator displays and errors on calculators

Concepts Reviewed and Expanded Upon

- scale drawings and map scales
- congruent figures
- similar figures
- regular and irregular polygons
- data, population, sample
- closed-ended and open-ended questions
- bias in statistics
- pictographs
- create and interpret bar graphs
- create and interpret line graphs
- interpret circle graphs
- converting between Fahrenheit and Celsius
- create and interpret histograms
- create and interpret stem and leaf plots
- convert between Fahrenheit and Celsius
- strategies for solving word problems

Lesson 94

SCALE DRAWINGS

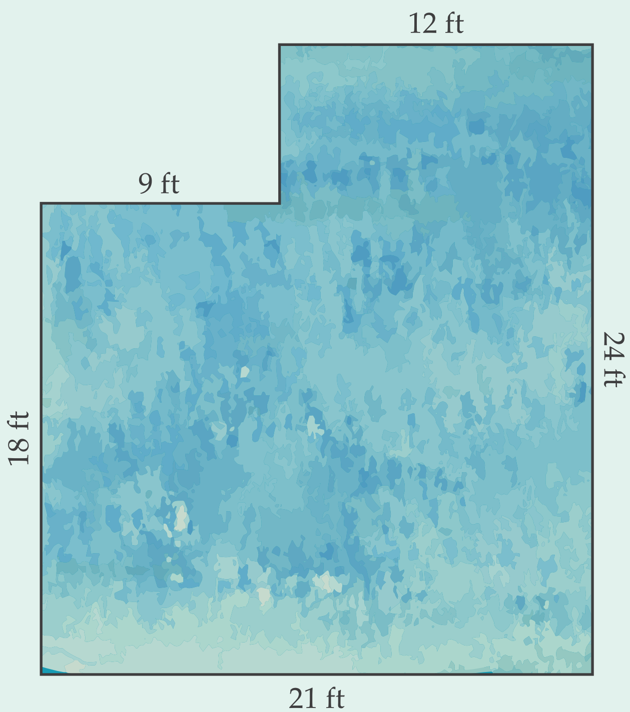
Supplies

ruler

Watch the video lesson and/or read the mini lesson.

Warm-Up

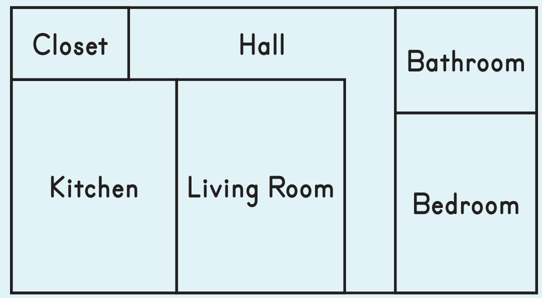
Find the area of the irregular figure.



$A =$ ______________

Video Lesson

Scan the QR code or watch the video lesson on goodandbeautiful.com/Math6.



actual length: ______________ actual width: ______________

Mental Math Checkup

1. Convert each decimal or fraction to a percent.

$0.412 =$ ☐ $\frac{4}{5} =$ ☐ $2.4 =$ ☐

2. Convert each improper fraction to a mixed number or whole number.

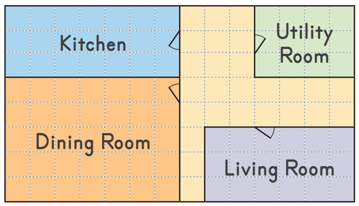
$\frac{75}{25} =$ ☐ $\frac{14}{3} =$ ☐ $\frac{42}{6} =$ ☐

3. Simplify using the order of operations.

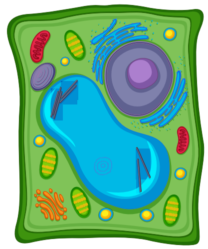
$90 \div 3 + 2 =$ ☐ $50 - 3 \bullet 8 =$ ☐

Mini Lesson

A ***scale drawing*** is a drawing that has been reduced or enlarged from its actual size according to a scale. A ***scale***, sometimes called a scale factor, is a ratio of the measured distance on the drawing to the actual distance. Since a scale is a ratio, a proportion can be created to find actual distances or scaled distances.



This drawing of the first floor of a house has been *reduced* according to a scale. If the scale is 1 cm : 4.5 m, then 1 cm on the drawing represents 4.5 actual meters.



This drawing of a plant cell has been *enlarged* according to a scale. If the scale is 1.5 cm : 0.1 mm, then 1.5 cm on the drawing represents 0.1 actual millimeters.

Finding Actual Distances

To find the actual distance given a scale drawing, create a proportion with the scale as the first ratio. Then use the measured distance and a variable for the unknown actual distance in the second ratio.

Example: Find the actual length, width, and area of the garden pictured below using the scale 1.5 cm : 5 ft.

First, measure the length and width on the drawing.

The length is 4.5 cm, and the width is 3 cm.

Then create a proportion with the scale and each measured distance.

Length: $\frac{1.5 \text{ cm}}{5 \text{ ft}} = \frac{4.5 \text{ cm}}{x \text{ ft}}$

Width: $\frac{1.5 \text{ cm}}{5 \text{ ft}} = \frac{3 \text{ cm}}{y \text{ ft}}$

Note: Be sure the terms of the ratios correspond. In other words, both ratios must take the same form of *measured distance : actual distance*.

Solve each proportion. Units may be left off for calculations.

Length:

$5 \bullet 4.5 = 1.5 \bullet x$

$22.5 = 1.5x$

$15 = x$

The actual length is 15 ft.

Width:

$5 \bullet 3 = 1.5 \bullet y$

$15 = 1.5y$

$10 = y$

The actual width is 10 ft.

Find the area by multiplying the actual length by the actual width.

$A = 15 \text{ ft} \bullet 10 \text{ ft} = 150 \text{ ft}^2$ *The area is 150 ft².*

Finding Scaled Distances

To find the scaled distance given a scale factor, create a proportion with the scale as the first ratio. Then use the actual distance and a variable for the unknown scaled distance in the second ratio.

Example: Using a scale of 1 cm : 2.2 m, find the scaled distance on a drawing for an actual distance of 15.4 m.

$\frac{1 \text{ cm}}{2.2 \text{ m}} = \frac{x \text{ cm}}{15.4 \text{ m}}$ Create and solve a proportion with the scale and the actual distance.

$2.2 \bullet x = 1 \bullet 15.4$

$2.2x = 15.4$

$x = 7$ The scaled distance is 7 cm.

Using a Map Scale

Map scales are often shown as bars like the one below. A ratio for the scale can be created from the image.

To determine a scale, measure the intervals on the bar.

- The distance from 0 to 100 on the bar measures 1 in. Therefore, the scale is 1 in : 100 mi.
- The distance from 0 to 50 on the bar measures 0.5 in. Therefore, the scale is 0.5 in : 50 mi.

The ratios 1 : 100 and 0.5 : 50 are equivalent ratios because they were created from the same map scale.

Practice

1. Write *enlarge* next to each object whose scale drawing would be an enlargement of the actual size and *reduce* next to each object whose scale drawing would be a reduction of the actual size.

blueprints for a house: ______________

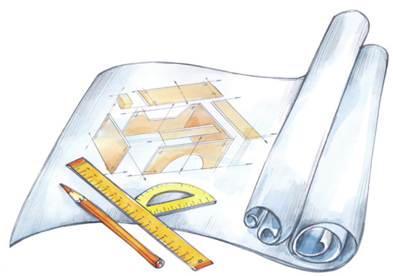
diagram of a human eye: ______________

scale drawing of a horse: ______________

scale drawing of an ant: ______________

scale drawing of a plant cell: ______________

map of a city: ______________



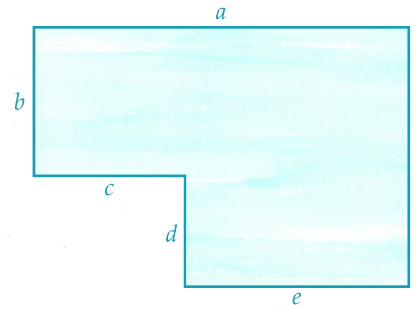
2. Using a scale of 1 in : 2.5 ft, find the scaled distance on a drawing for each actual distance.

5 ft ________ 25 ft ________

12.5 ft ________ 30 ft ________

12 ft ________ 22 ft ________

3. A scale drawing of an irregularly shaped swimming pool is shown below. Find each actual distance using the scale 1 cm : 8 ft.



a ____________ b ____________

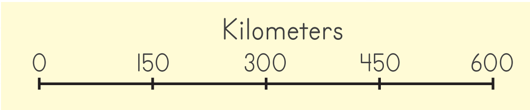
c ____________ d ____________

e ____________

What is the actual area of the pool? ____________

4. Use the centimeter side of a ruler to determine the scale.

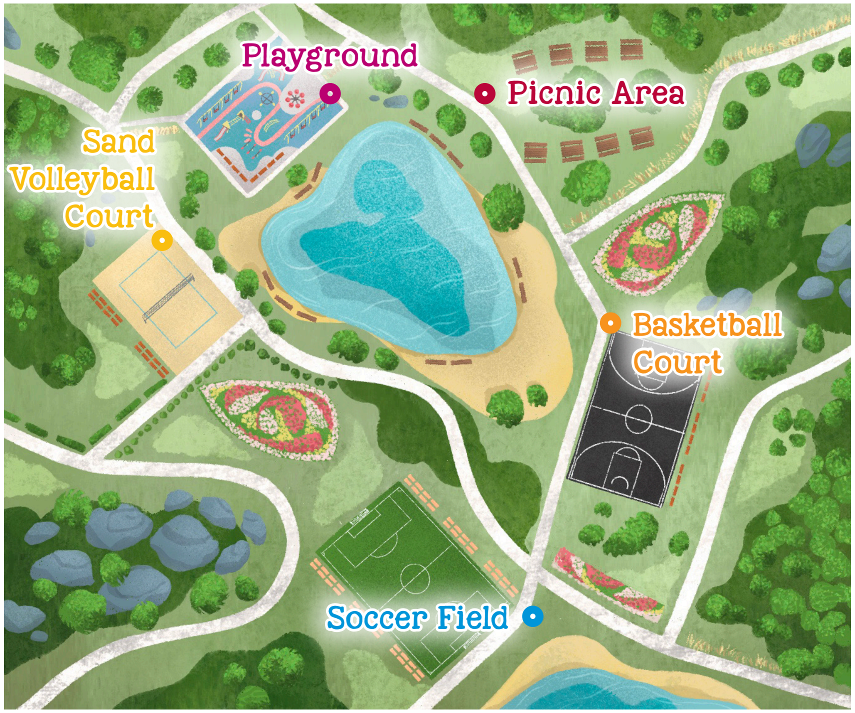
____________ : ____________



____________ : ____________

Practice

5. Use a ruler and the map of a city park below to find each actual distance. The scale is 1 cm : 50 ft.



Actual distance between . . .

playground and picnic area: __________

picnic area and basketball court: __________

sand volleyball court and soccer field: __________

basketball court and sand volleyball court: __________

basketball court and soccer field: __________

playground and sand volleyball court: __________

Review

1. Find the amount of tax and the total price of the item. If needed, round to the nearest hundredth. Lesson 64

price of item: \$33.80 tax amount: __________

tax rate: 6% total price: __________

2. Find the area and circumference of a circle with a diameter of 14 mm. Lesson 42

$A \approx$ ______________ $C \approx$ ______________

3. The ratio of girls to boys on a track team is 3 : 2. If there are 55 members on the track team, how many of them are girls? Lesson 92

4. Add the integers. Lesson 31

$8 + 9 =$ ______ $-8 + (-9) =$ ______

$88 + 53 =$ ______ $-88 + (-53) =$ ______

5. Multiply the integers. Lesson 32

$8 \bullet 9 =$ ______ $-8 \bullet 9 =$ ______

$-8(-9) =$ ______ $8(-9) =$ ______

Lesson 98

PARALLEL LINES CUT BY A TRANSVERSAL

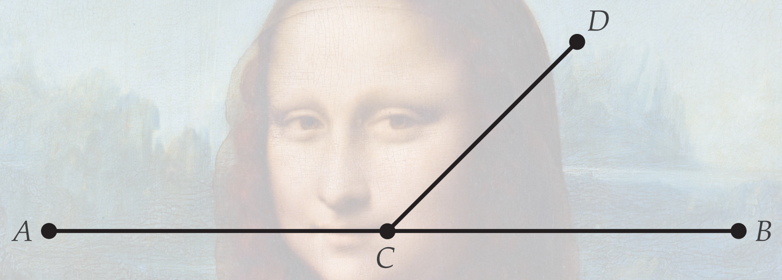
Supplies

protractor

Watch the video lesson and/or read the mini lesson.

Warm-Up

Measure each angle and fill in the blanks below.



$m\angle DCB =$ ______

$m\angle DCA =$ ______

$m\angle DCB + m\angle DCA =$ ______

$m\angle ACB =$ ______

Video Lesson

Scan the QR code or watch the video lesson on goodandbeautiful.com/Math6.

corresponding angles: ___ & ___, ___ & ___	$m\angle 3 = 148°$
___ & ___, ___ & ___	$m\angle 1 =$ ____
alternate interior angles: ___ & ___, ___ & ___	$m\angle 2 =$ ____
alternate exterior angles: ___ & ___, ___ & ___	$m\angle 4 =$ ____
a pair of congruent angles: ___ & ___	$m\angle 5 =$ ____
	$m\angle 6 =$ ____
	$m\angle 7 =$ ____
	$m\angle 8 =$ ____

Mental Math Checkup

1. Convert each percent or fraction to a decimal.

$555\% =$ ☐ $\frac{3}{5} =$ ☐ $80\% =$ ☐

2. Convert each improper fraction to a mixed number or whole number.

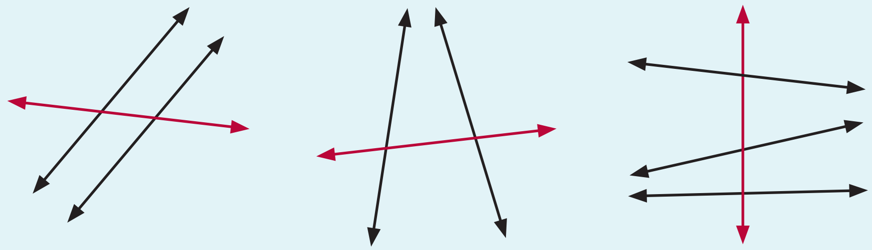
$\frac{31}{10} =$ ☐ $\frac{48}{12} =$ ☐ $\frac{100}{11} =$ ☐

3. Simplify using the order of operations.

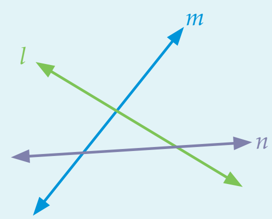
$19 + 8 \div 2 =$ ☐ $10 \bullet 4 - 15 =$ ☐

Mini Lesson

A line that intersects two or more lines is called a ***transversal***. Each of the red lines below is a transversal because it intersects at least two different lines.



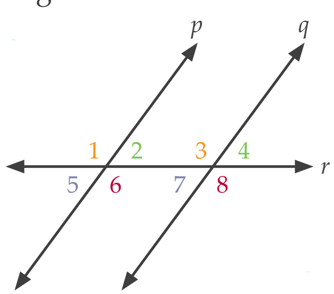
Lines can be named with a letter written next to the line. In the image, line *l* is a transversal for lines *m* and *n* because it intersects both of those lines. Line *m* is a transversal for lines *l* and *n*. Line *n* is a transversal for lines *l* and *m*.



