• Percents

- **Percent** means *per hundred*.

  50% means $\frac{50}{100}$, which reduces to $\frac{1}{2}$.

  5% means $\frac{5}{100}$, which equals $\frac{1}{20}$.

- Two ways to convert a fraction to a percent:
  1. Write the fraction with a denominator of 100.

     Example: $\frac{3}{5} \cdot \frac{20}{20} = \frac{60}{100} = 60\%$
  2. Multiply the fraction by 100%. Simplify.

     Example: $\frac{2}{3} \cdot \frac{100\%}{1} = \frac{200\%}{3} = 66\frac{2}{3}\%$

- To convert a percent to a fraction:

  Replace the percent sign with a denominator of 100 and reduce if possible.

  Example: $40\% = \frac{40}{100} = \frac{2}{5}$

- To solve a percent problem we can change the percent to a fraction.

  Example: What is 25% of \$36? We find $\frac{1}{4}$ of \$36 is \$9.

Practice:

Write each fraction as a percent.

1. $\frac{2}{5}$ = ____________________ **2.** $\frac{7}{8}$ = ____________________

Write each percent as a reduced fraction.

3. 75% = ____________________ **4.** 15% = ____________________

5. Sam scored 20% of the team's 20 points. How many points did Sam score?

____

6. Arrange these numbers in order from least to greatest.

$\frac{3}{4}$, $\frac{1}{2}$, 25%, 60%

____

Name ______________________________

• Decimal Numbers

Decimal Place Value						
hundreds 1	tens 2	ones 3	.	tenths 1	hundredths 2	thousandths 3

"One hundred twenty-three and one hundred twenty-three thousandths."

- To order decimal numbers, align on the decimal point and compare the digits in each place.
- To write a decimal number as a fraction or mixed number, write digits to the right of the decimal point as the numerator and write the denominator indicated by the place value of the last digit. Then reduce the fraction if possible.

  Example: $12.25 = 12\frac{25}{100} = 12\frac{1}{4}$

- To express a fraction as a decimal, perform the division indicated.

  Examples: $\frac{3}{4} = 4\overline{)3.00} = 0.75$

  $\frac{1}{6} = 6\overline{)1.00} = 0.1\overline{6}$ (the "6" repeats)

- To convert a decimal to a percent, multiply by 100%, or shift the decimal point two places to the right.

  Example: $0.4 \times 100\% = 40\%$ $\quad$ $0.40. = 40\%$

- To convert a percent to a decimal, shift the decimal point two places to the left.

  Example: $5\% = \frac{5}{100} = 0.05$

Practice:

1. Write $\frac{2}{5}$ as a decimal. ____________________
2. Write 0.35 as a fraction. ____________________
3. Express 0.065 as a percent. ____________________
4. Express 8% as a decimal. ____________________
5. Order these numbers from least to greatest. ______________________________

   0.4, 0.34, 0.43, 0.03
6. Arrange in order from least to greatest. ______________________________

   $\frac{3}{4}$, 1.5, 10%

• Adding and Subtracting Fractions and Mixed Numbers

> Three steps for adding or subtracting fractions.
> 1. Write fractions with common denominators.
> 2. Add or subtract numerators as indicated, regrouping if necessary.
> 3. Simplify by reducing and/or converting to a mixed number.

Example: $\frac{2}{3} + \frac{3}{4}$

Step 1 A common denominator is 12. Rename the fractions.

$\frac{2}{3} \cdot \frac{4}{4} = \frac{8}{12}$ $\qquad$ $\frac{3}{4} \cdot \frac{3}{3} = \frac{9}{12}$

Step 2 Add the renamed fraction.

$\frac{8}{12} + \frac{9}{12} = \frac{17}{12}$

Step 3 The sum is an improper fraction so we convert to a mixed number.

$\frac{17}{12} = \mathbf{1\frac{5}{12}}$

• To subtract mixed numbers, you may have to rename.

