Concepts and Skills Bank

1 Use Operations with Even and Odd Numbers

Lesson Planner

Objective

Draw conclusions about the answers to expressions involving even and/or odd numbers.

Vocabulary

even numbers, **odd numbers**

Materials: 4 envelopes, poster paper (optional)

Activate Prior Knowledge

Lead a discussion about how to identify even and odd numbers.

- Write 567 on the chalkboard. Ask students to identify the number as either even or odd. Have them explain their thinking to the class.
- Discuss how even and odd numbers differ by looking at the ones place. Even numbers have 0, 2, 4, 6, or 8 in the ones place. Odd numbers have 1, 3, 5, 7, or 9 in the ones place. Explain that even numbers begin at 0 and skip count by two, whereas odd numbers begin at 1 and skip count by two.

Using student page R64.

- Divide students into four groups and hand out envelopes containing operation rules written on strips of paper. For example, the addition group would receive four strips of paper in their envelope with addition number sentences (i.e., even + even = even) on them. When creating the strips, make at least one of the number sentences false.

Concepts and Skills Bank

1 Use Operations with Even and Odd Numbers

Even numbers are whole numbers that have 0, 2, 4, 6, or 8 in the ones place. Whole numbers that have a 1, 3, 5, 7, or 9 in the ones place are **odd numbers**.

Even and Odd Numbers — Key Concept

Even numbers	Odd numbers
0, 2, 4, 6, 8, 10, 12… 192, 194, 196… 2,930, 2,932…	1, 3, 5, 7, 9, 11, 13… 281, 283, 285… 45,933, 45,935…

The expressions below show different combinations of even and odd numbers.

Addition	even + even 4 + 6	odd + odd 3 + 9	even + odd 2 + 3	odd + even 7 + 2
Subtraction	even − even 8 − 4	odd − odd 7 − 5	even − odd 8 − 7	odd − even 9 − 6
Multiplication	even × even 6 × 2	odd × odd 5 × 3	even × odd 4 × 7	odd × even 1 × 8
Division	even ÷ even 8 ÷ 2	odd ÷ odd 9 ÷ 3	even ÷ odd 6 ÷ 3	odd ÷ even 5 ÷ 2

Exercises

Solve each equation. Then use *odd* or *even* to complete the sentence.

1. 32 + 12 = ■ 44
   even + even = ■ even
2. 55 + 27 = ■ 82
   odd + odd = ■ even
3. 38 + 83 = ■ 121
   even + odd = ■ odd
4. 72 − 25 = ■ 47
   even − odd = ■ odd
5. 62 − 18 = ■
   even − even = ■
6. 87 − 29 = ■
   odd − odd = ■

Use *odd* or *even* to complete each sentence.

7. odd × odd = ■ odd
8. even × even = ■ even
9. odd × even = ■ even
10. even ÷ even = ■ odd or even
11. odd ÷ odd = ■ odd
12. even ÷ odd = ■ even

- Assign groups the task of determining which number sentences are true and which are false.
- Have groups record their findings on poster paper or the chalkboard, and then share their results with the class. If time, invite students to try to disprove other groups' findings.

Using the Exercises

Exercises 1–6 Before solving each numerical expression, ask students to determine the answer to the verbal expressions. Then, have students check their answers by solving the expressions.

Exercises 7–12 Challenge students to determine the answers without looking at the operation rules posted by the groups.

Assess and Close

Assess students' understanding by asking them to solve two verbal expressions, such as "odd × even," without access to the posted rules. Ask students to support their answers by explaining their thinking with both numbers and words.

2 Add and Subtract Money with Decimals

The steps to follow when adding or subtracting money with decimals are similar.

EXAMPLE **Add Money with Decimals**

1 **$3.93 + $5.25**

Step 1 Line up the decimal points.

$$\begin{array}{r} \$3.93 \\ +\ \$5.25 \\ \hline . \end{array}$$

Step 2 Before adding, place a decimal point for the answer. Line it up under the decimal points.

Step 3 Add the numbers as you would if you were adding whole numbers. Place a dollar sign ($) in front of the sum.

$$\begin{array}{r} {\scriptstyle 1} \\ \$3.93 \\ +\ \$5.25 \\ \hline \$9.18 \end{array}$$

THINK 93¢ + 25¢ = 118¢. Since 100¢ = $1.00, regroup 118¢ as $1.18.

So, $3.93 + $5.25 = $9.18.