Parallel Lines Cut by a Transversal

Parallel lines are lines that never intersect and are always the same distance apart. When parallel lines are intersected by another line, this is referred to as *parallel lines cut by a transversal*.

When parallel lines are cut by a transversal, eight angles are created. In the image below, lines *p* and *q* are parallel, and line *r* is a transversal. The eight angles are numbered.



Corresponding angles are located in the same position on the parallel lines. The angles below are corresponding angles. Corresponding angles are congruent.

∠1 and ∠3 ∠2 and ∠4 ∠5 and ∠7 ∠6 and ∠8

Interior angles are located between the parallel lines. Angles 2, 3, 6, and 7 are interior angles. *Alternate interior angles* are interior angles that are located on opposite sides of the transversal. The angles below are alternate interior angles. Alternate interior angles are congruent.

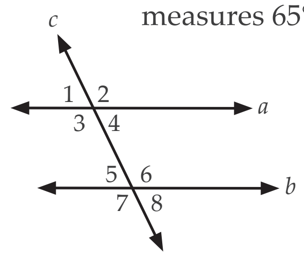
∠2 and ∠7 ∠3 and ∠6

Exterior angles are located outside of the parallel lines. Angles 1, 4, 5, and 8 are exterior angles. *Alternate exterior angles* are exterior angles that are located on opposite sides of the transversal. The angles below are alternate exterior angles. Alternate exterior angles are congruent.

∠1 and ∠8 ∠4 and ∠5

If given one angle measure, all other angle measures can be found. Corresponding angles have equal measures, and angles that form a straight line measure 180°.

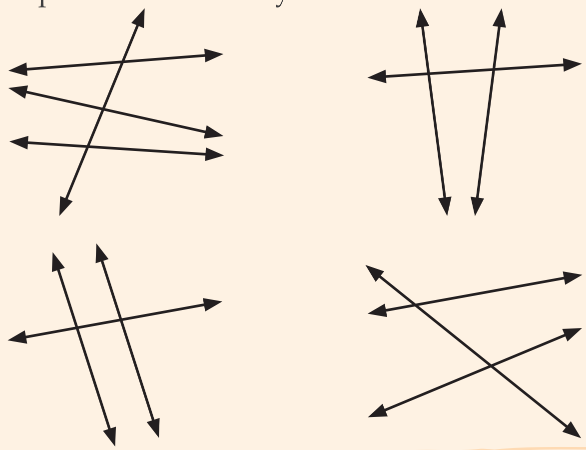
Example: In the figure below, lines *a* and *b* are parallel. If ∠5 measures 65°, find all other angle measures.



- Angles 5 and 1 are corresponding, so m∠1 = 65°.
- Angles 1 and 2 form a line, so 180° minus 65° gives the measure of ∠2. m∠2 = 115°
- Angles 1 and 3 form a line, so 180° minus m∠1 gives the measure of ∠3. m∠3 = 115°
- Angles 2 and 4 form a line, so 180° minus m∠2 gives the measure of ∠4. m∠4 = 65°
- Each of the remaining angles corresponds to an angle whose measure has already been found. Angles 2 and 6 are corresponding, so m∠6 = 115°.
  Angles 3 and 7 are corresponding, so m∠7 = 115°.
  Angles 4 and 8 are corresponding, so m∠8 = 65°.

Practice

1. Circle the transversal in each image below. Then box the image that shows parallel lines cut by a transversal.



2. Write *T* next to statements that are true and *F* next to statements that are false.

____ When parallel lines are cut by a transversal, all interior angles are always congruent.

____ When parallel lines are cut by a transversal, eight congruent angles are always formed.

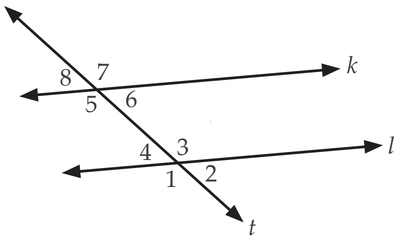
____ A transversal can cross more than two lines.

____ When parallel lines are cut by a transversal, eight angles with eight different measures are formed.

____ Parallel lines cross eventually.

____ When parallel lines are cut by a transversal, corresponding angles are congruent.

3. Lines *k* and *l* are parallel. Use the image to complete the statements.



Name an interior angle. ______

Name an exterior angle. ______

Name a pair of corresponding angles. ______ and ______

Name a pair of alternate interior angles. ______ and ______

Name a pair of alternate exterior angles. ______ and ______

Name a pair of supplementary angles. ______ and ______

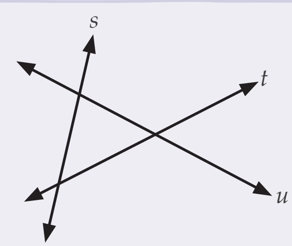
If $m\angle 3 = 133°$, then $m\angle 2 =$ ______.

If $m\angle 3 = 133°$, then $m\angle 5 =$ ______.

If $m\angle 3 = 133°$, then $m\angle 4 =$ ______.

If $m\angle 3 = 133°$, then $m\angle 7 =$ ______.

4.



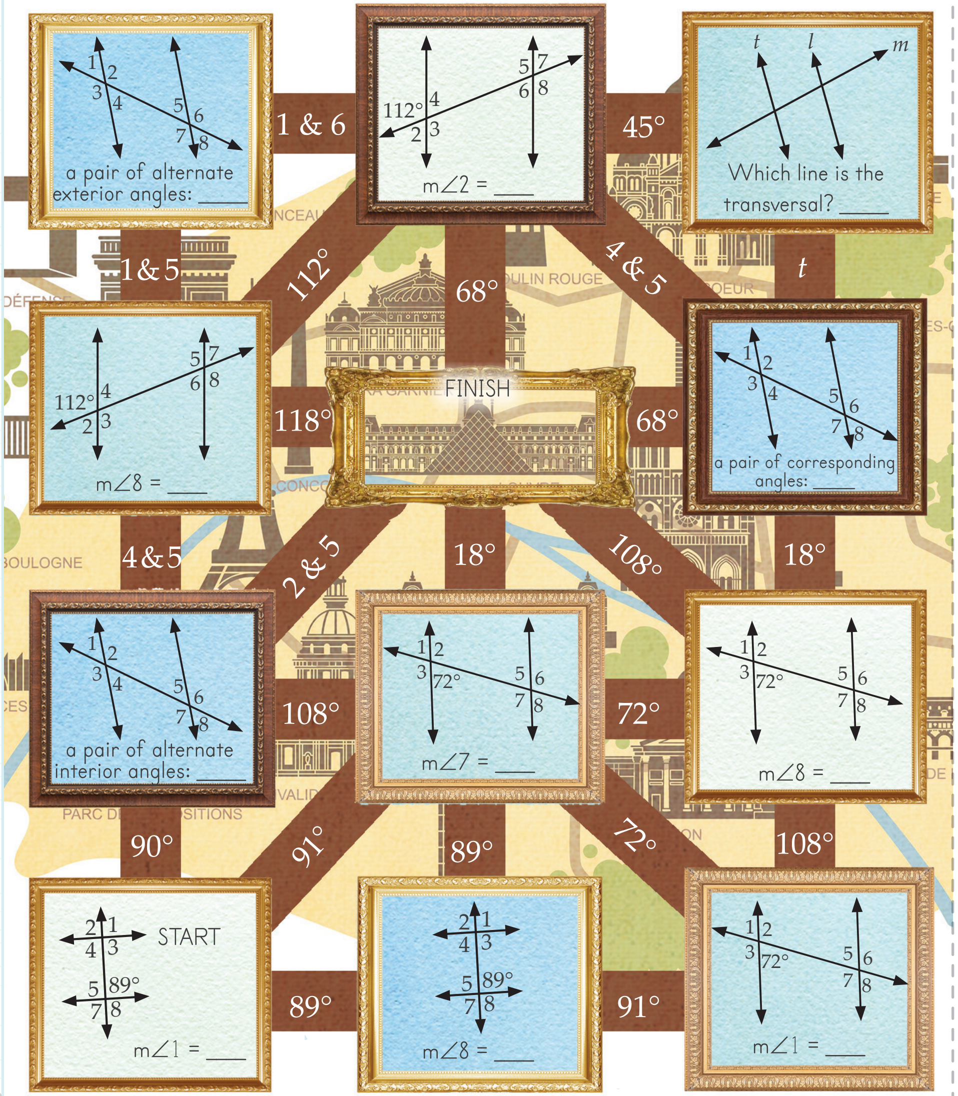
Line ____ is a transversal for lines *s* and *t*.

Line ____ is a transversal for lines *s* and *u*.

Line ____ is a transversal for lines *t* and *u*.

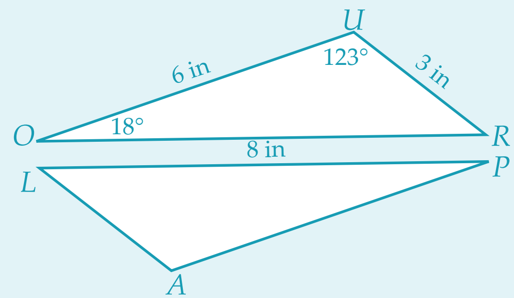
Practice

5. Complete the problem in the START box. Follow the path with the correct answer. Continue until you reach FINISH. All lines cut by a transversal are parallel.



Review

1. The triangles below are congruent. Complete the congruence statements and write the measurements. Lessons 96 & 39



$\triangle OUR \cong$ ____

$\angle RUO \cong$ ____

$m\angle URO =$ ____

$AL =$ ____

2. Solve each proportion using cross products. Lesson 87

$\frac{45}{a} = \frac{10}{8}$ $\qquad$ $\frac{12}{15} = \frac{28}{b}$

$a =$ ____ $\qquad$ $b =$ ____

3. Set up and solve a proportion for the scenario. Lesson 91

If 2 out of every 7 birds in a forest are robins, and there are 65 birds in the forest that are **not** robins, how many robins are in the forest?

____ robins

4. Write the prime factorization of each number using exponents. Lesson 2

72 $\qquad$ 125 $\qquad$ 280

____ $\qquad$ ____ $\qquad$ ____

Lesson 100

INTRODUCTION TO STATISTICS

Watch the video lesson and/or read the mini lesson.

Warm-Up

Write the answers on the lines below.

$33 - (-9) =$ _____

$(-5 + -2 + 4) \div 3 =$ _____

$-2 + 23 =$ _____

Video Lesson

Scan the QR code or watch the video lesson on goodandbeautiful.com/Math6.

population:

____

sample:

____

____

sample size:

____

open-ended / closed-ended

Is the sample biased? ____

Is the question biased? ____

Mental Math Checkup

1. Convert each percent or decimal to a fraction.

$55\% =$ ☐ $0.8 =$ ☐ $0.375 =$ ☐

2. Convert each improper fraction to a mixed number or whole number.

$\frac{26}{8} =$ ☐ $\frac{55}{15} =$ ☐ $\frac{100}{9} =$ ☐

3. Simplify using the order of operations.

$10 \bullet 12 \div 6 =$ ☐ $30 - 5 \bullet 3 =$ ☐

Mini Lesson

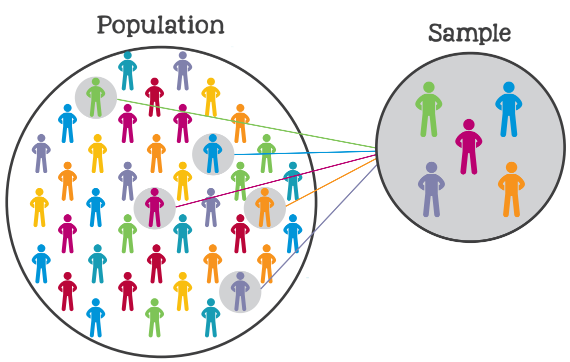
Statistics is a branch of mathematics that deals with collecting, analyzing, and interpreting data. ***Data*** is a collection of information, such as numbers, measurements, or facts. Data can be collected through observation or by asking questions. A statistical question is a question that requires a collection of data in order to be answered and one in which answers can vary or change.

For example, *"What is 5^2?"* is not a statistical question; there is only one answer, and data does not need to be collected. However, the question *"How did 6th-grade students do on the math test?"* is a statistical question. Data would need to be collected to answer this question, and there will be variation among the answers.

The answer to a statistical question could be an average (e.g., Student test scores averaged 82%.) or it could be a range (e.g., Students scored between 74% and 95%.).

Collecting Data

A ***survey*** is a way to collect information from a specific group, often called a population. The population is the entire group in question. Often only part of the population is surveyed. This part is called a ***sample***, or a ***representative sample***, and it represents the whole population. The ***sample size*** is the number of participants being surveyed. Examples of populations and samples are shown below.



Population	Sample	Sample Size
6th-grade students in America	1,000 6th-grade students per state	50,000
Voters in an upcoming town election	800 randomly selected voters	800
Nurses in 10 major hospitals	20 nurses per hospital	200

Closed-Ended and Open-Ended Questions

Surveys can be designed in many ways. Questions in a survey can be closed-ended or open-ended. ***Closed-ended questions*** are questions that give specific choices for answers. ***Open-ended questions*** are questions that do not have restrictions on answers that can be given. Examples of closed-ended and open-ended questions are below.

Closed-Ended Questions	Open-Ended Questions
Would you rather have chocolate or vanilla ice cream?	What is your favorite flavor of ice cream?
What is your favorite season?	What is your ideal outdoor temperature?

Bias in Surveys

Survey questions and samples can be biased or unbiased. Biased questions contain wording that can influence an answer, and biased samples are more likely to choose a certain answer. Bias can lead to errors in survey results. If it is more likely that a certain answer would be chosen based on the phrasing of the question or the sample surveyed, then the question or sample contains bias. Good survey questions and samples are unbiased.

Biased Question	Unbiased Question
Do you think the library has old, outdated books that should be replaced?	Do you think the library book collection should be updated?
Biased Sample	**Unbiased Sample**
100 teenage library patrons	100 randomly selected library patrons

Practice

1. Determine if each question below is a statistical question or not. Write *yes* or *no* on the line.

How many books do high schoolers read each week? ________

How often do families eat dessert? ________

How warm is it supposed to get today? ________

What subject do 6th graders like most? ________

What is half of 24? ________

How many parents prefer cheese pizza over pepperoni? ________

← YES OR NO →

2. For each of the following situations, identify the population, sample, sample size, and whether or not the *sample* is biased. Then write whether the *question* is closed- or open-ended and biased or unbiased.