Example:

$$\begin{array}{r} 5\frac{1}{6} \\ -3\frac{5}{6} \\ \hline \end{array} \longrightarrow \begin{array}{r} 4\frac{7}{6} \\ -3\frac{5}{6} \\ \hline 1\frac{2}{6} \end{array} = \mathbf{1\frac{1}{3}}$$

Practice:

1. $\frac{3}{5} + \frac{1}{5} =$ ____________

2. $\frac{2}{3} - \frac{1}{3} =$ ____________

3. $\frac{1}{4} + \frac{1}{6} =$ ____________

4. $\frac{2}{3} + \frac{5}{6} =$ ____________

5. $\frac{3}{4} - \frac{2}{5} =$ ____________

6. $25\frac{1}{2} + 13\frac{3}{4} =$ ____________

7. $4\frac{1}{8} - 2\frac{7}{8} =$ ____________

8. $6\frac{1}{3} - 2\frac{1}{2} =$ ____________

9. $8 - 2\frac{3}{5} =$ ____________

Name ______________________________

• Evaluation
• Solving Equations by Inspection

- A **formula** is an expression or equation. To use a formula, substitute the number you know to find the number you want to know.

  Example: Use the formula $P = 4s$ to find the perimeter of a square with sides 6 cm long.
  $P = 4s \longrightarrow$ substitute 6 cm for $s \longrightarrow P = 4(6) = 24$ cm

- To solve an equation, find the number for the variable that makes the equation true.

  Example: $4x = 20 \longrightarrow$ The solution is 5 because $4(5) = 20$.

- To **solve equations by inspection**, study equations to mentally find the solutions.

Practice:

1. A formula for area (A) of a parallelogram is $A = bh$. Find the area of a parallelogram with a base (b) of 15 cm and a height (h) of 9 cm.

____

2. Evaluate $2ac$ for $a = 4$ and $c = 24$. ______________________________

Solve each equation in problems 3–5 by inspection.

3. $6 + x = 32$

$x =$ ______________________________

4. $k - 8 = 14$

$k =$ ______________________________

5. $\frac{m}{9} = 7$

$m =$ ______________________________

6. Admission to the carnival is \$2. Each game ticket costs \$2. Brianna has \$10. Solve the following equation to find how many game tickets Brianna can buy.

$$2t + 2 = 10$$

____

• Powers and Roots

- An **exponent** shows repeated multiplication.

$$\text{base} \rightarrow 5^3 \leftarrow \text{exponent}$$

It shows how many times the base is used as a factor. Write 5 **three** times then **multiply**.

$$5^3 = 5 \cdot 5 \cdot 5 = 125$$

- Like factors can be grouped with an exponent.

Example: The prime factorization of 72 is $2 \cdot 2 \cdot 2 \cdot 3 \cdot 3$.

$$72 = 2^3 \cdot 3^2$$

- The exponent 2 used after a unit of length is a unit of area.

9 in.^{2} means 9 square inches

- Exponents can be applied to variables.

Example: $2xxyyyz = 2x^2y^3z$

- The inverse of raising a number to a power is taking a root of a number.

$\sqrt{25} = 5$ "The square root of 25 is 5."
$\sqrt[3]{125} = 5$ "The cube root of 125 is 5."

Practice:

1. Simplify: $7^3 =$

____

2. Simplify: $5^4 =$

____

3. Simplify: $\sqrt{16} =$

____

4. Simplify: $\sqrt[3]{27} =$

____

5. Express with exponents: $4xyyxx =$ ______________________

6. Mr. Ortiz wants new flooring for his office. His office is 12 feet square. Use the formula $A = s^2$ to find the number of square feet of flooring he needs.

____

Name ______________________________

• Irrational Numbers

- **Irrational numbers** are numbers that cannot be expressed exactly as decimals or fractions.
- The square root of any counting number that is not a perfect square is an irrational number.

Example: $\sqrt{8}$ is an irrational number.
$\sqrt{8}$ is between $\sqrt{4}$ and $\sqrt{9}$. Its value is greater than 2 and less than 3.

- Rational numbers and irrational numbers together form the set of **real numbers**. Real numbers can be represented by points on a number line. Every point on the number line represents either a rational number or an irrational number.
- The side length of a square is the square root of its area.

