Concepts and Skills Bank

1 Percents as Fractions

Lesson Planner

Objective

Express percents as fractions and decimals.

Vocabulary

percent

Activate Prior Knowledge

Discuss situations in which students have encountered percents. Sample answers: discounts at stores, test scores

Using Student Page R56.

- Refer to Example 1: Using a hundreds grid, shade 75 out of 100 squares.
- **What is another way to write 75% as a fraction in simplest form?** Sample answer: write 75 as a fraction over 100 and divide both numbers by the same number until the fraction is in simplest form.
- Refer to Example 2: One way to write 32% as a decimal is to locate the decimal point and move it 2 places to the left.
- **Explain how to write 32% as a decimal.** Sample answer: Divide 32 by 100 to get 0.32 or move the decimal two places to the left.

Exercises 1–14 Have students work independently to solve the exercises.

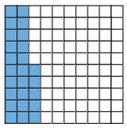
Assess and Close

Give students real-world examples of percents, fractions, and decimals and have them write them in different forms.

Concepts and Skills Bank

1 Percents as Fractions

The model to the right shows 25 squares shaded out of 100. This can be written as the fraction $\frac{25}{100}$ or $\frac{1}{4}$. It can also be written as the decimal 0.25.



A **percent** is a ratio that compares a number to 100.
25% = 25 out of 100 or $\frac{25}{100}$.

EXAMPLE **Write a percent as a fraction**

1 Write 75% as a fraction in simplest form.

75% means "75 out of 100."

$75\% = \frac{75}{100}$ Write as a fraction with a denominator of 100.

$= \frac{\overset{3}{\cancel{75}}}{\underset{4}{\cancel{100}}} = \frac{3}{4}$ Simplify.

EXAMPLE **Write a percent as a decimal**

2 Write 32% as a decimal in simplest form.

32% means "32 out of 100."

32% = 0.32 Write as a decimal.

Exercises

Write each percent as a fraction in simplest form.

1. 29% $\frac{29}{100}$ **2.** 30% $\frac{3}{10}$ **3.** 60% $\frac{3}{5}$ **4.** 84% $\frac{21}{25}$

5. 92% $\frac{23}{25}$ **6.** 8% $\frac{2}{25}$ **7.** 15% $\frac{3}{20}$ **8.** 22% $\frac{11}{50}$

Write each percent as a decimal.

9. 4% 0.04 **10.** 17% 0.17 **11.** 12% 0.12 **12.** 50% 0.50

13. Malak bought a box of colored paper clips. If 15% are green, what fraction of the paper clips are green? $\frac{3}{20}$

14. Of the students in a class, 65% have more than 1 pet. Write this amount as a decimal. 0.65

R56 Concepts and Skills Bank

2 Squared Numbers

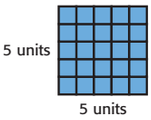
The product of a number and itself is the **square** of that number.

A square with an area of 16 square units is shown. The number 16 is a square number because the product of 4 and itself is 16.

EXAMPLES

1 **Find the square of 5.**

$5 \times 5 = 25$. Multiply 5 by itself.



2 **Use models to determine if 9 is a square number.**

9 units can be arranged to make a square because $3 \times 3 = 9$.

Yes, 9 is a square number

Exercises

Find the square of each number.

1. 6 **36** **2.** 10 **100** **3.** 15 **225** **4.** 12 **144**

5. 17 **289** **6.** 22 **484** **7.** 37 **1,369** **8.** 50 **2,500**

Use models to determine if each number is a square number. Write yes or no.

9. 4 **yes** **10.** 12 **no** **11.** 17 **no** **12.** 36 **yes**

13. 49 **yes** **14.** 50 **no** **15.** 64 **yes** **16.** 81 **yes**

★**17.** How much greater is the area of a square that is 10 meters by 10 meters than the area of a square that is 9 meters by 9 meters?
9 square meters

18. A square garden has an area of 121 square feet. How much fencing is needed to place a fence around the entire garden?
44 feet

Concepts and Skills Bank

2 Squared Numbers

Lesson Planner

Objective

Find the square of a number and identify square numbers.

Vocabulary

square

Activate Prior Knowledge

Discuss the area of square figures and the formula used to find the area. Emphasize that squares have sides of equal length, so the area is always going to be a number multiplied by itself.

Using Student Page R57.