The Vasquez family is trying to decide on a location for their family reunion for next summer. They ask five aunts their preferred reunion location.

population: ________________________________

sample: ________________________________

biased? yes / no   sample size: ________________________

The question is ______________-ended and ______________ .
open / closed   biased / unbiased

A church is planning a trip to the zoo and wants to know which animals its members most want to see. Ten children, 10 parents, and 10 grandparents from the congregation are asked what their favorite zoo animal is.

population: ________________________________

sample: ________________________________

biased? yes / no   sample size: ________________________

The question is ______________-ended and ______________ .
open / closed   biased / unbiased

The mayor is considering a bridge reconstruction project and wants to know if the town citizens would approve. He decides to ask all 20 employees who work in his office if they think the rickety old bridge should be made safer or not.

population: ________________________________

sample: ________________________________

biased? yes / no   sample size: ________________________

The question is ______________-ended and ______________ .
open / closed   biased / unbiased

Daniel invites his entire chess team to his birthday party. His mom is not sure what kind of pizza to order and asks two of the kids at the next meeting if they prefer sausage or boring old cheese.

population: ________________________________

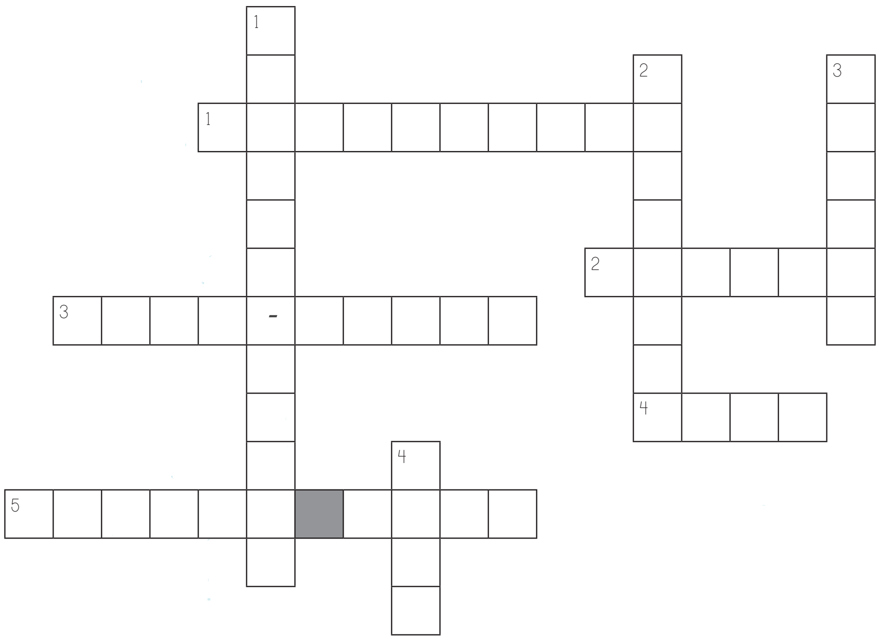
sample: ________________________________

biased? yes / no   sample size: ________________________

The question is ______________-ended and ______________ .
open / closed   biased / unbiased

Practice

3. Use vocabulary from this lesson to fill in the crossword puzzle.



Down

1. a question that gives specific choices for answers
2. a survey whose phrasing and sample selection don't favor a particular answer
3. a way to collect information from a specific group
4. when question phrasing or sample selection leads to a certain answer being more likely

Across

1. A survey collects information about a ______________.
2. a smaller part of the population surveyed, used to represent the whole population
3. a question without restriction on possible answers
4. a collection of information
5. the number of participants being surveyed

SENSATIONAL SURVEY

You are going to create and conduct a survey for today's lesson!

Think of an interesting topic that you can ask a **closed-ended question** about. Look back over the mini lesson or practice problems for some topic ideas. Write your survey question below, making sure that it is not biased.

____

____

____

Next, in the table at the bottom of the page, write 4 or 5 possible answers that people will be able to choose from.

Now consider who your population will be for this survey. Will it be limited to certain groups, certain ages, or people in certain places? Will you be able to survey your entire population? If not, think about how you will choose a sample for your survey and fill in the information below. Aim for a sample size of at least 10–15 people.

Population: ______________________________

Sample: __________________________ Sample size: _____

Is your sample biased in any way? Explain why or why not.

____

____

It's time to conduct your survey on your sample! Fill in the table below with your results.

My Survey Results

Possible Answers					
Tally					

Note: There is no review for this lesson.

Lesson 110

WORD PROBLEM STRATEGIES

There is no video for this lesson.

Word Problem Strategies

Sometimes word problems can seem intimidating at first, but now that you're a secret math agent, you should possess some strategies for tackling them without fear! The "secret" to solving word problems is to determine what is being asked, what information is given, and what information is needed to answer the question. Some word problems include extra information that is not needed.

These strategies may be helpful when solving word problems:

- Draw a picture or diagram.
- Find a pattern.
- Make a list, table, or chart.
- Use a smaller or simpler case.
- Write and solve an equation.
- Guess, check, and revise.

In this lesson you will be introduced to some of these strategies, and then you will practice using them to solve problems.

Determining What Is Asked, Given & Needed

Example: Five friends are going to a movie. Movie tickets cost $9 per person. The theater can seat 300 people. How much will the five friends pay for tickets?

What is being asked? How much will five movie tickets cost?
What is given? 5 friends, $9 per ticket, 300 seats
What is needed? the cost per ticket

TOP SECRET

SECRET CODE CLUES

Today you get to imagine that you are a secret math agent with an upcoming mission in an undisclosed location! Each word problem you solve has a letter or number underneath it. On the last page, write the letter or number from each problem on the line above its answer. When you are finished with the problems, unscramble the letters and/or numbers in each box to learn about your next mission.

It may be helpful to cross out information that is not needed:

Five friends are going to a movie. Movie tickets cost $9 per person. ~~The theater can seat 300 people.~~ How much will the five friends pay for tickets?

Now answer the question. Use a problem-solving strategy if desired. For example, drawing a picture or diagram might be helpful:

$9	$9	$9	$9	$9

$9 + $9 + $9 + $9 + $9 = 5 • $9 = $45. The friends will pay $45.

Determine what is being asked, what is given, and what is needed in the word problem below. Then solve the problem.

1. Bentley is inviting 11 friends over for a barbecue. He will need 24 hot dogs. There are 8 hot dogs in a package, and there are 10 packages of hot dogs in a case. How many packages of hot dogs should Bentley buy?

What is being asked? ______________________

What is given? ______________________

____

What is needed? ______________________

Cross out any information in the word problem that isn't needed.

Answer: ____ packages

S

As you practice each problem-solving strategy, continue to consider what is being asked, what is given, and what is needed.

Draw a Picture or Diagram

Example: Cambree is cutting a 6-foot-long board into pieces that are $\frac{1}{3}$ of a foot long. How many pieces will there be?

1 ft	1 ft	1 ft	1 ft	1 ft	1 ft

The diagram shows each foot of the 6-foot board. The smaller pieces are $\frac{1}{3}$ of a foot. There are 18 of them, so there will be 18 pieces.

Solve the problems on this page by drawing a picture or a diagram.

1. Josh is lining up his toy boats and toy cars next to each other. The boats are 10 cm long, and the cars are 6 cm long. When will the two lines of toys first be the same length?

at ___ cm
R

2. Cadence is laying tile in her foyer, which is a square with an area of 81 ft^2. How many 18-inch by 18-inch square tiles will she need to cover the foyer?

___ tiles
C

3. Robert is planting a garden. One-third of the garden will be corn, and $\frac{1}{3}$ will be potatoes. He will split the remaining area into three parts, two of which will be onions, and one of which will be radishes. What fraction of the garden will be onions, and what fraction will be radishes?

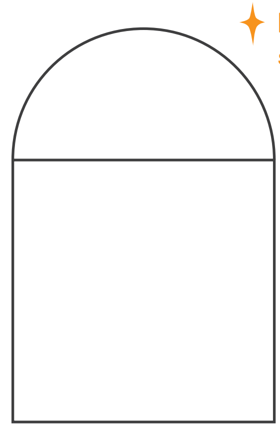
___ onions ___ radishes
O E

4. The perimeter of a rectangle is 58 meters. One side measures 11 meters. What is the area of the rectangle?

___ m^2
M

5. Elias is making a stained glass window that is a square with a semicircle on top of it. The diameter of the semicircle is 6 ft. What is the area of the window?

Hint: A picture is given. Find the area of the square and the semicircle and add them together.



___ ft^2
2

S		C	R		T		C		D	

Make a List, Table, or Chart

Example: If a recipe that makes 30 cookies uses 2 eggs, how many eggs are needed to make 75 cookies?

Make a table. Fill in the given values, and then find the missing values. Continue the table until the desired value is reached.

Eggs	1	2	3	4	5
Cookies	15	30	45	60	75

Five eggs are needed to make 75 cookies.

Solve the problems below by making a list, table, or chart.

1. If two large pizzas cost $17, how much will five large pizzas cost at the same unit price?

$ ______ N

2. How many outfits can be made with three shirts, three pairs of pants, and two pairs of boots? ✦ Hint: Name the shirts S1, S2, and S3; the pants P1, P2, and P3; and the boots B1 and B2. Consider drawing a tree diagram. Develop an organized way to create a list of possible outfits. Then count the outfits on the list.

______ outfits L

Write and Solve an Equation

Example: Six out of 40 science club members are also in a book club. What percent of science club members are in the book club?

Think of what is being asked. ⟶ What percent of 40 is 6?

Write an equation. Use a variable for the unknown. Use multiplication for "of" and equals for "is."

$$x \cdot 40 = 6$$

Divide both sides by 40 to get $x = 0.15$. Because the question asked for a percent, convert the decimal to a percent. $x = 15\%$

15% of science club members are in the book club.

Solve the problems below by writing and solving an equation.

1. Out of 90 restaurant customers, 36 chose roasted asparagus as a side dish. What percent of customers chose the asparagus?

______ % K

2. If you triple Martin's age and add 4, you get his mom's age. Martin's mom is 43. How old is Martin?

______ years old 6

3. Marilyn divides the money in her purse evenly among her 6 grandchildren. If each grandchild receives $4.62, how much money was in Marilyn's purse?

$ ______ Y

Use a Smaller or Simpler Case

Example: What number is multiplied by 55 to get 4,015?

If you're not sure what operation to use to get the answer, think of a smaller or simpler case. For example, what number is multiplied by 5 to get 30? It's 6. And 30 divided by 5 is 6. So to find the answer to the question, divide.

$$4{,}015 \div 55 = 73$$

Solve the problems on this side of the page by thinking of a smaller or simpler case.

1. What number is 19 multiplied by to get 1,558?

A

2. What number do you divide 777.6 by to get 9?
   Hint: Think of a smaller case, such as "What number do I have to divide 27 by to get 9?" and think of the relationships between the numbers.

T

3. What do you have to add to −14 to get 95?
   Hint: What do you have to add to 90 to get 95? What is the mathematical relationship between the numbers?

U

4. What do you have to add to 23.78 to get 32?

J

Congratulations, secret math agent! You have proven that you are ready for more mathematical missions. You are to report to the Palace Museum in Beijing, China. Unscramble the letters to reveal more details about the meeting.

___ ___ ___ ___ ___ ___
$\frac{2}{9}$ 36 36 3 18 40

Meet at the Gallery of ___ ___ ___ ___ ___ ___

___ ___ ___ ___ ___ ___
109 13 27.72 50.13 18 8.22

Date: ___ ___ ___ ___ ___ ___

___ ___ ___ ___ ___ ___ ___ ___
82 3 $\frac{1}{9}$ 86.4 $\frac{1}{9}$ 30 86.4 $\frac{2}{9}$

Your Code Name (a living thing): ___ ___ ___ ___ ___ ___ ___ ___

___ ___ ___ ___ ___ ___
$\frac{2}{9}$ 30 82 42.50 198 $\frac{2}{9}$

Your Mission Leader's Code Name (a color): ___ ___ ___ ___ ___ ___

Note: There is no review for this lesson.

Lesson 118

COURSE REVIEW

Supplies

ruler

There are approximately 18,000 species of butterflies in the world. They come in a variety of colors and sizes and can be found almost all over the world, even in parts of the arctic tundra. You'll learn more about these magnificent insects as you review concepts from Math 6.

Note: Although Lesson 117 was an introduction to calculators, calculators should not be used on this review.

Factors & Factoring

Lessons 2, 3, 48 & 71

Viceroy and monarch butterflies have a lot in common. Their patterns and coloring are almost the same. Throughout this course you have learned to find and use the *greatest common factor* of numbers.

Write the prime factorization of each number. Then find the GCF of the numbers.

140: ________________

GCF: ______

98: ________________

Factor each expression.

$98v+140$ ______________

$15+60m$ ______________

Use the distributive property to simplify each expression.

$11(12+7b+4)$ ______________

$\frac{2}{3}(39f+15)$ ______________

Operations with Fractions, Decimals & Integers

Lessons 9, 12–13, 17, 25, 31–32 & 56

Butterflies have a four-stage life cycle. In the problems below, perform the four basic operations with fractions, decimals, and integers.

Simplify.

$\dfrac{\frac{2}{3}}{\frac{4}{15}}=$ _____

$\frac{5}{8}+\frac{3}{16}=$ _____

$\frac{5}{8}\div\frac{3}{16}=$ _____

$5\frac{1}{2}-2\frac{2}{3}=$ _____

$22.1-1.58=$ _____

$163+98.6=$ _____

$68.04\div 5.4=$ _____

$19.2\bullet 8.5=$ _____

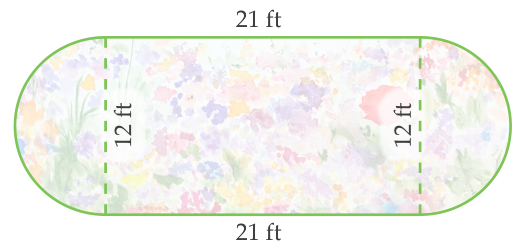
$29+(-56)=$ _____

$-23\bullet 15=$ _____

Area, Perimeter & Volume

Lessons 22, 42, 73 & 107

Butterflies are pollinators. Suppose a flower garden with the outline shown below was planted to attract butterflies. Find the area and perimeter of the garden. Use 3.14 for π.



$A\approx$ ________ ft^2

$P\approx$ ________ ft

Convert the area to square yards.

$A\approx$ ________ yd^2

Suppose the butterfly conservatory at a botanical garden is built in the shape of a rectangular prism. The area of the base is 9,200 ft^2, and it is 20 feet tall. Find the volume of the conservatory in cubic feet.

$V=$ __________ ft^3

Converting Units & Scientific Notation

Lessons 67–69, 106, 109 & 116

Suppose that a pupa (chrysalis) took two weeks to transform into a butterfly. Convert two weeks to hours.

2 weeks = ________ hours

A female Queen Alexandra's birdwing has a wingspan of up to 28 cm and can weigh up to 12 g. Convert 28 cm to kilometers, and then rewrite the answer in scientific notation. Convert 12 g to milligrams, and then rewrite the answer in scientific notation.

28 cm = _________ km = ____ × ________ km

12 g = __________ mg = ____ × ________ mg

Butterflies are cold-blooded, and most are unable to fly when the temperature is below 60 °F. Convert 60 °F to degrees Celsius. Round to the nearest tenth.

60 °F ≈ ______ °C

Suppose a watering can at a botanical garden holds 1.5 gallons. How many cups does it hold?

_____ c

Solving Equations & Inequalities

Lessons 49–50, 61–62, 72 & 81

Solve each equation or inequality.

$7.2b = 64.8$ | $89 = 8u - 15$

$b =$ _____ | $u =$ _____

$t^2 = 64$ | $e + 15 = -2$

$t =$ _____, $t =$ _____ | $e =$ _____

$\sqrt[3]{r} = -4$ | $\frac{f}{8} - 41 = 11$

$r =$ _____ | $f =$ _____

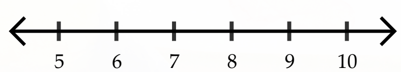
$12 \geq 3l + 9$

____

Solve the inequality and graph the solution on the number line below.

$8y - 47 > 17$

____



Percents, Ratios & Proportions

Lessons 52–55, 85 & 91–93

Some butterflies use camouflage to avoid predators. Some species eat toxins as caterpillars and become poisonous. Other species have coloring similar to poisonous species, so predators avoid them as well.

Just as there is more than one way for butterflies to avoid predators, you have learned more than one way to solve problems involving percents. Solve each problem below using the method of your choice.

What is 15% of 114? _____

30 is 24% of what number? _____

84 is what percent of 120? _____

The ratio of children to adults at a butterfly conservatory is 2 : 5. There are 203 people at the conservatory.

How many of them are children? _____

Three out of every 16 butterflies in a butterfly conservatory are monarchs. There are 546 butterflies that are NOT monarchs.