EXAMPLE **Subtract Money with Decimals**

2 **$15.28 − $8.12**

Step 1 Line up the decimal points. Place the decimal point.

$$\begin{array}{r} \$15.28 \\ -\ \$8.12 \\ \hline . \end{array}$$

Step 2 Subtract. Place a dollar sign ($) in front of the difference.

$$\begin{array}{r} \$15.28 \\ -\ \$\ 8.12 \\ \hline \$\ 7.16 \end{array}$$

So, $15.28 − $8.12 = $7.16.

Exercises

Add or subtract.

1. $7.22 + $5.37 **$12.59** **2.** $8.04 + $4.63 **$12.67** **3.** $13.44 + $35.52 **$48.96**

4. $9.68 − $7.35 **$2.33** **5.** $7.42 − $3.31 **$4.11** **6.** $12.83 − 11.52 **$1.31**

Using the Exercises

Exercises 1–3 Show students how to use subtraction to check the answers to these addition problems.

Exercises 4–6 Suggest using the strategy of using addition to check the answers to these exercises.

Assess and Close

Ask each student to write two number stories, one that requires addition to solve and another that requires subtraction to solve. Remind the class to end each number story with a question. If time, students can meet with the teacher or another student for brief proofreading sessions to ensure their stories make sense and are well written. Proofreading could be done overnight by the teacher to allow him/her to assess students' understanding of the number story writing process. Finally, have students switch stories with someone in the classroom and solve, or include the most well written number stories in a class assessment piece.

Concepts and Skills Bank

2 Add and Subtract Money with Decimals

Lesson Planner

Objective

Add and subtract monetary amounts containing decimal points.

Materials: 4 envelopes, poster paper (optional)

Activate Prior Knowledge

- Lead a discussion about how to write various amounts of money.
- Point out that either a cent sign (¢) or a dollar sign accompanied by a decimal point are used when writing monetary amounts.

Using student page R65.

- Display a variety of classroom objects, each with an appropriate price. Ask students to use addition to find various totals using the displayed objects. For example, "What is the total price of a backpack ($20.95) and a box of markers ($6.50)?" Remind students to line up the decimal points when writing a problem.
- After finishing a problem, ask students to look at their answers to ensure they make sense.
- Present a number story to the class that requires subtraction to solve, such as "How much more does a globe ($47.25) cost than a pencil sharpener ($1.99)?" Again, remind students of the importance of lining up the decimal points before solving the problem.

Concepts and Skills Bank

3 Multiply Money

Lesson Planner

Objective

Solve 3-digit by 1-digit multiplication problems involving monetary amounts.

Materials: food menu(s) (class copy or 1 per group), list of party items (1 per student or small group)

Activate Prior Knowledge

- Invite students to share strategies for finding the total cost of 4 slices of pizza if the price of each slice is $1.25.
- Call students to the chalkboard to share their solutions.

Using student page R66.

- Share with students that while addition can be used to solve problems such as the one above, multiplication is usually faster.
- Explain to students that they do not need to line up decimal points when writing a multiplication problem involving money. However, they do need to include a dollar sign and a decimal point in the answer. After solving the problem, they must bring the decimal point straight down into the answer or count the number of digits behind the decimal point. A dollar sign must be placed in front of the answer.
- Divide students into small groups. Display a food menu. If the menu prices are in dollars only, add a decimal point and some cents to each item. Pose problems for small groups to solve using the menu.
- If time permits, assign students the task of "ordering" lunch for their entire group. Ask students to record their menu choices and to determine the total cost of lunch for their group. Tell students they are required to use both multiplication and addition to determine the total cost.

3 Multiply Money

Multiplying money can be used to find the total cost of many items that have the same price.

EXAMPLE **Multiplying Money**

1 Suppose a notebook costs $2.15. How much would 6 notebooks cost?

Step 1 Write the problem as shown.

$$\begin{array}{r} \$2.15 \\ \times\ \ 6 \\ \hline \end{array}$$

Step 2 Multiply the hundredths place.

$$\begin{array}{r} {\scriptstyle 3} \\ \$2.15 \\ \times\ \ 6 \\ \hline 0 \end{array}$$

Step 3 Multiply the tenths place.

$$\begin{array}{r} {\scriptstyle 0\ 3} \\ \$2.15 \\ \times\ \ 6 \\ \hline 90 \end{array}$$

Step 4 Multiply the ones.

$$\begin{array}{r} {\scriptstyle 0\ 3} \\ \$2.15 \\ \times\ \ 6 \\ \hline 1290 \end{array}$$

Step 5 Since there are two digits behind the decimal point, place the decimal point two places in front of the last digit of the answer. Write a dollar sign ($) in front of the product.

$$\begin{array}{r} {\scriptstyle 0\ 3} \\ \$\ 2.15 \\ \times\ \ 6 \\ \hline \$12.90 \end{array}$$

So, 6 notebooks cost $12.90.