- Refer to Example 1: **What is one way to show the square of 5?** Sample answer: The square of 5 means 5^2 or $5 \times 5 = 25$.
- Refer to Example 2: A model can be used to determine if 9 is a square number by arranging 9 units to make a square. Manipulatives may be used to help students better understand this concept.

Exercises 1-18 Have students work independently to solve the exercises.

Assess and Close

Manipulatives are helpful to give students a better understanding of square numbers. Give students a random number of squares to see if the total is a square number. For example, give one student 15 squares and ask them to find out if 15 is a square number by making a model.

Concepts and Skills Bank

3 Congruent and Similar Triangles

Lesson Planner

Objective

Identify congruent and similar triangles.

Vocabulary

congruent triangles, similar triangles

Activate Prior Knowledge

Discuss what students know about the terms congruent and similar.

- **What have you already learned about the terms congruent and similar?** Sample answers: Congruent means the figures will have the same shape and size. Similar means the figures will have the same shape but different sizes.

Using Student Page R58.

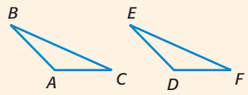
- Refer to Example 1: The measure of the side lengths and the size of the angles in congruent triangles are always equal.
- **How can you tell if a triangle is congruent or similar?** Sample answer: Without a measuring device, it is hard to be exact. The best way is to compare both figures and look for noticeable differences or similarities.

3 Congruent and Similar Triangles

Congruent and Similar Triangles Key Concepts

Words If two triangles are congruent, they have the same angle measures and side lengths.

Model



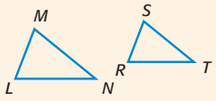
Symbols The symbol ≅ means congruent. $\triangle ABC \cong \triangle DEF$

Congruent sides: $\overline{AB} \cong \overline{DE}$; $\overline{AC} \cong \overline{DF}$; $\overline{BC} \cong \overline{EF}$

Congruent angles: $\angle A \cong \angle D$; $\angle B \cong \angle E$; $\angle C \cong \angle F$

Words If two triangles are similar, they have the same angle measures, but different side lengths.

Model



Symbols The symbol ~ means similar. $\triangle LMN \sim \triangle RST$

Congruent angles: $\angle L \cong \angle R$; $\angle M \cong \angle S$; $\angle N \cong \angle T$

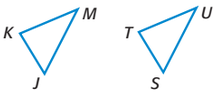
note: Congruent figures are also similar.

EXAMPLE **Congruent Triangles**

1 **IF $\triangle JKM \cong \triangle STU$ name the congruent sides and angles.**

≅ sides: $\overline{JM} \cong \overline{SU}$; $\overline{KM} \cong \overline{TU}$; $\overline{JK} \cong \overline{ST}$

≅ angles: $\angle J \cong \angle S$; $\angle K \cong \angle T$; $\angle M \cong \angle U$

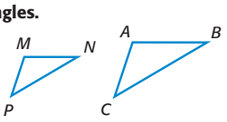


EXAMPLE **Similar Triangles**

2 **IF $\triangle MNP \sim \triangle ABC$ name the congruent angles.**

≅ sides: $\frac{MP}{AC} \cong \frac{MN}{AB} ; \frac{NP}{BC}$

≅ angles: $\angle P \cong \angle C$; $\angle M \cong \angle A$; $\angle N \cong \angle B$



Exercises

Tell whether the triangles appear to be *congruent*, *similar*, or *neither*.

1.  congruent

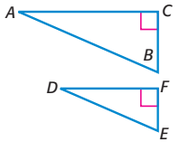
2.  neither

3.  congruent

4.  similar

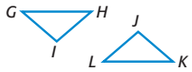
Identify the corresponding angle in the similar triangles shown.

5. $\angle A$ $\angle D$
6. $\angle F$ $\angle C$
7. $\angle B$ $\angle E$
8. $\angle D$ $\angle A$



Identify the corresponding side in the congruent triangles shown.

9. $\overline{GH}$ $\overline{LK}$
10. $\overline{IH}$ $\overline{JK}$
11. $\overline{IJ}$ $\overline{GI}$
12. $\overline{GH}$ $\overline{LK}$

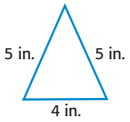


Solve.

13. Two triangles are similar. The height of one triangle is 4 times greater than the other triangle. If the smaller triangle is 33 centimeters tall, how tall is the larger triangle? 132 cm

14. Mia is cutting out 12 triangles for a project. She decides to speed up the process by cutting multiple sheets of paper at once. Is Mia cutting congruent triangles or similar triangles? Explain. Sample Answer: Congruent; Each triangle will be the same size and have equal angle measurements.