How many butterflies are in the conservatory? _____

Percent Discounts & Tax

Lessons 64 & 65

Alek plans to buy a pair of binoculars for observing butterflies. Find each amount below. Round to the nearest cent.

original price: $18.98

percent discount: 10%

tax rate: 6%

amount of discount: _________

sale price: _________

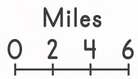
amount of tax: __________

total cost: __________

Scale Drawings

Lesson 94

Brian and Arlene are using a city map to find a butterfly conservatory. Use a ruler (centimeter side) to find the map scale.



____________ : ____________

Arlene measures the distance from their hotel to the conservatory on the map. The measured distance is 0.75 cm.

What is the actual distance? ____________

Proportions on a Graph

Lessons 82 & 86

Create a ratio table and answer the questions for the scenario below. Then graph the equation.

If 4 tickets to a butterfly conservatory cost $10, how much will 6 tickets cost? ______

x	y
2	
4	10
6	
8	

Write an equation to represent the scenario.

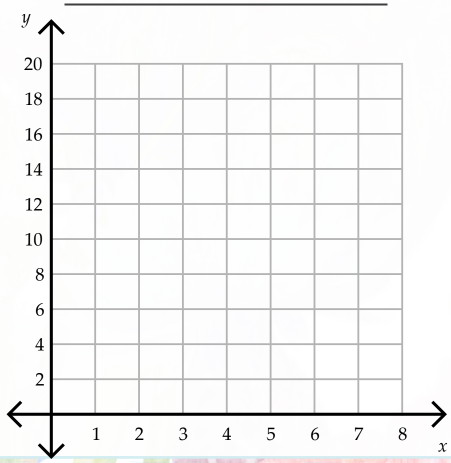
____

What is the independent variable?

____

What is the dependent variable?

____



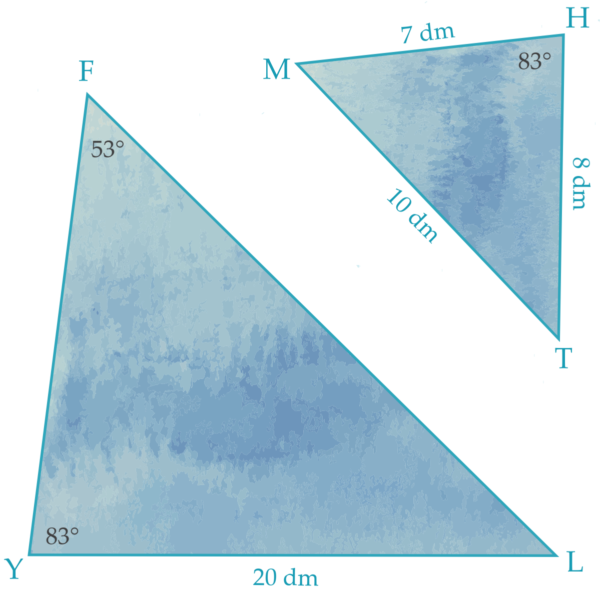
Similar Figures

Lessons 6, 96 & 97

Butterflies and moths are genetically *similar*.

Complete the statements below for the *similar* triangles.

$\triangle MTH \sim \triangle FLY$



$m\angle FLY =$ _____

$m\angle TMH =$ _____

$m\angle MTH =$ _____

$FY =$ ________

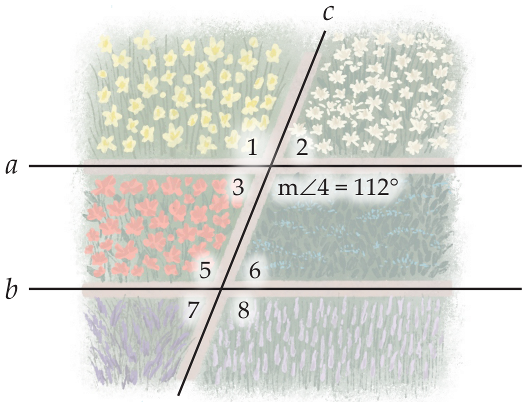
$FL =$ ________

$\angle YFL \cong$ _______

Parallel Lines Cut by a Transversal

Lesson 98

The image below shows some paths at a butterfly conservatory. Paths *a* and *b* are parallel. Use the image to complete the problems below.



Which angle corresponds with ∠4? ____

List a pair of alternate exterior angles.

_____ & _____

Write an angle that is supplementary to ∠4.

_____

Find the angle measures.

m∠1 = ______ m∠2 = ______

m∠3 = ______ m∠5 = ______

m∠6 = ______ m∠7 = ______

m∠8 = ______

Statistics & Circle Graphs

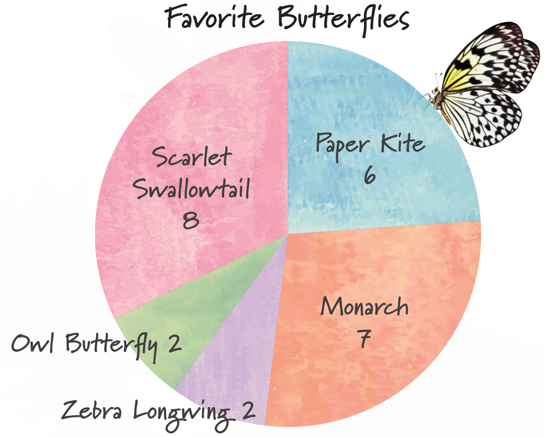
Lessons 100–102

Students who visited a butterfly conservatory were asked which of the five species below was their favorite.

Is the question a statistical question? ____

Is the question open-ended or closed-ended?

(circle one) *open-ended / closed-ended*



What is the sample size? _____

Write the percent of students who chose each species as their favorite.

Paper Kite: _____

Monarch: _____

Zebra Longwing: _____

Owl Butterfly: _____

Scarlet Swallowtail: _____

Measures of Central Tendency & Box Plots

Lessons 111 & 113

A scientist who specializes in the study of butterflies and moths is called a lepidopterist. Suppose a lepidopterist tracked the life span of 20 butterflies at a conservatory. The list below represents the number of days each butterfly lived. Write the data values in numerical order and find the measures below. Then create a box plot from the data.

12, 7, 5, 15, 6, 8, 10, 12, 11, 15,
13, 12, 5, 16, 13, 8, 12, 16, 9, 15

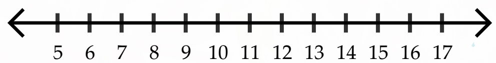
Data in order: ____, ____, ____, ____, ____,
____, ____, ____, ____, ____, ____, ____, ____,
____, ____, ____, ____, ____, ____, ____

mean: ______ mode: ______

min: ______ max: ______ range: ______

median: ______ Q1: ______ Q3: ______

IQR: ______



LESSONS 119-120

COURSE ASSESSMENT

Instructions

- This assessment is different from the other assessments you have taken in Math 6. Instead of covering only concepts taught in Unit 4, this assessment covers concepts you have learned throughout the entire course, and the problems are designed to assess multiple skills. For example, a single complex fractions problem in the fraction and integer operations section covers concepts such as dividing fractions, canceling before multiplying, multiplying fractions, plotting a fraction on a number line, and converting an improper fraction to a mixed number or whole number. This assessment does not cover every skill you learned in Math 6; instead, it focuses on skills you need to know to successfully start Math 7. Here are some tips: First, read the instructions carefully. Second, do not rush through the problems. Third, if you start to get frustrated with one section, skip to a different section and then come back later. The sections do not need to be completed in order.
- **For Lesson 119,** complete all the exercises with purple headers only. You may cover the additional practice sections or fold the page to concentrate only on the purple sections. Have your parent or teacher correct the work. If there are mistakes in a section, your parent or teacher will check the orange "Additional Practice" checkbox for that section.
- **For Lesson 120,** complete all the orange sections that are checked. If you still make multiple mistakes, review those sections.
- Parents/teachers may determine if the student may use the Reference Chart for the assessment. It is recommended that the student first try the assessment without the Reference Chart and then refer to it if needed.

Although Lesson 117 was an introduction to calculators, calculators should not be used on the assessment.

Student

FACTORS & FACTORING
(LESSONS 2, 3, 48 & 71)

Find the prime factorization of each number. Then find the GCF of the numbers.

48: ______________________________

GCF: _____

56: ______________________________

Factor each expression.

$9 + 48 =$ $7b + 56 =$ $48 + 56q =$

☐ Additional Practice

FACTORS & FACTORING

Separate each composite number into a factor pair until every factor is a prime number.

Find the prime factorization of each number. Then find the GCF of the numbers.

36: ______________________________

GCF: _____

42: ______________________________

This template can be used for factoring: ___(___ + ___). Write the GCF in the first blank and determine what terms multiplied by the GCF equal the terms in the expression.

Factor each expression.

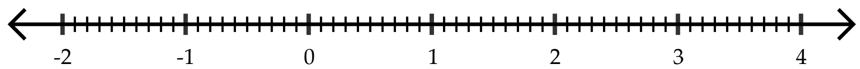
$3 + 42 =$ $12 + 36t =$ $42r + 36 =$

FRACTION AND INTEGER OPERATIONS
(LESSONS 9, 14, 25 & 56)

Simplify. Then plot the answers on the number line below.

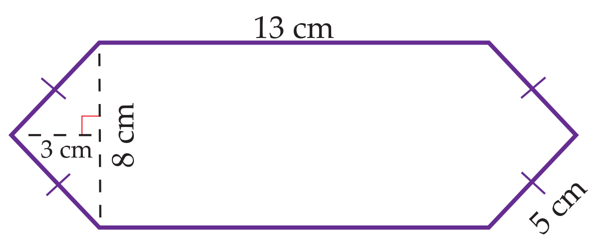
$\dfrac{\frac{7}{5}}{\frac{14}{15}} =$ $-4 \div 4 =$ $\dfrac{18}{4} - \dfrac{7}{2} =$

$2 - (-2) =$ $\dfrac{2}{5} + \dfrac{5}{5} =$



GEOMETRIC FIGURES
(LESSONS 7, 21, 22 & 73)

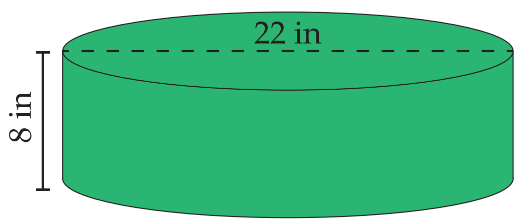
Find the perimeter and area of the figure.



$P =$ ________

$A =$ ____________

Find the volume of the solid. Use 3.14 for π.



$V \approx$ ______________

Additional Practice

FRACTION AND INTEGER OPERATIONS

Find common denominators before adding or subtracting.

$\dfrac{30}{6} - \dfrac{13}{3} =$ $\dfrac{1}{5} + \dfrac{14}{5} =$

Cancel before multiplying. Multiply the numerators; multiply the denominators. To divide, multiply the first number by the reciprocal of the second number. A complex fraction is division.

$\dfrac{2}{3} \bullet \dfrac{6}{2} =$ $\dfrac{\frac{3}{8}}{\frac{1}{4}} =$

Integer operations rules:

Addition: add and keep the sign

Subtraction: subtract and use the sign of the greater absolute value

Multiplication/Division: same signs → answer is positive
different signs → answer is negative

$-4 \div 2 =$ $-10 - 5 =$

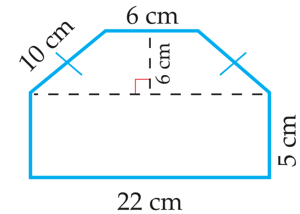
Additional Practice

See Reference Chart for area formulas.

GEOMETRIC FIGURES

To find the volume of a prism or cylinder, multiply the area of the base by the height. $V =$ *area of base* • *height*

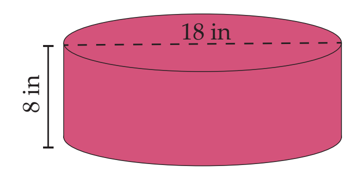
Find the perimeter and area of the figure.



$P =$ ________

$A =$ ____________

Find the volume of the solid. Use 3.14 for π.



$V \approx$ ______________

NUMBER PATTERNS & DEPENDENT & INDEPENDENT VARIABLES (LESSONS 10 & 82)

Determine the rule, fill in the blanks, and circle A for arithmetic or G for geometric.

8, 11, 14, ____, ____, ____ rule: _______ A or G

1, 3, 9, ____, ____, ____ rule: _______ A or G

Complete the input-output table using the equation given.

$$y = \frac{x}{4}$$

x	y
–12	
–4	
8	
20	

Fill in the missing values in the table and write the equation.

x	y
–1	–3
0	–2
2	
6	

equation:__________

DECIMAL OPERATIONS (LESSONS 12, 13, 16 & 17)

Simplify.

$3.0582 + 1.43 =$ $10.7035 - 8.35 =$

$7.92 \div 3.96 =$ $8.75 \bullet 0.32 =$

Additional Practice

NUMBER PATTERNS & DEPENDENT & INDEPENDENT VARIABLES

Arithmetic sequences add or subtract the same value each time. Geometric sequences multiply or divide by the same value each time. Determine the rule, fill in the blanks, and circle A for arithmetic or G for geometric.

32, 16, 8, ____, ____, ____ rule: _______ A or G

4, 9, 14, ____, ____, ____ rule: _______ A or G

Complete the input-output table using the equation given.

$$y = 3x$$

x	y
–10	
–2	
6	
15	

Determine the rule. Fill in the missing values. Use the variables and the rule to write the equation.

x	y
–1	2
0	3
2	
6	

equation: __________

Additional Practice

DECIMAL OPERATIONS

Line up the decimal points to add or subtract the numbers.

$2.765 + 1.123 =$ $8.4035 - 7.035 =$

Multiply the numbers. Count the number of decimal places in both factors to know where to write a decimal point in the answer.

$2.05 \bullet 1.2 =$

Move the decimal point in the divisor to make a whole number and move the decimal point in the dividend the same number of places to the right. Divide as usual.

$10.75 \div 5 =$

SOLVING EQUATIONS & DISTRIBUTING (LESSONS 20, 26, 31, 32, 43, 47, 49–51 & 72)

Simplify the expressions.

$3(k-4)=$ ________ $a(8+3^2+2)-5=$ ________

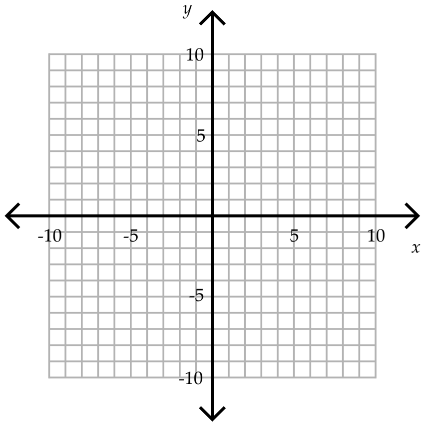
Solve the equations.

$16+5b=11$ $1-\frac{3}{2}t=19$

COORDINATE GRID & GRAPHING LINES (LESSONS 27 & 83)

Use the equation $y=x-5$ to complete the table and graph below.

x	y
–2	
0	
5	
8	



Which quadrant does the line not pass through? _____

CUBE ROOTS AND SQUARE ROOTS (LESSONS 33, 61 & 62)

Solve the equations.

$\sqrt{x}=6$ $z^3=-8$ $64=x^2$

Additional Practice

SOLVING EQUATIONS & DISTRIBUTING

Order of Operations: parentheses, exponents, multiplication and division (left to right), addition and subtraction (left to right)

Simplify the expressions.

$4(m-10)=$ ________ $5^2+8\div2=$ ________

Isolate the variable on one side of the equation. Any changes made to one side of an equation must be made to the other side. Solve each equation.