Exercises

Multiply.

1. $5.24 × 3 = **$15.72**
2. $3.74 × 5 = **$18.70**
3. $4.98 × 7 = **$34.86**
4. $7.02 × 4 = **$28.08**
5. $2.33 × 8 = **$18.64**
6. $6.02 × 9 = **$54.18**

Using the Exercises

Exercises 1–6 Remind students to always place a dollar sign and a decimal point in their answers. Also, ask students to use repeated addition to check at least two of the exercises.

Assess and Close

Inform students that they have a budget of $60 to plan a party for 8 people. Provide them with the list of party items below. Working alone or in groups, students can choose items for the fun feast.

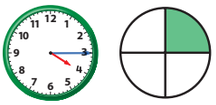
Ask students to create a table showing how many of which items they bought and the cost involved.

ITEM	COST
1 bag of 8 hot dog buns	$1.99
1 package of 10 hot dogs	$2.50
1 bag of potato chips	$3.50
1 bag of rice cakes	$3.19
1 case of bottled water (6 waters included)	$3.79
1 2–liter of juice	$1.50
1 bag of apples (6 apples included)	$5.49
1 package of napkins (50 napkins included)	$1.39
1 package of plastic cups (20 cups included)	$3.50
1 package of paper plates (20 plates included)	$2.25
1 small bag of ice (enough for 6 people)	$2.35
1 large bag of ice (enough for 10 people)	$5.25

4 Relate Fractions to a Clock

Clocks can be used to show fractions. The hours and minutes divide a clock into equal parts.

The clock shows 4:15. The minute hand started at the 12 on the clock at the beginning of the 4:00 hour. It has moved around $\frac{1}{4}$ of the clock since 4:00. Compare the clock to the fraction model.



EXAMPLE

1 **Write the fraction of the clock that the minute hand has traveled since 7:00.**

The minute hand started at the 12 and has traveled half way around the clock. So, the minute hand has traveled $\frac{1}{2}$ of the clock.

Exercises

Write the fraction of the clock that the minute hand has traveled since the beginning of the hour.

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

2.  $\frac{1}{2}$

3.  $\frac{0}{1}$

Use the clock at the right for Exercises 4–7. Write the fraction of the clock that the minute hand will travel for each given time.

4. 3:15 $\frac{1}{4}$
5. 3:20 $\frac{1}{3}$
6. 3:45 $\frac{3}{4}$
7. 3:50 $\frac{5}{6}$

Concepts and Skills Bank

4 Relate Fractions to a Clock

Lesson Planner

Objective

Gain a better understanding of both fractions and telling time by relating common fractions to the minute hand on a clock.

Materials: page of blank clock faces (1 per student), notebook paper (1 piece per student)

Manipulatives: class set of manipulative clocks

Activate Prior Knowledge

Pass out class set of clocks and initiate practice of telling time to the nearest five-minute interval.

- Dictate different times for students to show on their clocks, such as 5:00, 8:45, 1:20, and 9:40.
- Draw a large circle on the chalkboard. Invite a volunteer to write the numbers 1 through 12 on the circle as they would appear on a clock. Ask the class how many equal parts the volunteer divided the clock into. Discuss how the clock is divided into 12 equal parts, or twelfths. Each part is $\frac{1}{12}$ of the whole, and $\frac{12}{12}$ equals one whole hour.

Using student page R67.

- Discuss with students how much of the hour has passed when the minute hand points to 4 $\frac{4}{12}$, to 6 $\frac{6}{12}$, to 9 $\frac{9}{12}$, and to 12 $\frac{12}{12}$.
- Pass out a page of blank clock faces to each student. Give the class time to divide the clocks into equal parts in different ways.
- Have students share their work with a partner. Invite students to share their findings on the chalkboard until all fractional possibilities have been recorded (halves, thirds, fourths, sixths, and twelfths).