15. Marcus is building a triangular frame for his garden. Before he cuts the wood for the frame, he draws the triangle shown. If one inch represents 2 feet, find the dimensions of the sides of the frame. Two sides will be 10 feet long and one side will be 8 feet long.



16. In Exercise 15, is Marcus' drawing similar or congruent to the frame he built? Explain. Sample Answer: Similar; the angles will be the same but the side lengths are different.

Exercises 1- 16 Have students work independently as they: determine whether the figures are congruent or similar, identify corresponding angles, identify corresponding sides, and solve word problems.

Assess and Close

Have students use a ruler and a protractor to create two congruent triangles and two similar triangles.

Concepts and Skills Bank

4 Interior Angle Measures of Triangles

Lesson Planner

Objective

Find missing angle measures in triangles.

Vocabulary

triangle

Activate Prior Knowledge

Discuss what students already know about triangles.

- **What do all triangles have in common?** Sample answer: They are three sided figures.
- **What are different types of triangles?** Sample answer: acute, equilateral, isosceles, obtuse, right, and scalene

Using Student Page R60.

- Explain that the interior angles of a triangle add up to 180 degrees.
- **How can you find the measure of an interior angle of a triangle?** Sample answer: You could measure the angles. Or, if two of the angles are given, they could subtract the known angles from 180°.
- Refer to Example 1: In order to find a missing angle of a triangle, it is helpful to set up an equation showing what you know and do not know.

Exercises 1–8 Have students work independently to determine the interior angle measures of the triangles.

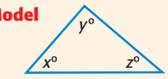
4 Interior Angle Measures of Triangles

Sum of Angle Measures in a Triangle Key Concept

Words

The sum of the measures of the angles in a triangle is 180°.

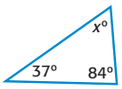
Model



Symbols $x° + y° + z° = 180°$

EXAMPLE Find Angle Measures

1 **Find the value of x in the triangle.**



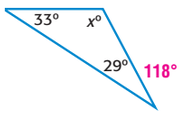
Since the sum of the angle measures in a triangle is 180°, $x + 37 + 84 = 180$.

$x + 37 + 84$	=	180	Write the equation.
$x + 121$	=	180	Add 37 and 84.
-121	=	-121	Subtract 121 from each side.
x	=	59	

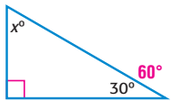
So, the value of x is 59.

Exercises

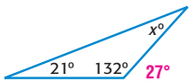
Find the value of the missing angle x.

1. 

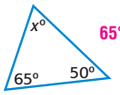
118°

2. 

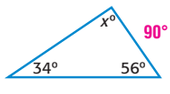
60°

3. 

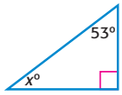
27°

4. 

65°

5. 

90°

6. 

37°

7. Lamar drew a triangle with three equal sides. What is the measure of each angle? How did you find the answer? **60°; The sum of the angles of a triangle is 180°, since all three angles are equal 180 ÷ 3 = 60.**

8. Adrian was asked to draw a triangle in which each angle is 10° greater than the next angle. If the largest angle is 70°, what is the measure of the other two angles? How can you check your solution? **60°, 50°; Add all three angles to get 180°.**

Assess and Close

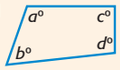
Have students each draw a triangle and cut them out. After each student has a triangle, have them tear each angle of the triangle off to prove that the triangle's interior angles do add up to 180 degrees. Students should be able to show that all three angles will make a straight line, or a 180° angle. Have students find triangles throughout the room. Have them measure the interior angles to determine if the angles add up to 180°.

5 Interior Angle Measures of Quadrilaterals

Sum of Angle Measures in a Quadrilateral Key Concept

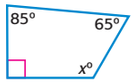
Words
The sum of the measures of the angles in a quadrilateral is 360°

Model
360°



Symbols $a° + b° + c° + d° =$

EXAMPLE **Find Angle Measures**



1 **Find the value of x in the quadrilateral.**

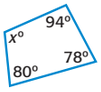
The sum of the angle measures in a quadrilateral is 360°.

$$\begin{aligned} x + 65 + 85 + 90 &= 360 \\ x + 240 &= 360 \quad \text{Add 65, 85, and 90.} \\ -240 &= -240 \quad \text{Subtract 240 from each side.} \\ x &= 120 \end{aligned}$$

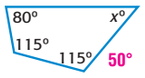
So, the value of x is 120.