$6+2n=24$ $12-7p=54$

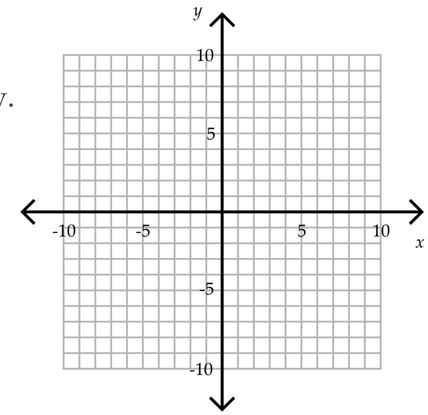
Additional Practice

COORDINATE GRID & GRAPHING LINES

Substitute each x-value into the equation and find the corresponding y-value. Each row is an ordered pair. Plot and connect the ordered pairs. Substitute an x-value in the equation or find the x-value on the graph to find a missing y-value.

Use the equation $y=x+3$ to complete the table and graph below.

x	y
–5	
0	
2	
6	



Which quadrant does the line not pass through? _____

Additional Practice

CUBE ROOTS AND SQUARE ROOTS

Variable under a square/cube root sign: square/cube both sides
Squared/cubed variable: take the square/cube root of both sides
An equation with a squared variable has two solutions.

Solve the equations.

$\sqrt{x}=7$ $z^3=-27$ $16=x^2$

CONVERSION WITH UNIT RATES AND UNIT MULTIPLIERS
(LESSONS 67–69, 95, 107 & 109)

If 5 cucumbers cost $2.90, how much do 7 cucumbers cost? _____

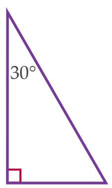
How many tablespoons are in 0.5 gallons? _____

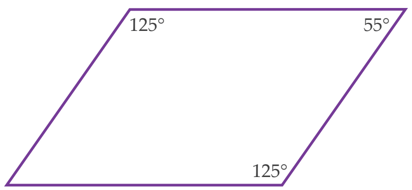
ANGLE MEASURES
(LESSONS 37, 39 & 40)

Classify each angle by its degree measure. Write **A** for acute, **R** for right, **O** for obtuse, and **S** for straight.

23° ____ 90° ____ 180° ____ 145° ____

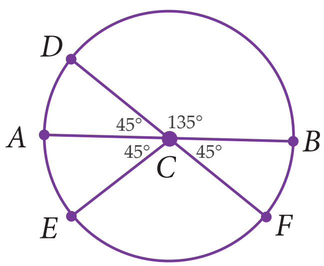
Find the missing angle measures.





CIRCLES & SEMICIRCLES
(LESSONS 41 & 42)

Find the measure of central angle ECF. Name a diameter and radius of ⊙C.



m∠ECF = _________

diameter: __________

radius: __________

Find the circumference and area of ⊙C if the diameter measures 6 inches.

C = __________ A = __________

See Reference Chart for conversions.

Additional Practice

CONVERSION WITH UNIT RATES AND UNIT MULTIPLIERS

Choose a unit multiplier with the old unit in the denominator. Use unit multipliers to convert between units.

$$\text{old unit} \bullet \frac{\text{new unit}}{\text{old unit}} = \text{new unit}$$

If 3 slices of pizza cost $3.75, how much do 8 slices cost? _________

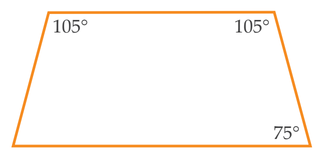
How many centimeters are in 1.5 kilometers? _________

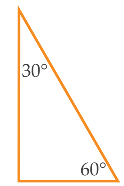
Additional Practice

ANGLE MEASURES

Acute angle: less than 90° Right angle: 90°
Obtuse angle: between 90° & 180° Straight angle: 180°
The sum of the interior angle measures of a triangle is 180°. The sum of the interior angle measures of a quadrilateral is 360°.

Find the missing angle measures and classify them as acute (**A**), right (**R**), obtuse (**O**), or straight (**S**).

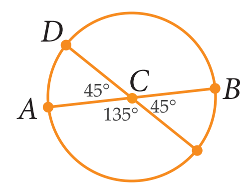




Additional Practice

CIRCLES & SEMICIRCLES

Sum of the nonoverlapping central angles of a circle: 360°
Sum of the nonoverlapping central angles of a semicircle: 180°
Find the measure of central angle BCD.



m∠BCD = _________

Find the circumference and area of ⊙C if the radius measures 4 inches. Use 3.14 for pi.

$C \approx$ __________ $A \approx$ __________

See Reference Chart for circle formulas.

SOLVING PERCENT PROBLEMS
(LESSONS 44, 52–55, 64 & 65)

Find the total cost.

price: $375

percent discount: 25%

amount of discount: ________

sale price: ____________

tax rate: 5%

tax amount: _________

total cost: ___________

30% of what number is 15?__________

75 is what percent of 200?__________

SIMPLE & COMPOUND PROBABILITY
(LESSONS 76 & 77)

What is the probability of rolling a number less than 5 on a standard die?

______ (fraction) ______ (percent)

What is the probability of flipping heads on a coin and then getting blue on a spinner with 3 equal sections colored red, yellow, and blue?

______ (fraction)

FRACTIONS OF A GROUP
(LESSON 70)

What is $\frac{3}{5}$ of 115? __________

10 is $\frac{2}{7}$ of what number? __________

What fraction of 18 is 60? __________

Additional Practice
SOLVING PERCENT PROBLEMS

Use the formula percent • whole = part to find the amount of discount. Find the sale price first by subtracting the discount. Then find the amount of tax on the sale price using the formula above and add the tax to the sale price to find the total cost. Find the total cost:

price: $400

percent discount: 45%

amount of discount: ____________

sale price: ____________

tax rate: 5%

tax amount: _______

total cost: ________

Convert the percent to a decimal or fraction and write a variable for the whole. Then solve the equation.

15% of what number is 75?__________

Write a variable for the percent, solve the equation, and convert the decimal or fraction answer to a percent.

30 is what percent of 120?__________

Additional Practice
SIMPLE & COMPOUND PROBABILITY

$$\text{probability} = \frac{\text{number of desired outcomes}}{\text{number of possible outcomes}}$$

Outcomes add up to 1 or 100%. Compound probability of independent events can be found by multiplying the probability of each event.

If the probability of randomly choosing a red card is 50%, what is the probability of NOT choosing a red card? ______ (percent)

What is the probability of rolling a number greater than 2 on a standard die and then flipping heads on a coin? ______ (fraction)

Additional Practice
FRACTIONS OF A GROUP

The word *of* means *multiply*, and the word *is* means *equals*.

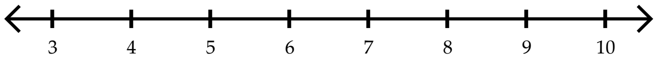
What fraction of 45 is 15? __________

45 is $\frac{5}{3}$ of what number? __________

SOLVING AND GRAPHING INEQUALITIES ON NUMBER LINES (LESSONS 79–81)

Solve the inequality. Graph the solution on the number line.

$6n - 12 > 30$ ______



RATIOS & PROPORTIONS (LESSONS 84, 85, 87 & 91–93)

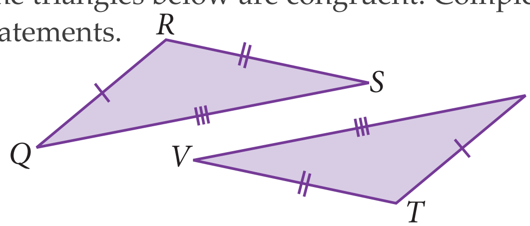
Write and solve a proportion to answer the questions.

There are 16 bananas for every 3 bunches. How many bunches will hold 48 bananas? _____ bunches

For every 9 animals at the zoo, there are 2 birds. There are 180 animals at the zoo. How many are birds? _____birds

SIMILAR AND CONGRUENT FIGURES (LESSONS 96 & 97)

The triangles below are congruent. Complete the congruence statements.



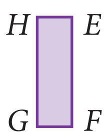
$\triangle QRS \cong$ ______

$\angle TVU \cong$ ______

$\overline{SQ} \cong$ ______

Fill in the missing sides to complete each proportion.

quadrilateral $ABCD \sim$ quadrilateral $EFGH$



$\frac{AB}{EF} = \frac{BC}{}$

$\frac{FG}{BC} = \frac{HE}{}$

Additional Practice

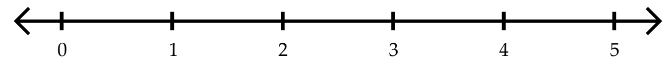
SOLVING AND GRAPHING INEQUALITIES ON NUMBER LINES

To solve a two-step inequality, first add or subtract on both sides of the inequality to isolate the term with the variable. Then multiply or divide on both sides of the inequality to isolate the variable.

Solve the inequality. $4t + 8 < 20$ ______

$<$ less than (open circle)
$\leq$ less than or equal to (closed circle)
$>$ greater than (open circle)
$\geq$ greater than or equal to (closed circle)

Graph the solution on the number line.



Additional Practice

RATIOS & PROPORTIONS

$\frac{\text{part}}{\text{whole}} = \frac{\text{part}}{\text{whole}}$

Use the formula to write a ratio from the problem. Write a variable in for the missing information and solve.

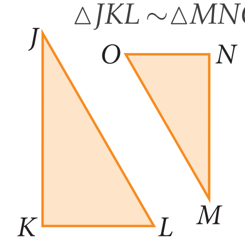
For every 12 children at the water park, 5 have a blue swimsuit. There are 80 children wearing blue swimsuits. How many children are at the water park? _____ children

Additional Practice

SIMILAR AND CONGRUENT FIGURES

List vertices in corresponding order. Corresponding angles are congruent. Proportions should be written with corresponding sides within each ratio.

$\triangle JKL \sim \triangle MNO$

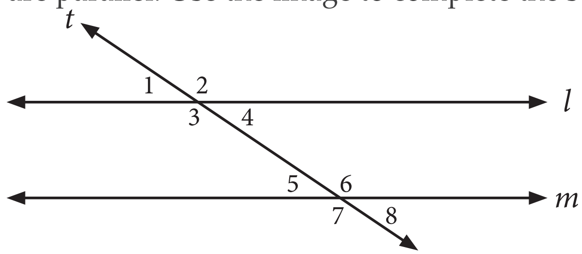


Fill in the missing sides to complete the proportion.

$\frac{KL}{NO} = \frac{LJ}{}$

PARALLEL LINES CUT BY A TRANSVERSAL (LESSON 98)

Lines *l* and *m* are parallel. Use the image to complete the statements.



Name a pair of corresponding angles. ______ and ______

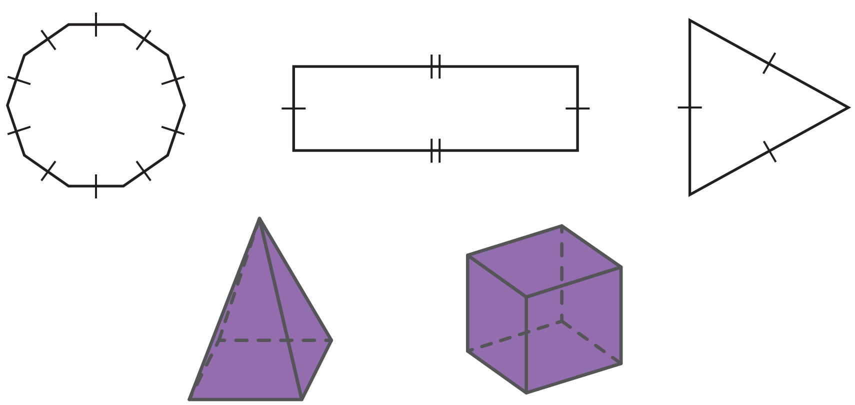
Name a pair of alternate interior angles. ______ and ______

Name a pair of alternate exterior angles. _____ and _____

Name a pair of supplementary angles. ______ and ______

POLYGONS AND POLYHEDRONS (LESSON 99)

Label the regular polygons or polyhedrons with an **R** and the irregular polygons or polyhedrons with an **I**.

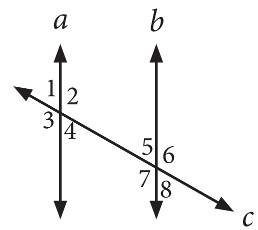


Additional Practice

PARALLEL LINES CUT BY A TRANSVERSAL

- *Corresponding angles* are located in the same position relative to the parallel lines. Corresponding angles are congruent.
- *Interior angles* are located between the parallel lines. *Alternate interior angles* are on opposite sides of the transversal.
- *Exterior angles* are located outside of the parallel lines. *Alternate exterior angles* are on opposite sides of the transversal.

Lines *a* and *b* are parallel. Complete the statements.



Name a pair of corresponding angles.

______ and ______

Name a pair of alternate interior angles.

______ and ______

Name a pair of alternate exterior angles.

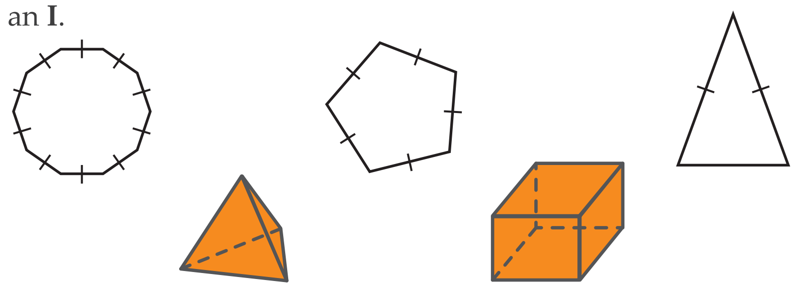
_____ and _____

Additional Practice

POLYGONS AND POLYHEDRONS

A *regular polygon* is a polygon that has all sides of equal length and all angles of equal measure. Polygons that are not regular are called irregular polygons. A *regular polyhedron* is a polyhedron that has congruent regular polygons as faces.

Label the regular polygons with an **R** and the irregular polygons with an **I**.



MEASURES OF CENTRAL TENDENCY AND BOX PLOTS (LESSONS 112 & 113)

Find the measures of central tendency and create a box plot from the following data. Round to the nearest tenth if necessary.

13, 13, 14, 15, 17, 17, 18, 18, 18, 18, 20, 21, 23, 24, 25

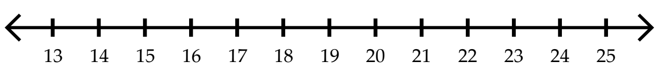
Measures of Central Tendency:

mean: _____ median: _____ mode: _____

Box Plot:

minimum: ______ maximum: ______ range: ______

Q1: ______ Q2: ______ Q3: ______ IQR: ______



Additional Practice

MEASURES OF CENTRAL TENDENCY AND BOX PLOTS

- The *mean* is the average of the data set. Add the data values and divide by the number of values in the set.
- The *median* is the middle value. If there are two middle values, find the average of the two.
- The *mode* is the value that occurs most often in the set.

1, 1, 1, 2, 3, 5, 5, 5, 6, 8, 10, 11, 13, 13, 15

Measures of Central Tendency:

mean: _____ median: _____ mode: _____

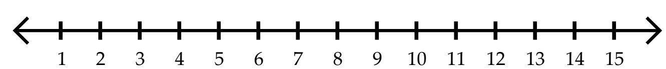
Q1 is the median of the first half of the data set.
Q2 is the median of the entire data set.
Q3 is the median of the second half of the data set.
The IQR is the difference between Q1 and Q3.

Box Plot:

minimum: ______ maximum: ______ range: ______

Q1: ______ Q2: ______ Q3: ______ IQR: ______

A box plot has a box from Q1 to Q3 with a vertical line in the box at Q2. Horizontal lines connect the minimum value to Q1 and the maximum value to Q3.