Practice:

1. Which of the following numbers is irrational? ______________________

A. -4 **B.** $\sqrt{5}$ **C.** $\frac{7}{3}$ **D.** $\sqrt{4}$

2. Which of these numbers is between 3 and 4 on the number line?

A. $\sqrt{6}$ **B.** $\sqrt{8}$ **C.** $\sqrt{11}$ **D.** $\sqrt{18}$

____

3. Arrange these real numbers in order from least to greatest.

$2, \frac{9}{4}, \sqrt{3}, -4$

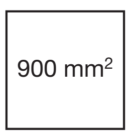
____

4. Arrange these real numbers in order from least to greatest.

$\frac{5}{2}, 4, \sqrt{12}, -1$

____

5. Find the length of each side of this square. ______________



Name ______________________________

• Rounding and Estimating

- To round whole numbers:
  1. Circle the place value you are rounding to.
  2. Underline the digit to its right.
  3. If the underlined number is 5 or more, add 1 to the circled number. If the underlined number is 4 or less, the circled number stays the same.
  4. Replace the underlined number (and any numbers after it) with zero.
- To round decimal numbers:
  1. Use steps 1–3 above.
  2. Drop all digits after the circled digit.
- To round mixed numbers:
  1. Compare the fraction to $\frac{1}{2}$.
  2. If the numerator is half or more than half of the denominator, round up. If the numerator is less than half the denominator, round down.

     Example: Round $13\frac{5}{12}$ to the nearest whole number.
     $\frac{5}{12}$ is less than $\frac{1}{2}$ because 5 is less than half of 12. So, we round down to 13.
- Estimating calculations helps us decide if an answer is reasonable.
  Round each number in the problem and then do the calculation.

Practice:

1. In 2005, there were 2529 students in Oak Hill School. Round that number to the nearest hundred. ______________________
2. Round 4.32728 to two decimal places. ______________________
3. Round $5\frac{5}{8}$ to the nearest whole number. ______________________
4. Estimate the sum of 5721 and 2453. ______________________
5. Estimate the product of $11\frac{3}{4}$ and 8.48 by rounding each number to the nearest whole number before multiplying. ______________________
6. Jake works 38 hours for $7.80 per hour. He expects his weekly paycheck will be about $300. Explain why Jake's calculation is or is not reasonable?

____

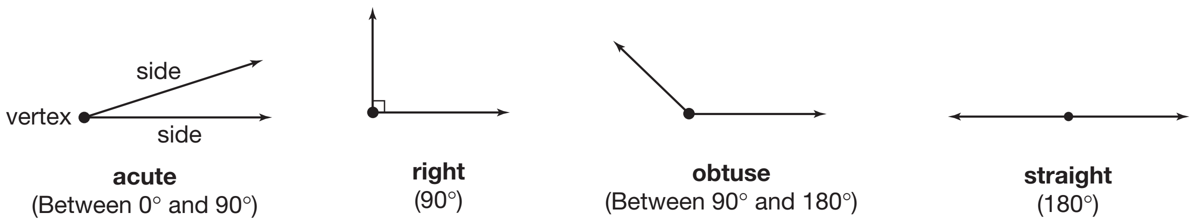
____

Name ______________________________

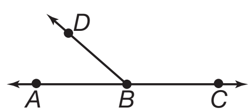
• Lines and Angles

- A **line** is a straight path that extends without end in both directions.
- A **ray** begins at one end point and continues in one direction without end.
- A **segment** is part of a line and has two endpoints.

- An **angle** is two rays with the same endpoint.



- If two angles together form a straight angle, the angles are called a **linear pair** and the sum of their measures is 180°.
  In the figure below, $\angle ABD$ and $\angle DBC$ are a linear pair.



Practice:

1. What is the name of this figure?

____

2. Describe this pair of lines.

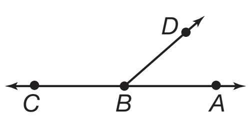
____

3. Describe $\angle CBD$.

____

4. If the measure of $\angle CBD$ is 135°, then what is the measure of $\angle ABD$?

____



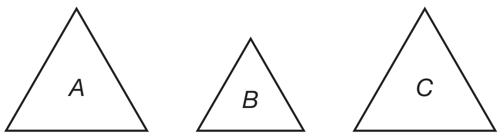
Name ________________________________

• Polygons

Name of Polygon	Number of Sides
Triangle	3
Quadrilateral	4
Pentagon	5
Hexagon	6
Heptagon	7
Octagon	8

- **Polygons** are closed plane figures with straight sides.
- A polygon is **regular** if all its sides are the same length and all its angles are the same size.
- Polygons are named by the number of sides.
- Figures that are the same shape and size are **congruent**.