Exercises

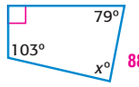
Algebra **Find the value of x in each quadrilateral.**

1.


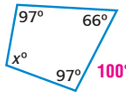
108°

2.


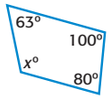
50°

3.


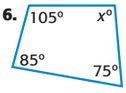
88°

4.


100°

5.


117°

6.


95°

7. Jacob was asked to draw a quadrilateral in which each angle is 10° greater than the next angle. If the smallest angle is 75°, what is the measure of the other three angles? How can you check your solution? 85°, 95°, 105°; Add all four angles to get 360°.

Concepts and Skills Bank

5 Interior Angle Measures of Quadrilaterals

Lesson Planner

Objective

Find missing angle measures in quadrilaterals.

Vocabulary

quadrilateral

Activate Prior Knowledge

Discuss the properties of quadrilaterals.

- **What do all quadrilaterals have in common?** four sides, four angles

Using Student Page R61.

- Give students copies of various quadrilaterals. Some of them should have three angles labeled, the others should not have any angles labeled. Students can write equations or use protractors to find the measures of each of the four angles.
- **What is the sum of the angles of a quadrilateral?** 360°

Exercises 1–7 Have students compare their answers after completing Exercises 1 through 7 independently.

Assess and Close

Have students find objects in the classroom that are in the shapes of quadrilaterals. Have the students use a protractor to measure three of the angles of the quadrilateral and use algebra to find the measure of the fourth angle. Have students check their work by measuring the fourth angle with a protractor.

Concepts and Skills Bank

6 Two-Dimensional Figures

Lesson Planner

Objective

Identify and name polygons.

Vocabulary

polygon, triangle, quadrilateral, pentagon, hexagon, octagon

Activate Prior Knowledge

Show students examples and non-examples of polygons and ask them to categorize them. Have them justify their classifications.

Using Student Page R62.

- Have students draw examples and nonexamples of polygons. If possible, have the students give their polygons names based on the number of sides.
- **Give an example of a real-world object that is not a polygon.** Sample answers: bowl, Earth, cup

Exercises 1–6 Have students work independently to determine if the figures are polygons.

Concepts and Skills

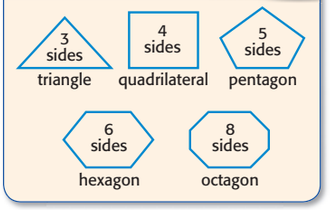
6 Two–Dimensional Figures

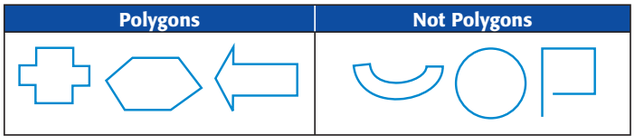
A two-dimensional figure is a closed figure with length and width. Two-dimensional figures are also known as plane figures.

A **polygon** is a simple closed figure formed by three or more sides. The number of sides determines the name of the polygon.

A circle is not a polygon because it is a curve.

Polygons Key Concept





EXAMPLES

Tell whether each shape is a polygon. If it is a polygon, identify the polygon.

1. 
No. It has curves.

2. 
Yes. It is a closed figure with 6 sides. It is a hexagon.

Exercises

Tell whether each shape is a polygon. If it is a polygon, identify the polygon.

1. 
no

2. 
yes; octagon

3. 
no

Identify the type polygon for each sign.

4. 
yes; quadrilateral

5. 

yes; octagon

6. 
yes; pentagon

R62 Concepts and Skills Bank

Assess and Close

Have students create two different drawings using figures. One drawing should only use only polygons. The other drawing should not contain any polygons.

7 Mean

The **mean** is a type of average. To find the mean of a set of data, you can add the data, then divide by the total number of data.

EXAMPLE **Find the Mean**

1. **Find the mean of the following test scores:**
75, 77, 89, 95, 66, 81, 54, 99

$75 + 77 + 89 + 95 + 66 + 81 + 54 + 99 = 636$ Add the data.

$= \frac{636}{8}$ Divide by the number of test scores.

$= 79.5$

So, the mean is 79.5.

Exercises

Find the mean.