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MATH 6 ANSWER KEY

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Math 6 Answer Key

Lesson 1

OPPOSITES AND ABSOLUTE VALUE

Watch the video lesson and/or read the mini lesson.

Warm-Up

The warm-up is discussed in the video.
This section can be completed either before or during the video.

Using a scale that counts by one, label the missing numbers on each of the number lines.

0 1 2 3 4 5 6 7 8 9 10

−5 −4 −3 −2 −1 0 1 2 3 4 5

−10 −9 −8 −7 −6 −5 −4 −3 −2 −1 0

Video Lesson

Scan the QR code or watch the video lesson on goodandbeautiful.com/Math6. This section is completed during the video.

$\lvert -12 \rvert = 12$	$\lvert 0 \rvert = 0$
$\lvert 35 \rvert = 35$	$\left\lvert \frac{3}{5} \right\rvert = \frac{3}{5}$
$\lvert -100 \rvert = 100$	$\lvert -8.2 \rvert = 8.2$

$\lvert 14 \rvert = \lvert -14 \rvert$

Mental Math Checkup

Write the answers in the spaces provided. This section is completed independently.

1. Count by 100 from 0 to 1,000.
2. Add 1,000 to each number.
   239,719 240,719 76,736 77,736 3,791 4,791
3. What is the third month of the year? March

Practice

1. If the number is an integer, write "yes" on the line. If not, write "no."

   7 yes −40 yes 0 yes $\frac{4}{5}$ no
   5.1 no $\frac{1}{3}$ no −21 yes −8.4 no

2. Write each of the expressions as an integer. Some examples are given.

a loss of \$2,000	−2,000	500 ft below sea level	−500
a drop of 15 °F	−15	a debt of \$10	−10
a price increase of \$60	60	a deposit of \$50	50
125 ft above sea level	125	a withdrawal of \$50	−50
30 degrees below zero	−30	a gain of \$45	45

3. Find the opposite of each number. Use the number line for help if necessary.

-15 -10 -5 0 5 10 15

Number	Opposite	Number	Opposite
4	−4	12	−12
7	−7	−12	12
−2	2	−5	5
−1	1	8	−8
0	0	3	−3

4. Find the absolute value of each number.

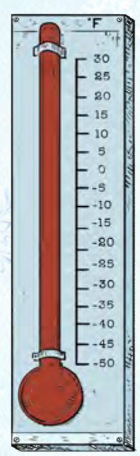
   $\lvert 450 \rvert$ 450 $\lvert -22 \rvert$ 22 $\lvert 0 \rvert$ 0 $\lvert -108 \rvert$ 108
   $\lvert 15 \rvert$ 15 $\lvert -15 \rvert$ 15 $\lvert -3 \rvert$ 3 $\lvert 18 \rvert$ 18

5. Find the change from the first temperature to the second. Write the change as an integer.

   5 °F to 15 °F 10 −50 °F to −25 °F 25
   0 °F to −15 °F −15 −10 °F to −35 °F −25
   25 °F to 15 °F −10 −5 °F to 15 °F 20

6. Compare the following using <, >, or =.

   $\lvert 0 \rvert < \lvert -5 \rvert$ $7 > \lvert 2 \rvert$ $\lvert -4 \rvert = \lvert 4 \rvert$
   $\lvert 5 \rvert < 7$ $\lvert -15 \rvert < \lvert -23 \rvert$ $32 > \lvert -30 \rvert$



7. Cross off the incorrect absolute values.

   $\lvert -15 \rvert = 15$ $\cancel{\lvert -15 \rvert = -15}$
   $\cancel{\lvert -5 \rvert = -5}$ $\lvert -5 \rvert = 5$
   $\cancel{\lvert 15 \rvert = -15}$ $\lvert 15 \rvert = 15$
   $\lvert 5 \rvert = 5$ $\cancel{\lvert 5 \rvert = -5}$

Practice

8. Circle the greater value in each row.

a. the opposite of 3 — |2|
b. |–25| — the opposite of –24
c. |–14| — –14
d. the opposite of 4 — the opposite of –4
e. |10| — ten less than zero
f. the opposite of 8 — –9

9. Circle the correct word in *italics* to make a true statement.

The absolute value of a positive number is a *positive* / *negative* number.
The absolute value of a negative number is a *positive* / *negative* number.
The opposite of a positive number is a *positive* / *negative* number.
The opposite of a negative number is a *positive* / *negative* number.

10. Complete the chart below. The first row is given as an example.

Number	Opposite	Absolute Value
$-\frac{5}{8}$	$\frac{5}{8}$	$\frac{5}{8}$
3.4	–3.4	3.4
–27.482	27.482	27.482
$-\frac{1}{5}$	$\frac{1}{5}$	$\frac{1}{5}$
$\frac{3}{10}$	$-\frac{3}{10}$	$\frac{3}{10}$
–50.5	50.5	50.5

Review

1. Circle the even numbers and cross out the odd numbers.

~~589,137~~ 1,792,870 ~~84,781,791~~ 901,728,176

2. Compare each pair of numbers using <, >, or =.

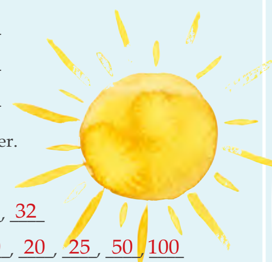
6,371,278 < 6,372,278
5.810 = 5.81
431,081 < 431,801

3. Complete each problem.

$654 \div 3 =$ 218
$382{,}718 + 12{,}795 =$ 395,513
$5{,}361 \times 12 =$ 64,332
$265{,}710 - 12{,}795 =$ 252,915

4. List the next five multiples of each number.

20, 40, 60, 80, 100, 120
50, 100, 150, 200, 250, 300
12, 24, 36, 48, 60, 72



5. List the factors of each number.

25: 1, 5, 25
32: 1, 2, 4, 8, 16, 32
100: 1, 2, 4, 5, 10, 20, 25, 50, 100

Lesson 2

PRIME FACTORIZATION

Watch the video lesson and/or read the mini lesson.

Warm-Up

The warm-up is discussed in the video.
This section can be completed either before or during the video.

Write each expression as a number in standard form.

4^2 — 16
2^5 — 32
3^3 — 27

Write each expression using exponents.

$7 \times 7 \times 7 \times 7$ — 7^4
10×10 — 10^2

Video Lesson

Scan the QR code or watch the video lesson on goodandbeautiful.com/Math6. This section is completed during the video.

60

Factor trees may vary.

$2^2 \times 3 \times 5$

Mental Math Checkup

Write the answers in the spaces provided. This section is completed independently.

1. Count by 50 from 0 to 500.

2. Add 10,000 to each number.

726,101 736,101 27,193,716 27,203,716 827,719 837,719

3. How many quarters are in $2.00? 8

Mini Lesson

A ***prime number*** is a whole number that has exactly two factors: the number itself and the number 1. Examples: 5, 13, 67

A ***composite number*** is a whole number that has more than two factors. Examples: 6, 27, 81

A ***factor pair*** is two factors of a number whose product is the given number; numbers in a factor pair are referred to as factors of the given number. Example: A factor pair of 46 is 2 and 23.

Prime factorization is a number written as the product of its prime factors. For example, the prime factorization of 60 can be written as $2 \times 2 \times 3 \times 5$ or $2^2 \times 3 \times 5$.

A ***factor tree*** is a diagram used to identify the prime factors of a composite number.

Example: Use a factor tree to find the prime factors of 450.

450

2 225

5 45

5 9

3 3

Start by writing the number you are factoring at the top.

Then use lines to separate the number into a factor pair.

Hint: If you don't see any obvious factors, you can begin with small numbers and use the divisibility rules to find a factor. Do not use 1 as a factor because 1 is not a prime number.

See the Reference Chart for divisibility rules.

Circle factors that are prime numbers.

Separate each composite number into a factor pair until every factor is a prime number.

$450 = 2 \times 3^2 \times 5^2$

Write the prime factors (the circled numbers) as a multiplication problem in order from least to greatest, using exponents when a factor repeats.

To check your work, multiply the prime factors. The product should equal the number you started with. $2 \times 3^2 \times 5^2 = 2 \times 9 \times 25 = 450$

Practice

1. Circle the composite numbers in each set.

{2, 7, 12, 17, 22, 27} {1, 3, 5, 7, 9, 11, 13}

{5, 10, 15, 20, 25, 30} {4, 11, 19, 26, 33, 40}

{7, 16, 25, 34, 43, 52} {0, 11, 22, 33, 44, 55}

2. Write all the prime numbers between 1 and 50.

2, 3, 5, 7, 11, 13, 17, 19,

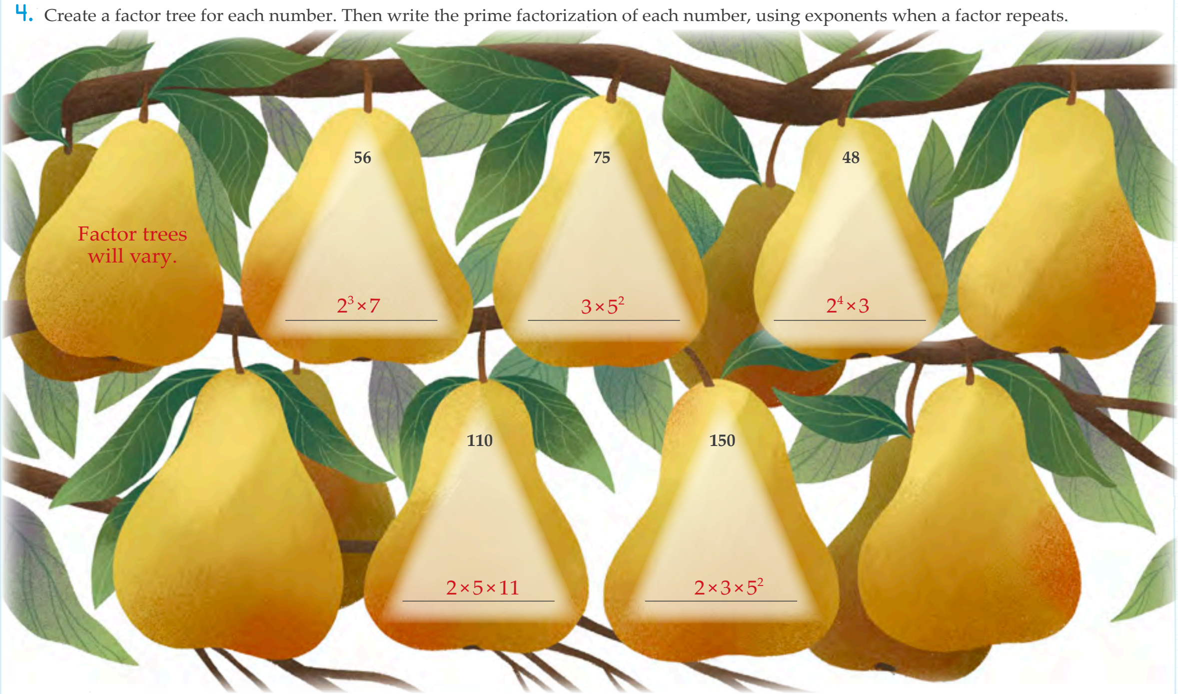
23, 29, 31, 37, 41, 43, 47

3. Cross out the numbers below that are divisible by ALL of these numbers: 2, 3, 4, 5, 6, 9, and 10.

1,242	750	~~18,000~~	3,636
~~5,400~~	140,600	~~82,800~~	~~112,140~~

Practice Continued

4. Create a factor tree for each number. Then write the prime factorization of each number, using exponents when a factor repeats.

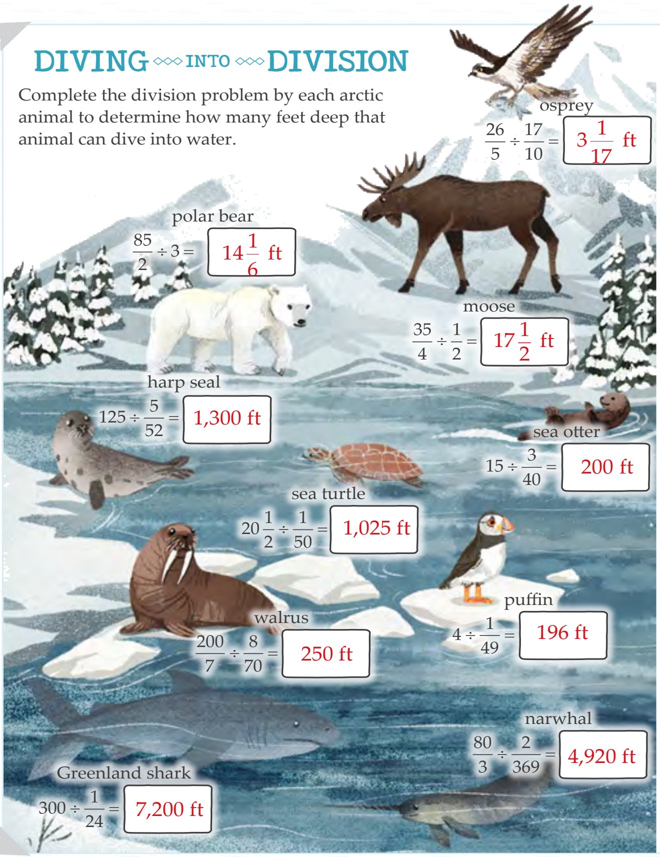


5. Using the prime factorization given below, write each number in standard form.

$2^5 \times 3 =$ 96 $3^2 \times 5 \times 7 =$ 315 $2^3 \times 11 =$ 88 $7 \times 13^2 =$ 1,183 $2^2 \times 5^2 \times 17 =$ 1,700 $2 \times 3 \times 5 \times 7^2 =$ 1,470

DIVING INTO DIVISION

Complete the division problem by each arctic animal to determine how many feet deep that animal can dive into water.



- osprey: $\frac{26}{5} \div \frac{17}{10} =$ $3\frac{1}{17}$ ft
- polar bear: $\frac{85}{2} \div 3 =$ $14\frac{1}{6}$ ft
- moose: $\frac{35}{4} \div \frac{1}{2} =$ $17\frac{1}{2}$ ft
- harp seal: $125 \div \frac{5}{52} =$ 1,300 ft
- sea otter: $15 \div \frac{3}{40} =$ 200 ft
- sea turtle: $20\frac{1}{2} \div \frac{1}{50} =$ 1,025 ft
- puffin: $4 \div \frac{1}{49} =$ 196 ft
- walrus: $\frac{200}{7} \div \frac{8}{70} =$ 250 ft
- narwhal: $\frac{80}{3} \div \frac{2}{369} =$ 4,920 ft
- Greenland shark: $300 \div \frac{1}{24} =$ 7,200 ft

Review

1. Multiply. Lesson 9

   $2\frac{1}{4} \times 4\frac{3}{5} =$ $10\frac{7}{20}$ $1\frac{4}{7} \times 3\frac{1}{3} =$ $5\frac{5}{21}$

2. Add or subtract. Lesson 12

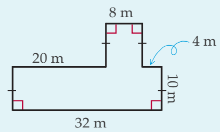
   $185.57 + $9.13 + $25.98 = $220.68

   $9,435 − $5,714.34 = $3,720.66

3. Compare the following using <, >, or =. Lesson 20

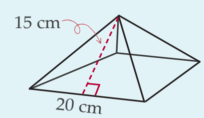
   $12 \bullet 6 \div 3^2 - (3.5 - 2.5) + 5 \; > \; \frac{2}{5} \bullet 35 - (4^2 - 6) + (21 \div 7)$

4. Find the area of the irregular figure. Lesson 21



   $A =$ 400 m²

5. Find the surface area of the square pyramid. Lesson 22



   $SA =$ 1,000 cm²

Lesson 26

PROPERTIES

Watch the video lesson and/or read the mini lesson.