Using the Exercises

Exercises 1–3 Tell the class they may use their blank clock faces to help them solve these exercises. Point out the example of 4:15 and the corresponding $\frac{1}{4}$ shaded on the circle at the top of the lesson. Students may also use manipulative clocks.

Exercises 4–7 Ask students who finish early to write equivalent fractions for each time. For example, the fractions $\frac{1}{4}$ and $\frac{3}{12}$ can be written for Exercise 4.

Assess and Close

Time Trial Have students number from 1 to 10 on a piece of notebook paper. Dictate fractional times (such as $\frac{6}{12}$ of the hour past 4, or 4 and $\frac{6}{12}$ of the hour) and ask students to record the corresponding times (4:30) on their papers.

Concepts and Skills Bank

5 Points, Lines, Line Segments, Rays, and Angles

Lesson Planner

Objective

Solve 3-digit by 1-digit multiplication problems involving monetary amounts.

Vocabulary

point, line, ray, line segment, angle

Materials: small, handmade posters of geometric figures, 5 index cards per student

Activate Prior Knowledge

Display the posters of each geometric figure, or draw them on the chalkboard.

- Teach students the following song, which is sung to the tune of *Do-Re-Mi*.

  Point, a point, a spot or dot
  Ray, reminds me of the sun
  Angle, two rays from just one point
  Line, has a long, long way to run
  Segment, a section of a line
  That has two endpoints every time
  These geometric figures are on my mind

  Which brings us back to point (Repeat)

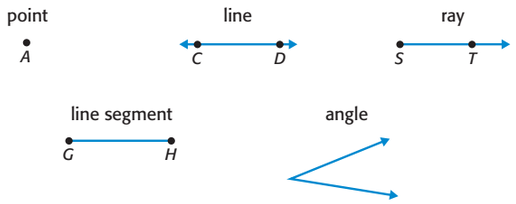
- Ask students to identify the figures.

Using student page R68.

- Divide students into small groups and distribute copies of a table similar to the one shown. Embark on a geometric safari around the room. Have students find and record the various figures.

5 Points, Lines, Line Segments, Rays, and Angles

A **point** is shown by a dot. A **line** is a set of points that form a straight path that goes in opposite directions without ending. A **ray** is a line that has an endpoint and goes on forever in one direction. A **line segment** is a part of a line between two endpoints. An **angle** is made up of two rays that meet at the endpoints.



EXAMPLE **Identify a Figure**

1 **Describe the figure at the right.**

The figure has one endpoint. The arrow indicates that it goes on forever in one direction.

So, it is a ray.

Exercises

Describe each figure as a *point*, *line*, *ray*, *line segment*, or *angle*.

1. line

2. ray

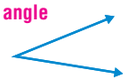
3.

line segment

4. point

5. ray

6. angle



- If time permits, invite students to share the results of their safari with their fellow classmates.

Type	Location	Draw It

Using the Exercises

Exercises 1–6 Remind students to think of the lyrics to the song they learned to help them identify each figure. Encourage them to be mindful of arrows which extend beyond points when determining the name of each figure.

Assess and Close

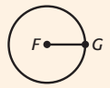
Assign students the task of creating study cards. On each index card, students are to write the name of a figure, draw it, and write at least two facts about it. Note cards can then be used to study for any upcoming assessments.

6 Attributes of Circles

A **circle** is a two-dimensional closed figure in which all points are the same distance from a fixed point, called the **center**. The distance around the circle is called the **circumference**. The parts of a circle are below.

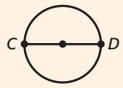
Parts of a Circle — Key Concepts

A line segment that connects the center of a circle to a point on the circle is a **radius** of the circle.



Line segment *FG* is the radius.

A line segment that connects two points on a circle and goes through the center of a circle is a **diameter** of a circle.

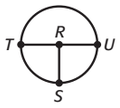


Line segment *CD* is the diameter.

EXAMPLE

1. **Identify point *R* and line segment *TU*.**

Point *R* is in the middle of the circle. Line segment *TU* connects two points on a circle and goes through the center of the circle.

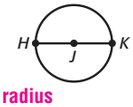


So, point *R* is the center, and line segment *TU* is the diameter.

Exercises

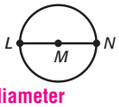
Identify the given points or line segments for each circle.