Figure *A* is congruent to Figure *C*. Figure $A \cong$ Figure C



- Figures that are the same shape are **similar**.

Figure *A* is similar to Figure *B* and Figure *C.*

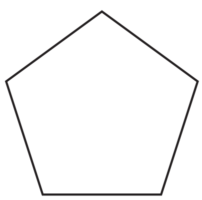
Figure $A \sim$ Figure B Figure $A \sim$ Figure C

- A **dilation** is an enlargement. The original figure and its dilation are similar.

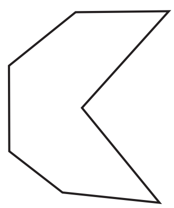
Practice:

Name each polygon. Tell whether it is regular or irregular.

1. ____________________



2. ____________________

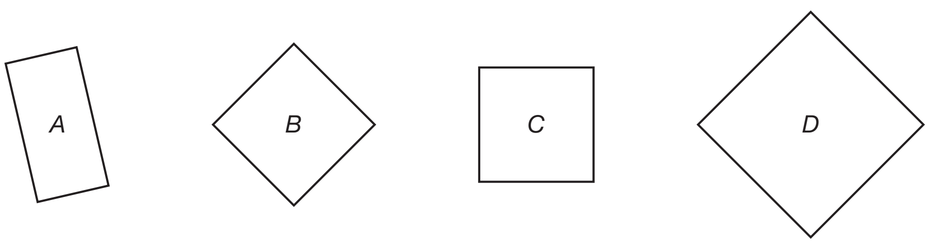


3. Which figures below appear to be congruent?

____

4. Which figures below appear to be similar?

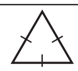
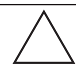
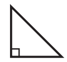
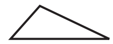
____



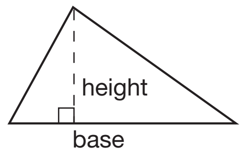
5. Which figure above appears to be a dilation of Figure *B*? ________________

Name ____________________

• Triangles

Classifying Triangles					
By Sides			**By Angles**		
Characteristic	**Type**	**Example**	**Characteristic**	**Type**	**Example**
Three sides of equal length	Equilateral triangle		All acute angles	Acute triangle	
Two sides of equal length	Isosceles triangle		One right angle	Right triangle	
Three sides of unequal length	Scalene triangle		One obtuse angle	Obtuse triangle	

- The measures of the three angles of a triangle total 180°.
- The area of a triangle $= \frac{1}{2}$ base · height.

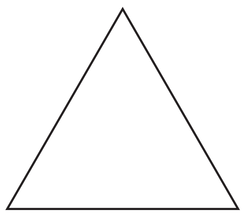


$A = \frac{1}{2}bh$

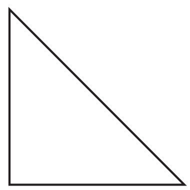
Practice:

Classify each triangle in Problems 1 and 2 by angle and by side.

1. ____________________

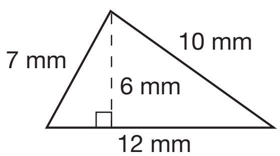


2. ____________________

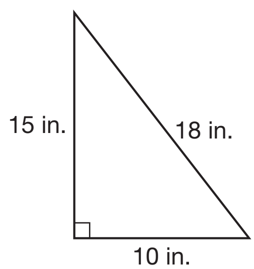


Find the area of each triangle in Problems 3 and 4.

3. ____________________

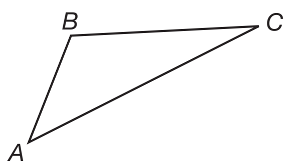


4. ____________________



5. If $\angle A$ is 40° and $\angle B$ is 110°, what is the measure of $\angle C$?

____



6. Classify *ABC* by sides and by angles.

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