Warm-Up

Complete the problems below.

20 + 70 90	70 + 20 90
4(2•5) 40	(4•2)5 40
4,923,007 • 1 4,923,007	802,115 + 0 802,115

Video Lesson

Scan the QR code or watch the video lesson on goodandbeautiful.com/Math6.

2

Mental Math Checkup

1. Count by 300 from 0 to 3,000.
2. Divide each number by 200.

   400   2   8,000   40   120,000   600

3. If today is November 25th, what date is seven days from today?

   December 2

Practice

1. Determine the property shown by each statement. Then write the first letter(s) of that property on the line under the statement.

Associative property | Commutative property | Distributive property | IDentity property | INverse property

$42 \bullet 1 = 42$ ID	$9 + 14 = 14 + 9$ C	$6(8+7) = 6 \bullet 8 + 6 \bullet 7$ D
$-24 + 24 = 0$ IN	$37 \bullet 2 = 2 \bullet 37$ C	$(5+3)+10 = 5+(3+10)$ A
$11 + 0 = 11$ ID	$(2 \bullet 6)3 = 2(6 \bullet 3)$ A	$7(16-8) = 7 \bullet 16 - 7 \bullet 8$ D
$\frac{5}{8} \bullet \frac{8}{5} = 1$ IN		

2. Use the **associative property** to rewrite and complete each problem. The first one is given as an example.

$5(12 \bullet 8) = (5 \bullet 12)8 = 60 \bullet 8 = 480$

$(9+38)+2 = 9+(38+2) = 9+40 = 49$

$(8 \bullet 15)2 = 8(15 \bullet 2) = 8(30) = 240$

$23+(57+18) = (23+57)+18 = 80+18 = 98$

3. Use the **commutative property** to complete each problem.

Hint: Rearrange the numbers to make the problems easier to complete.

$7 + 19 + 23 = 49$ $\qquad$ $18 + 34 + 52 = 104$

$6 \bullet 3^2 \bullet 5 = 270$ $\qquad$ $2^3 \bullet 20 \bullet 5 = 800$

4. Use the **distributive property** to complete each problem.

$11(9+8) = 187$

$12(40-12) = 336$

$(12+11)7 = 161$

5. Use the **identity property** to fill in the blanks. Then complete the problems.

$54 \bullet \underline{1} = 54$ $\qquad$ $8\frac{2}{9} + \underline{0} = 8\frac{2}{9}$ $\qquad$ $-\frac{1}{3} + \underline{0} = -\frac{1}{3}$

$-67 \bullet \underline{1} = -67$ $\qquad$ $4,284.9 + 0 = \underline{4,284.9}$ $\qquad$ $\frac{11}{25} \bullet 1 = \underline{\frac{11}{25}}$

$-80,591 \bullet 1 = \underline{-80,591}$ $\qquad$ $-16.803 + 0 = \underline{-16.803}$

6. Write the opposite of each number.

8.7 $\underline{-8.7}$ $\qquad$ -90 $\underline{90}$ $\qquad$ $-\frac{4}{5}$ $\underline{\frac{4}{5}}$

$6\frac{8}{9}$ $\underline{-6\frac{8}{9}}$ $\qquad$ 7.93 $\underline{-7.93}$ $\qquad$ -0.5104 $\underline{0.5104}$

Practice

7. Write the reciprocal of each number.

$\frac{5}{12}$ $\underline{\frac{12}{5}}$ $\qquad$ 3 $\underline{\frac{1}{3}}$ $\qquad$ $\frac{33}{4}$ $\underline{\frac{4}{33}}$

92 $\underline{\frac{1}{92}}$ $\qquad$ $\frac{7}{16}$ $\underline{\frac{16}{7}}$ $\qquad$ 181 $\underline{\frac{1}{181}}$

8. Complete each problem using the **inverse property**.

$-5.26 + 5.26 = 0$ $\qquad$ $\frac{98}{7} \bullet \frac{7}{98} = 1$ $\qquad$ $10.18 + 4.25 + (-10.18) = 4.25$

$16\frac{1}{2} + \left(-16\frac{1}{2}\right) = 0$ $\qquad$ $33 \bullet \frac{1}{33} = 1$ $\qquad$ $\frac{9}{10} \bullet \frac{7}{11} \bullet \frac{10}{9} = \frac{7}{11}$

9. Use the properties you have learned to complete the problems.

$27.2 + 14 + 32.8 + 6 = 80$ $\qquad$ $8(20+3) = 184$ $\qquad$ $2 \bullet 9 \bullet 5 \bullet 3 = 270$

$1(44+0+37) = 81$ $\qquad$ $(10-1)69 = 621$ $\qquad$ $\frac{1}{6} \bullet \frac{5}{7} \bullet 14 \bullet 6 = 10$

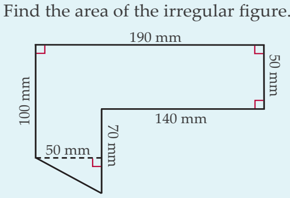
$14 + 8 + (-14) = 8$ $\qquad$ $\frac{2}{3} \bullet \frac{8}{5} \bullet 7 \bullet \frac{5}{8} \bullet \frac{3}{2} = 7$

Review

1. Compare the following using <, >, or =. Lesson 13

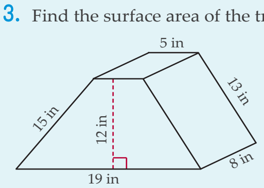
$8,720 \times 0.621 < 8,720$ $\qquad$ $91.48 \times 1.226 > 91.48$

2. Find the area of the irregular figure. Lesson 21



$A = \underline{12,500 \text{ mm}^2}$

3. Find the surface area of the trapezoidal prism. Lesson 22



$SA = \underline{704 \text{ in}^2}$

4. Convert each decimal to a fraction. Lesson 23

$0.15 = \frac{3}{20}$ $\qquad$ $3.25 = 3\frac{1}{4}$ $\qquad$ $0.002 = \frac{1}{500}$

List terms with variables in alphabetical order with constants at the end.

Practice

1. Color boxes with like terms in the same color. For example, use one color for like terms with the variable b and another color for like terms with the variable d. Colors will vary.

$5a$	b	$8c$	$-b$	$3a$
$4c$	$-9d$	$3d$	d	c
$-3b$	$2d$	a	$-d$	$7b$
$2c$	$4d$	$-5d$	$6d$	$5c$
$4a$	$2b$	$-c$	$4b$	$-2a$

Hint: You'll use four different colors.

2. Combine like terms to simplify the expressions. The first is given as an example.

$a+a+a$ $\underline{3a}$

$g+g+g+g$ $\underline{4g}$

$r+r+r+r+r+r$ $\underline{6r}$

$m+m$ $\underline{2m}$

$x+x+x+x+x$ $\underline{5x}$

3. Draw lines to connect equivalent expressions.

$5n+3n$	$10n$
$4n-2n$	$8n$
$n+9n$	$4n$
$8n-2n$	$6n$
$3n+n$	n
$6n-5n$	$2n$

4. Simplify the expressions.

$8y+2y$ $\underline{10y}$ $\quad$ $5x+3x$ $\underline{8x}$

$-7v+12v+4$ $\underline{5v+4}$ $\quad$ $6t+2+5t-3$ $\underline{11t-1}$

$9z-4+8$ $\underline{9z+4}$ $\quad$ $20u-19u-2$ $\underline{u-2}$

$w+3w+4w$ $\underline{8w}$ $\quad$ $6+7p-4$ $\underline{7p+2}$

5. Rewrite the expressions so like terms are next to each other. Then simplify the expressions. The first one is given as an example.
The order of the terms will vary, but like terms will be next to each other.

$3x+4y+5x=$ $\underline{3x+5x+4y}$ $=$ $\underline{8x+4y}$

$a+3b+2a-b=$ $\underline{a+2a+3b-b}$ $=$ $\underline{3a+2b}$

$8d+9c-3d=$ $\underline{9c+8d-3d}$ $=$ $\underline{9c+5d}$

$11p+4s-s+p=$ $\underline{11p+p+4s-s}$ $=$ $\underline{12p+3s}$

$7-6h+g+2h=$ $\underline{g-6h+2h+7}$ $=$ $\underline{g-4h+7}$

$4k+r+3k-2k=$ $\underline{4k+3k-2k+r}$ $=$ $\underline{5k+r}$

6. Fill in the blanks to make equivalent expressions.

$2t+\underline{4t}=6t$ $\quad$ $-3s+5+\underline{7s}=4s+5$

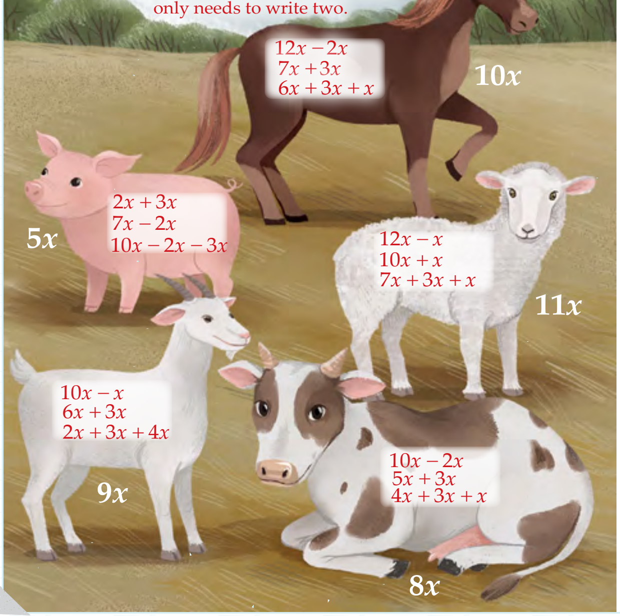
$4p+5p+\underline{3p}=12p$ $\quad$ $q+7r-\underline{r}+2q=3q+6r$

Practice

7. Use terms from the box and addition or subtraction to create TWO expressions that are equivalent to the expression listed by each animal. Write the expressions on each animal. For example, if the expression by the animal was $7x$, you could write $10x-3x$ and $5x+2x$ on the animal. For an extra challenge, try to write expressions with three terms on some of the animals.

$5x$	$2x$	$-3x$	x	$10x$	$12x$	$-2x$	$-x$	$6x$	$4x$	$7x$	$3x$

Answers will vary. Three examples are given for each one, but the child only needs to write two.



Review

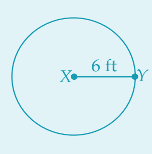
1. Complete each problem. Lesson 20

$14-3(4)+5^2=$ 27 $\quad$ $56\div7+2^3-11=$ 5

2. Simplify each expression. Lesson 20

$\dfrac{\sqrt[3]{27}}{2^3+1}=\dfrac{1}{3}$ $\quad$ $\dfrac{2^4\div 8}{\sqrt[3]{125}-4}=2$

3. Use ⊙X to fill in the information. Lesson 42



radius = $\underline{6\text{ ft}}$

diameter = $\underline{12\text{ ft}}$

area ≈ $\underline{113.04\text{ ft}^2}$

circumference ≈ $\underline{37.68\text{ ft}}$

4. Write *yes* or *no* on each line. Lesson 43

Is $a=18$ a solution to the equation $a\div3=9$? $\underline{\text{no}}$

Is $b=2.3$ a solution to the equation $5-b=2.7$? $\underline{\text{yes}}$

5. Find the percent of each number. Lesson 44

What is 25% of 120? $\underline{30}$

What is 15% of 75? $\underline{11.25}$

What is 90% of 8? $\underline{7.2}$

Lesson 71

DISTRIBUTIVE PROPERTY AND FACTORING WITH VARIABLES

Supplies: colored pencils

Watch the video lesson and/or read the mini lesson.

Warm-Up

Write the second factor in expanded form. Then use the distributive property to multiply.

$5 \bullet 342$
$= 5(300 + 40 + 2)$
$= 1{,}500 + 200 + 10$
$= 1{,}710$

$4 \bullet 813$
$= 4(800 + 10 + 3)$
$= 3{,}200 + 40 + 12$
$= 3{,}252$

Video Lesson

Scan the QR code or watch the video lesson on goodandbeautiful.com/Math6.

$\frac{1}{2}(10x + 14)$
$= \frac{1}{2}(10x) + \frac{1}{2}(14)$
$= 5x + 7$

$20b + 140$
$= 20(b + 7)$

Mental Math Checkup

Complete each division fact in your head, and then write the answer in the box.

$55 \div 5 =$ 11	$48 \div 4 =$ 12	$63 \div 7 =$ 9
$96 \div 8 =$ 12	$42 \div 7 =$ 6	$99 \div 11 =$ 9
$72 \div 12 =$ 6	$36 \div 4 =$ 9	$35 \div 7 =$ 5
$60 \div 5 =$ 12	$110 \div 11 =$ 10	$120 \div 12 =$ 10

Practice

1. Use the distributive property to simplify each expression. The first one is given as an example. Remember to combine like terms.

$9(10x + 9)$	$90x + 81$
$18(2 + 3y)$	$36 + 54y$
$12(9c - 4 + 11c)$	$240c - 48$
$\frac{1}{2}(12 + 38x)$	$6 + 19x$
$\frac{1}{3}(69y - 18)$	$23y - 6$
$5(9z + 5 - 3z + 4)$	$30z + 45$

2. Find the GCF of the factors in each expression. Then use the GCF to factor each expression. The first one is given as an example.

$26d + 39$ GCF: 13 — $13(2d + 3)$
$99f + 77$ GCF: 11 — $11(9f + 7)$
$84 + 16g$ GCF: 4 — $4(21 + 4g)$
$500h + 200$ GCF: 100 — $100(5h + 2)$
$72 + 30j$ GCF: 6 — $6(12 + 5j)$

3. Factor each expression.

$3k + 6$ — $3(k + 2)$
$25m + 15$ — $5(5m + 3)$
$9n + 27$ — $9(n + 3)$
$16 + 24p$ — $8(2 + 3p)$

4. Match the equivalent expressions in the table using patterns (stripes, polka dots, etc.) and/or colors. The first one is given as an example.

$30x - 90$	$9x - 12$	$4(6x + 7)$
$\frac{1}{2}(18x + 24)$	$9(5x - 1)$	$5(9x - 1)$
$\frac{1}{4}(36x - 48)$	$7(3x + 4)$	$3x - 9$
$45x - 9$	$18x + 21$	$3(6x + 7)$
$30(x - 3)$	$21x + 28$	$24x + 28$
$45x - 5$	$3(x - 3)$	$9x + 12$

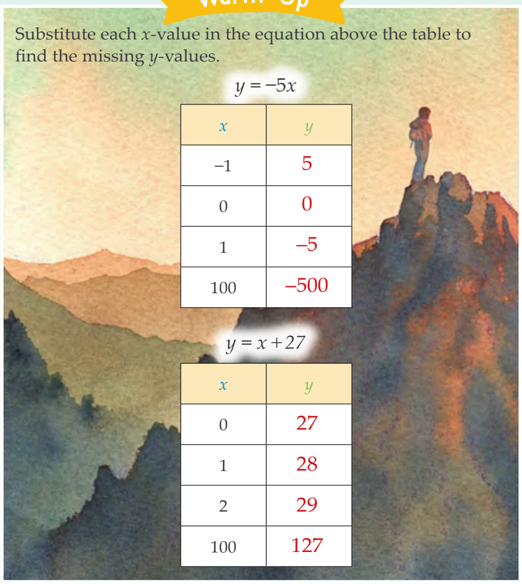
Lesson 83

GRAPHING LINES

Watch the video lesson and/or read the mini lesson.