1. line segment *JK*



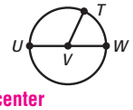
radius

2. line segment *LN*



diameter

3. point *V*



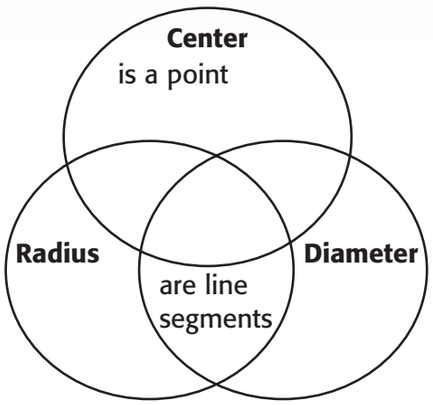
center

Using the Exercises

Exercises 1–3 Before students complete the exercises, invite them to ponder why a ray or line cannot serve as the radius or diameter of a circle. If students are having a difficult time distinguishing between radius and diameter, relate to them that the word *radius* is shorter than *diameter*, and the radius of a circle is always shorter than its diameter.

Assess and Close

Venn Diagram Have students complete the three-ring Venn diagram shown below with facts they have learned about each term. Challenge students to record at least two facts in each region of the diagram.



Concepts and Skills Bank

6 Attributes of Circles

Lesson Planner

Objective

Recognize and understand the properties of a circle.

Vocabulary

circle, center, circumference, radius, diameter

Materials: sticky notes (1 per student); yarn, Venn diagram (1 per student)

Activate Prior Knowledge

Distribute a sticky note to each student. Instruct students to write something they know about circles on the note.

- Invite students to post finished notes on the chalkboard. Read aloud and discuss the information on all of the notes.

Using student page R69.

- Have students gather in a large circle. Explain that the distance around a circle is called the *circumference*. Choose a student to serve as the *center* of the circle.
- Give a student standing in the circumference one end of a length of yarn. Then, give the student standing in the center the other end of the piece of yarn. Discuss the radius. Name the radius after the first letter of the name of each student. Repeat a few more times.
- Continue the activity above, but with a longer piece of yarn to signify the circle's diameter.

Concepts and Skills Bank

7 Intersecting, Perpendicular, and Parallel Lines

Lesson Planner

Objective

Classify lines as intersecting, perpendicular, and/or parallel.

Vocabulary

intersecting lines, perpendicular lines, parallel lines

Materials: yarn, stapler, blank pieces of paper (3 per student), scissors, glue, crayons, markers, or colored pencils

Activate Prior Knowledge

Lead a discussion about the three types of lines.

- Brainstorm a list of intersecting, perpendicular, and parallel lines or line segments that occur in the real world.
- Challenge students to determine whether pairs of lines can fit two definitions (they can—lines can be both intersecting and perpendicular).

Using student page R70.

- Pass out blank paper and $1\frac{1}{2}$ to 2 feet of yarn to each student. Instruct students to fold both pieces of paper in half before putting one inside the other and stapling them along the crease. Have students make a book containing the definitions of the three types of lines. On each page, students are to write the type of line, its definition, and use small pieces of the yarn to illustrate the lines.
- If time permits, encourage students to create mnemonic devices to help them remember the three definitions; for example, there are three of the letter l in the word "parallel" that will never touch—they are parallel!

Concepts and Skills

7 Intersecting, Perpendicular, and Parallel Lines

Two lines can be related in three ways. They can be intersecting, perpendicular, or parallel.

Pairs of Lines — Key Concept

Definition	Model
Intersecting lines are lines that meet or cross at a point.	
Perpendicular lines are lines that meet or cross each other to make a square corner.	
Parallel lines are lines that are the same distance apart and do not intersect.	

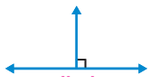
EXAMPLE **Describe a Pair of Lines**

1. **Classify the lines at the right as *intersecting, perpendicular,* or *parallel*.**

The lines cross at one point, so they are intersecting. Since they do not form a square corner, they are perpendicular lines.

Exercises

Classify each pair of lines as *intersecting, perpendicular,* or *parallel*.

1.  intersecting
2.  parallel
3.  intersecting
4.  perpendicular
5.  parallel
6.  intersecting

R70 Concepts and Skills Bank

- After discussing the terms *parallel* and *perpendicular*, have students find real-world examples of objects with parallel and perpendicular lines.
- Have students find parallel planes in three-dimensional figures and objects in the classroom.