1. Number of DVDs: 21, 23, 25, 27, 19 **23**
2. Test scores: 99, 87, 81, 95, 94, 84, 67 **86.7**
3. Number of pets: 2, 3, 7, 4, 5, 8, 6 **5**
4. Points scored: 11, 17, 34, 57, 14, 49, 35 **31**
5. Coins collected: 105, 112, 155, 142, 164, 187, 123 **141.1**
6. Yards gained: 751.1, 857.1, 801.4, 610.1 **754.9**
7. Miles traveled: 21.5, 25.9, 34.1, 24.7, 22.6 **25.8**
8. Students from Mrs. Whittier's class went on a field trip to collect different kinds of leaves for their science project. Use the chart to determine the mean number of leaves collected. **12 leaves**

Student	Number of leaves
Manny	17
Tanya	4
Jai	7
Randy	11
Kelly	21

9. Trisha went to the mall and walked by several jewelry displays. There were 30 pairs of earrings in the first display. There were 40 necklaces in the next display. The third display had 25 rings. The final display had 50 bracelets. Find the mean number of jewelry in the displays. **36 pieces of jewelry**

Concepts and Skills Bank

7 Mean

Lesson Planner

Objective

Find the mean of a data set.

Vocabulary

mean

Activate Prior Knowledge

Give students the set of values, {68, 75, 78, 72, 80}, and ask them to estimate what single value the set is "around". See students' work, around 75.

Using Student Page R63.

- Review with students how to determine the median of a set of data. Order the numbers from least to greatest, and then find the number in the middle.
- Discuss with students how to find the mean by adding all of the values in the set and dividing by the number of values that were added.
- **In your own words, explain a time when it would be helpful to find the mean of a data set.** Sample answers: charting statistics for athletes, examining a set of classroom test scores.

Exercises 1–9 Have students work independently as they find the mean for each of the exercises.

Assess and Close

Have students write their heights, in inches, on the board. Have them find the mean of the heights of every student in the class.

Concepts and Skills Bank

8 Stem-and-Leaf Plots

Lesson Planner

Objective

Display and analyze data using a stem-and-leaf plot.

Vocabulary

stem-and-leaf plot

Activate Prior Knowledge

Discuss some of the different ways to display data such as bar graphs, line graphs, and pictographs.

Using Student Page R64.

- Discuss with students the steps involved when creating a stem-and-leaf plot. Discuss what should be done if the range is 40 to 80 but there are no values in the 70s. Do you need a 7 in the stem? Yes, there would be a 7 stem, but no accompanying leaf.
- Discuss with students how to read a stem-and-leaf plot.
- **In Example 1, what is the greatest number in the set? the least number?** 51; 85

Exercises 1–5 Have students work independently as they create and analyze stem-and-leaf plots.

Concepts and Skills

8 Stem-and-Leaf Plots

A **stem-and-leaf plot** is a way to organize and distribute data.

- The leaf is the last digit of the number.
- The other digits to the left of the leaf form the stem.

For the numbers 21, 24, 35, and 38, 2 and 3 are the stems. The numbers 1, 4, 5 and 8 are the leaves.

Stem	Leaf
2	1 4
3	5 8

EXAMPLE

1 **SPORTS** **Make a stem-and-leaf plot of the basketball scores below.**

68, 52, 85, 64, 59, 51, 62, 66

51, 52, 59, 62, 64, 66, 68, 85 — Write the data from least to greatest.

51, 52, 59
62, 64, 66, 68
85 — Group the numbers with the same first digit.

Stem	Leaf
5	1 2 9
6	2 4 6 8
8	5

Seperate each stem from each leaf.

Exercises

Make a stem-and-leaf plot for each set of numbers. 1–2 See students' work

1. 83, 86, 99, 43, 75, 91

2. 33, 31, 62, 20, 32, 25

Write the set of numbers from least to greatest used to form each stem-and-leaf plot.

3.

Stem	Leaf
0	4 5 8
1	3 4 7
2	6

4, 5, 8, 13, 14, 17, 26

4.

Stem	Leaf
4	1
5	1 2 6 8

41, 51, 52, 56, 58

5. Sarah wants to use a stem-and-leaf plot to organize her test scores. List the digits that will make up the stem portions of the plot for the scores 80, 92, 88, 85, 76, 94, 98. 7, 8, 9

Assess and Close

Have students research the high temperatures for their city for the last fifteen days. Have them create a stem-and-leaf plot of the temperatures.