Warm-Up

Substitute each x-value in the equation above the table to find the missing y-values.



$y = -5x$

x	y
−1	5
0	0
1	−5
100	−500

$y = x + 27$

x	y
0	27
1	28
2	29
100	127

Video Lesson

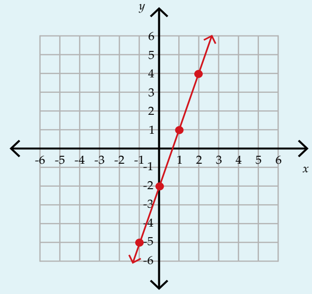
Scan the QR code or watch the video lesson on goodandbeautiful.com/Math6.

x	y
−1	$3(-1) - 2 = -5$
0	$3(0) - 2 = -2$
1	$3(1) - 2 = 1$
2	$3(2) - 2 = 4$

ordered pairs:

(−1, −5) (0, −2)

(1, 1) (2, 4)



Mental Math Checkup

1. Count down by $\frac{1}{4}$ from $8\frac{1}{4}$ to 6.

$8\frac{1}{4}$, 8, $7\frac{3}{4}$, $7\frac{1}{2}$, $7\frac{1}{4}$, 7, $6\frac{3}{4}$, $6\frac{1}{2}$, $6\frac{1}{4}$, 6

2. Find each percent.

What is 300% of 5? 15 What is 300% of 50? 150

3. Multiply or divide.

$1{,}000 \div 50 =$ 20 $2{,}100 \bullet 4 =$ 8,400

Practice

1. Complete each input-output table. Then list the ordered pairs from each table on the lines below the table.

$y = x - 4$

x	y
−1	−5
0	−4
1	−3
2	−2

(−1, −5) (0, −4)

(1, −3) (2, −2)

$y = 3x$

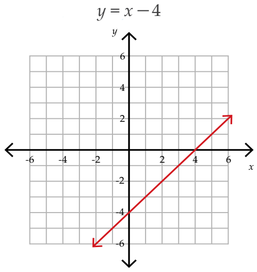
x	y
−1	−3
0	0
1	3
2	6

(−1, −3) (0, 0)

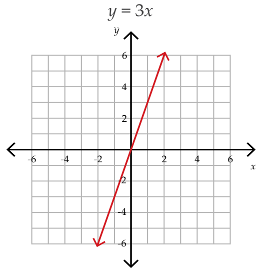
(1, 3) (2, 6)

2. Graph the equations from Problem 1 on the coordinate planes below.

$y = x - 4$



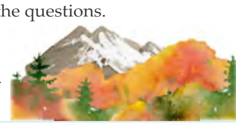
$y = 3x$



3. Use the equation $y = -3x - 5$ to answer the questions.

What is the y-value when x is 8? −29

What is the y-value when x is −3? 4



4. Complete each input-output table. For each table, plot the ordered pairs on the graph on the next page and connect the points from the table to form a line. Use a ruler to extend each line to the edge of the graph. Each line will go through one of the triangles, which represent the tallest mountain summit on each continent in the world. Using the key at the bottom, write the name of the mountain on the line under each table. Once the names are written in the blanks, the mountains will be in order from tallest to shortest.

1. $y = 5x - 37$

x	y
6	−7
7	−2
8	3

Mt. Everest

2. $y = -4x + 21$

x	y
3	9
4	5
6	−3

Mt. Aconcagua

3. $y = x$

x	y
−5	−5
0	0
5	5

Mt. Denali

4. $y = 0.5x + 4$

x	y
−8	0
0	4
4	6

Mt. Kilimanjaro

5. $y = 3x - 9$

x	y
0	−9
2	−3
4	3

Mt. Elbrus

6. $y = -x$

x	y
−8	8
0	0
8	−8

Mt. Vinson

7. $y = -3x + 6$

x	y
0	6
2	0
4	−6

Mt. Kosciuszko

Key:
- Aconcagua
- Vinson
- Kosciuszko
- Kilimanjaro
- Everest
- Denali
- Elbrus

Lesson 108

INTEGER OPERATIONS REVIEW

There is no video for this lesson.

Klipspringers are small African antelope, typically less than 24 inches tall and weighing 22–40 pounds as adults. Klipspringer means "rock jumper" in Afrikaans. These amazing animals can jump up to 12 feet in the air and can land on rocks as small as a silver dollar! In this lesson, klipspringers will help you review operations with integers.

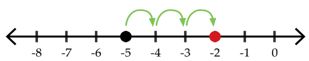
Adding Integers Using a Number Line

One helpful strategy for adding or subtracting integers is using a number line.

To *add* integers, start at the location of the first integer on the number line. If adding a positive integer, move in the positive direction (right). If adding a negative integer, move in the negative direction (left). Move the distance of the absolute value of the second number.

Example 1: $-5 + 3$

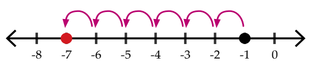
Start at –5. Move **right** 3 places.



$-5 + 3 = -2$

Example 2: $-1 + (-6)$

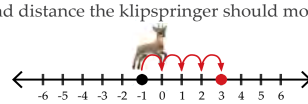
Start at –1. Move **left** 6 places.



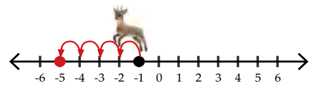
$-1 + (-6) = -7$

Practice

To solve each problem below, draw arrows showing the direction and distance the klipspringer should move on the number line.

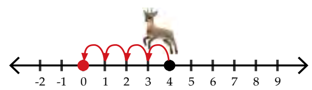


$-1 + 4 =$ 3

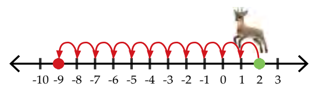


$-1 + (-4) =$ –5

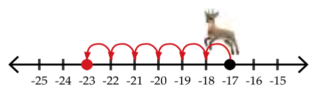
$0 + (-3) =$ –3



$4 + (-4) =$ 0



$2 + (-11) =$ –9



$-17 + (-6) =$ –23

Subtracting Integers Using a Number Line

To *subtract* integers, rewrite the problem as an addition problem by adding the opposite. Then follow the steps for adding integers.

Example 1: $6 - 8 = 6 + (-8)$

Start at 6. Move **left** 8 places.

$6 + (-8) = -2$

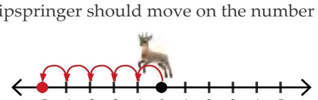
Example 2: $-4 - (-8) = -4 + 8$

Start at –4. Move **right** 8 places.

$-4 + 8 = 4$

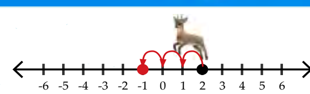
Practice

To solve each subtraction problem, rewrite it as an addition problem. Then draw arrows showing the direction and distance the klipspringer should move on the number line.



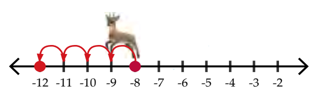
$0 - 5 =$ 0 + –5 = –5

$0 - (-5) =$ 0 + 5 = 5

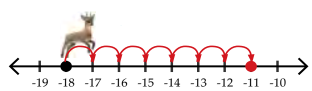


$2 - 3 =$ 2 + –3 = –1

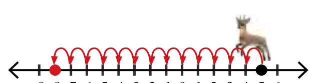
$2 - (-3) =$ 2 + 3 = 5



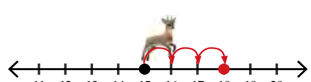
$-8 - 4 =$ –8 + –4 = –12



$-18 - (-7) =$ –18 + 7 = –11



$5 - 13 =$ 5 + –13 = –8



$15 - (-3) =$ 15 + 3 = 18

Practice

6. Begin at Start and follow the path that shows the correct scientific notation for each number until you reach the box marked Finish!

Review

1. Find the amount of discount, sale price, amount of tax, and total cost for the item. Lesson 65

original price: \$28.80
percent discount: 10% tax rate: 6%

amount of discount: \$2.88 amount of tax: \$1.56

sale price: \$25.92 total cost: \$27.48

2. If 186 students are going on a field trip, and each van can hold 15 students, how many vans are needed to take all the students on the field trip? Lesson 110

13 vans

3. Convert 114.5 ft^2 to square inches. Lesson 107

16,488 in^2

4. How many minutes are in one week? Lesson 109

10,080 minutes

5. A popcorn machine pops 7 quarts in 4 minutes. How many quarts of popcorn can it pop in 10 minutes? Lessons 92 & 95

17.5 qt

Preventing Errors

- Read the manual and/or reference card and practice using the calculator.
- Estimate the answer before entering a problem.
- Complete the problem on paper first and simply use the calculator to check your answer.
- Enter the calculations twice and make sure you get the same answer both times.
- Check that the answer displayed on the calculator is reasonable.

For example, consider the problem $6{,}258 \div 70$. First, round 6,258 to 6,300 because you can calculate $6{,}300 \div 70$ mentally. The answer should be close to 90. Now complete the problem by hand in the space below:

$$\begin{array}{r} 89.4 \\ 70\overline{)6258.0} \\ -560 \\ 658 \\ -630 \\ 280 \\ -280 \\ 0 \end{array}$$

If you have access to a calculator, enter the problem by pressing the keys below. Notice that a comma is not typed.

6 2 5 8 ÷ 7 0 =

Write the answer displayed on the calculator: 89.4

Is the displayed answer the same as your answer above? If not, check whether one answer is more reasonable than the other. Try entering the problem in the calculator again. If you get the same answer on the calculator twice, check your written work for errors.

The Order of Operations

Basic/Standard/4-Function calculators often DO NOT follow the order of operations. Instead, they perform all operations in the order that you enter them.

For example, suppose that Otis entered a problem into two different calculators and got two different answers.

Calculator A: $3 + 5 \bullet 9 = 72$

Calculator B: $3 + 5 \bullet 9 = 48$

If you have access to a calculator, check whether your calculator is programmed to follow the order of operations by typing in the same problem that Otis did. Here are the keys to press:

3 + 5 × 9 =

Write the answer displayed on your calculator: Answers will vary.

Now complete the problem by hand here. Be sure to use the order of operations.

$3 + 5 \bullet 9 =$ 48

Based on the order of operations, 48 is the correct answer because multiplication is performed before addition.

If your calculator showed 72 as the answer, the calculator is NOT following the order of operations. Instead, it is performing calculations in the order they are typed. You'll need to use parentheses when entering calculations or enter them in the order specified by the order of operations, like this:

3 + (5 × 9) =

OR

5 × 9 + 3 =

If your calculator did not follow the order of operations, try one of the above methods and see if you now get the correct answer of 48.

LESSONS 119–120 COURSE ASSESSMENT

Instructions

This assessment is different from the other assessments you have taken in Math 6. Instead of covering only concepts taught in Unit 4, this assessment covers concepts you have learned throughout the entire course, and the problems are designed to assess multiple skills. For example, a single complex fractions problem in the fraction and integer operations section covers concepts such as dividing fractions, canceling before multiplying, multiplying fractions, plotting a fraction on a number line, and converting an improper fraction to a mixed number or whole number. This assessment does not cover every skill you learned in Math 6; instead, it focuses on skills you need to know to successfully start Math 7. Here are some tips: First, read the instructions carefully. Second, do not rush through the problems. Third, if you start to get frustrated with one section, skip to a different section and then come back later. The sections do not need to be completed in order.

For Lesson 119, complete all the exercises with purple headers only. You may cover the additional practice sections or fold the page to concentrate only on the purple sections. Have your parent or teacher correct the work. If there are mistakes in a section, your parent or teacher will check the orange "Additional Practice" checkbox for that section.

For Lesson 120, complete all the orange sections that are checked. If you still make multiple mistakes, review those sections.

Parents/teachers may determine if the student may use the Reference Chart for the assessment. It is recommended that the student first try the assessment without the Reference Chart and then refer to it if needed.

Although Lesson 117 was an introduction to calculators, calculators should not be used on the assessment.

Student

FACTORS & FACTORING
(LESSONS 2, 3, 48 & 71)

Find the prime factorization of each number. Then find the GCF of the numbers.

48: $2^4 \bullet 3$

GCF: 8

56: $2^3 \bullet 7$

Factor each expression.

$9 + 48 = 3(3+16)$ $\quad$ $7b + 56 = 7(b+8)$ $\quad$ $48 + 56q = 8(6+7q)$

Additional Practice

FACTORS & FACTORING

Separate each composite number into a factor pair until every factor is a prime number.

Find the prime factorization of each number. Then find the GCF of the numbers.

36: $2^2 \bullet 3^2$

GCF: 6

42: $2 \bullet 3 \bullet 7$

This template can be used for factoring: ___(___ + ___). Write the GCF in the first blank and determine what terms multiplied by the GCF equal the terms in the expression.

Factor each expression.

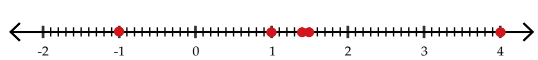
$3 + 42 = 3(1+14)$ $\quad$ $12 + 36t = 12(1+3t)$ $\quad$ $42r + 36 = 6(7r+6)$

FRACTION AND INTEGER OPERATIONS
(LESSONS 9, 14, 25 & 56)

Simplify. Then plot the answers on the number line below.

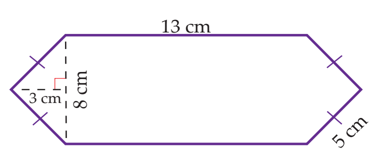
$\frac{\frac{7}{5}}{\frac{14}{15}} = 1\frac{1}{2}$ $\quad$ $-4 \div 4 = -1$ $\quad$ $\frac{18}{4} - \frac{7}{2} = 1$

$2 - (-2) = 4$ $\quad$ $\frac{2}{5} + \frac{5}{5} = 1\frac{2}{5}$



GEOMETRIC FIGURES
(LESSONS 7, 21, 22 & 73)

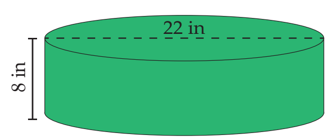
Find the perimeter and area of the figure.



$P =$ 46 cm

$A =$ 128 cm²

Find the volume of the solid. Use 3.14 for π.



$V \approx$ 3,039.52 in³

Additional Practice

FRACTION AND INTEGER OPERATIONS

Find common denominators before adding or subtracting.

$\frac{30}{6} - \frac{13}{3} = \frac{2}{3}$ $\quad$ $\frac{1}{5} + \frac{14}{5} = 3$

Cancel before multiplying. Multiply the numerators; multiply the denominators. To divide, multiply the first number by the reciprocal of the second number. A complex fraction is division.

$\frac{2}{3} \bullet \frac{6}{2} = 2$ $\quad$ $\frac{\frac{3}{8}}{\frac{1}{4}} = \frac{3}{2}$

Integer operations rules:

Addition: add and keep the sign

Subtraction: subtract and use the sign of the greater absolute value

Multiplication/Division: same signs → answer is positive
different signs → answer is negative

$-4 \div 2 = -2$ $\quad$ $-10 - 5 = -15$

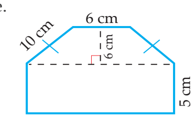
Additional Practice

See Reference Chart for area formulas.

GEOMETRIC FIGURES

To find the volume of a prism or cylinder, multiply the area of the base by the height. $V =$ *area of base* • *height*

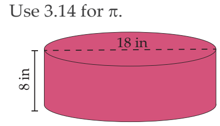
Find the perimeter and area of the figure.



$P =$ 58 cm

$A =$ 194 cm²

Find the volume of the solid. Use 3.14 for π.



$V \approx$ 2,034.72 in³