Using the Exercises

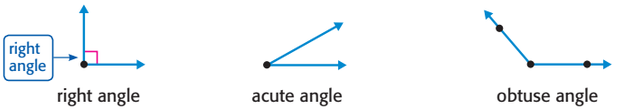
Exercises 1–6 Remind students that a square corner always indicates a pair of perpendicular lines. Also, tell students that at least one of the exercises has two answers (the lines in Exercise 4 are both intersecting and perpendicular).

Assess and Close

Ask students to create abstract art using the various types of lines. Pass out paper to each student. Have students draw 2 sets of parallel lines (green or blue), 1 set of perpendicular lines (yellow or orange), and 3 sets of intersecting lines (red or purple). Students will use crayons, markers, or colored pencils to create original art according to the specifications set forth.

8 Classify Angles

Angles can be classified by how far the rays spread apart. An angle that has the type of corner found on a square is called a **right angle**. Any angle that is smaller than a right angle is called an **acute angle**. An angle that is larger than a right angle but smaller than a straight line is called an **obtuse angle**.



right angle acute angle obtuse angle

EXAMPLES

Classify the angle as *right, acute,* or *obtuse*.

1

The angle shown looks like the corner of a square. So, the angle is a right angle.

2

The angle shown is smaller than a right angle. So, it is an acute angle.

Exercises

Classify the angle at the right as *right, acute,* or *obtuse*. Use a square pattern block if needed.

1. acute 

2. right 

3. obtuse 

4. obtuse 

5. acute 

6. right 

7. Give a real-world example of each type of angle. Sample answer: acute: capital A; right: book corner; obtuse: lawn chair

Using the Exercises

Exercises 1–6 Show students how to use a square pattern block to determine an angle's type. Also, point out that an angle does not have to have points drawn on it to be an angle (such as the angle shown in Exercise 1).

Exercise 7 If time permits, encourage students to write more than one example for each type of angle.

Assess and Close

Divide students into small groups. Have them circulate around the classroom and collect objects which have angles. When they return to their workspace, have each group draw a large 3-ring Venn diagram on their piece of poster-sized paper. Instruct students to label the three main regions "right angle," "acute angle," and "obtuse angle." Finally, have students categorize their objects by placing them in the correct region of the Venn diagram. Those objects that contain more than one type of angle should be placed where the main regions overlap.

Concepts and Skills Bank

8 Classify Angles

Lesson Planner

Objective

Recognize and understand properties of three types of angles: right, acute, and obtuse.

Vocabulary

right angle, acute angle, obtuse angle

Materials: blank piece of 8 $\frac{1}{2}$ x 11" paper (1 per student); poster-sized paper (1 per group); straws, pipe cleaners, or toothpicks

Manipulatives: square pattern blocks

Activate Prior Knowledge

Review with students the definition for "angle," which was learned in a previous Concept and Skills Lesson.

- Ask students to explain how an angle is different from other geometric figures they have learned about, such as a ray or line segment.

Using student page R71.

- Lead students in "Angle Calisthenics." Show students how to make the different angles using their arms or legs, and then call out angle types at random for students to create.
- Have students make a pamphlet detailing the three types of angles. On each face of the pamphlet students can include the definition of each angle, details about its measure in degrees, examples of where it can be found in the classroom, and a graphic representation of the angle using straws, pipe cleaners, or toothpicks as the sides of the angles.

Concepts and Skills Bank

9 Triangles

Lesson Planner

Objective

Recognize and understand the properties of the six types of triangles.

Vocabulary

isosceles triangle, equilateral triangle, scalene triangle, acute triangle, right triangle, obtuse triangle

Materials: books, magazines, or Internet sites containing photographs of architecture; blank paper (1 piece per student)

Manipulatives: square pattern blocks

Activate Prior Knowledge

Lead a discussion about triangles.

- Discuss how triangles differ from other shapes (i.e., number of sides/angles).
- Have students go on a triangle scavenger hunt by looking through books and magazines, or looking online as a class at photographs of architecture.

Using student page R72.

- Using the two charts on page R72, classify the triangles students find by their sides and angles.
- As a class or in small groups, brainstorm mnemonic devices to aid students in memorizing the different types of triangles. For example, "An acute triangle has such cute little angles!" Teach students to sing "Oh isosceles, Oh isosceles; You look just like a pine tree" to the tune of "O Tannenbaum."

9 Triangles

You can classify triangles by the lengths of their sides or by their angles.

Classify Triangles by Sides Key Concepts

Isosceles	Equilateral	Scalene
		
at least two sides have the same length	all sides have the same length	no sides have the same length

Classify Triangles by Angles Key Concepts

Acute	Right	Obtuse
		
3 acute angles	1 right angle, 2 acute angles	1 obtuse angle, 2 acute angles

EXAMPLE

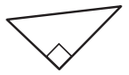
1. **Classify the triangle by its sides and by its angles.**

None of the sides have the same length. There is one obtuse angle and 2 acute angles.

So, the figure shown is a scalene triangle and an obtuse triangle.

Exercises

Classify each triangle by its sides and by its angles.

1. 
2. 
3. 
4. 

isosceles; acute | scalene; right | scalene; obtuse | equilateral; acute

- Challenge students to think of triangle side and angle combinations that are impossible, such as a right, equilateral triangle or an obtuse, equilateral triangle.

Using the Exercises

Exercises 1–4 Tell students they may use a square pattern block to identify right triangles. Remind students to use the brainstormed mnemonic devices to help them classify each triangle.

Assess and Close

Have students fold a blank piece of paper in half three times and then unfold it to reveal eight regions. Tell students to number the squares 1 through 8. Describe different triangles for students to draw in each region. For example, students could be instructed to draw an acute, equilateral triangle in the first region.

10 Similar and Congruent Figures

Two figures that have the same shape but different sizes are called **similar**.
When figures have the same size and the same shape, they are **congruent**.

similar

same shape
different size

congruent

same shape
same size

EXAMPLE

1 **Classify the set of figures as *similar* or *congruent*.**

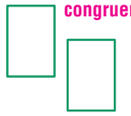
The figures are the same shape and same size.

So, the figures are congruent.

Exercises

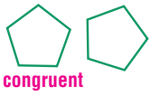
Classify each set of figures as *similar* or *congruent*.

1. congruent



2. similar

3. congruent



4. congruent

5. similar

6. congruent

7. Write a real-world example of a pair of objects that are similar.
Sample answer: a small paperclip and a large paperclip.

Using the Exercises

Exercises 1–6 Before students attempt to classify each set of figures, show them how to trace one of them and then lay the tracing on top of the other to determine if they are either congruent or similar. They can use tracing paper, an overhead transparency, or any sheet of paper that is thin and easy to see through. Inform students that they may have to rotate the tracing because figures do not always have the same orientation.

Exercise 7 After students have recorded an example and if time permits, encourage them to draw the objects.

Assess and Close

Shape Sort Supply each student with a piece of blank paper and some colored paper. Have them fold the piece of blank paper into three equal regions and label them "similar," "congruent," and "neither." Next, have students use the colored paper to cut out 2 shapes for each region. Explain that they are to write why each set of shapes belongs in the particular regions.

Concepts and Skills Bank

10 Similar and Congruent Figures

Lesson Planner

Objective

Classify geometric figures as either similar or congruent.

Vocabulary

similar, **congruent**

Materials: paper cut-outs of two similar figures; scrap paper; tracing paper, an overhead transparency, or any sheet of paper that is thin and easy to see through; scissors; glue; blank piece of paper (1 per student); colored paper

Manipulatives: various pattern blocks

Activate Prior Knowledge

Pass out pairs of pattern blocks to small groups of students, such as two triangles, two squares, two trapezoids, etc. Ask students to find exact matches among the blocks.

- Tell students that when two objects have exactly the same size and shape, they are congruent.

Using student page R73.

- Hold up paper cut-outs of two similar figures and invite a volunteer to place them on top of each other to determine if they are congruent. When the student determines that they are not, introduce the term "similar."
- Have students draw examples of similar figures on paper. Then, invite students to the chalkboard to draw their favorite set of similar figures on the chalkboard.

Concepts and Skills Bank

11 Transformations

Lesson Planner

Objective

Classify transformations as turns, flips, or slides.

Vocabulary

transformation, **turn**, **flip**, **slide**

Materials: scrap paper, handheld mirrors (optional), notebook paper (1 piece per student)

Manipulatives: various pattern blocks

Activate Prior Knowledge

Tell students to stand up and move around the room (at no faster than a walk).

- After a few minutes, have students stop and face the front. Then, ask them to turn to face the door. Explain to students that they have just turned, or rotated, to face a different direction. Draw a rotation on the chalkboard to illustrate.
- Have students pick up a book. Have them flip the book so that it is a mirror image of itself. Relate to students that the movement of the book can be classified as a flip, or reflection. Demonstrate a rotation on the chalkboard.
- Finally, ask students to take one step in any direction. Inform them that the movement they have just made can be classified as a slide, or translation. Draw an example of a translation on the chalkboard.

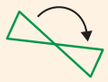
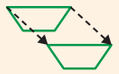
Using student page R74.

- Pass a pattern block to each student. Instruct students to draw the three different transformations by first tracing their block and then moving it. Have students refer to page R74 to aid them in practicing the transformations.

11 Transformations

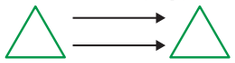
When a geometric figure changes location, it has gone through a **transformation**. Three types of transformations are **turn**, **flip**, and **slide**.

Transformations — Key Concept

turn (rotation)	flip (reflection)	slide (translation)
		
A turn is a transformation in which a figure is rotated or turned around a point.	A flip is a transformation that flips a figure across a line to make a mirror image of that figure.	A slide is moving a figure in a vertical, horizontal, or diagonal direction.

EXAMPLE

1. **Identify the transformation. Write *turn*, *flip*, or *slide*.**

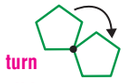
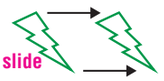
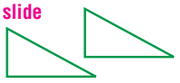


The triangle above has moved sideways. It has not turned or flipped.

So, the transformation of the triangle is a slide.

Exercises

Identify each transformation. Write *turn*, *flip*, or *slide*.

1.  turn
2.  flip
3.  slide
4. slide 
5. turn 
6.  slide

- Point out to students the hour and minute hands on a clock are rotating figures; they rotate about a fixed point.
- Have students check their flips with handheld mirrors (if available) to ensure they are correctly drawn.
- Students may think of themselves sliding down a playground slide to help them understand how figures slide.

Using the Exercises

Exercises 1–6 Tell students that there will not always be arrows present to help them classify a transformation.

Assess and Close

Ask students to fold a piece of notebook paper in half twice. In the first region, students are to write their name. They will entitle the remaining three regions "turn," "flip," and "slide." Inside each, students will write the definition of each, illustrate each, and cite two real-world examples.

12 Minimum, Maximum, Mode, and Range

Data are pieces of information that often use numbers. One way to describe a set of data is to use the mode. The **mode** of a set of data is the number that occurs most often. The **range** is the difference between the least (**minimum**) and the greatest (**maximum**) numbers.

EXAMPLE

1 **Find the mode, minimum, maximum, and range in the set of data to the right.** **5, 2, 3, 9, 5, 5, 2**

To find the mode, find the most common numbers. Five is the number that occurs most often. 2, 2, 3, 5, 5, 5, 9

To find the range, subtract the minimum from the maximum.

So, 5 is the mode in the set of data. The minimum is 2, the maximum is 9, and the range is 7.

9 − 2 = 7
maximum minimum range

Exercises

For each set of data, find the mode, minimum, maximum, and range.

1. 6, 1, 4, 5, 4
4, 1, 6, 5

2. 8, 1, 9, 3, 1
1, 1, 9, 8

3. 3, 3, 3, 1, 5, 10
3, 1, 10, 9

4. 4, 2, 4, 2, 4, 8
4, 2, 8, 6

5. 12, 11, 4, 33, 3, 12
12, 3, 33, 30

6. 15, 3, 5, 3, 51
3, 3, 51, 48

7. **SCHOOL** Five students took a spelling test. The scores were 90, 88, 99, 100, and 99. Find the range of the scores. 100 − 88 = 12

8. **TRUCKS** A delivery truck company has seven trucks. Two of the trucks drove 25 miles. Three of the trucks drove 39 miles. The rest of the trucks drove 40 miles. Write the number of miles each truck drove to show the set of data. Find the mode.
25, 25, 39, 39, 39, 40, 40; mode = 39

Concepts and Skills Bank

12 Minimum, Maximum, Mode, and Range

Lesson Planner

Objective

Given a set of data, identify the minimum, maximum, mode, and range.

Vocabulary

mode, range, minimum, maximum

Materials: sticky notes (1 per student), notebook paper (1 piece per student)

Manipulatives: number cube (1 per student)

Activate Prior Knowledge

Choose a data type, such as number of siblings, and instruct students to record it on a sticky note. Next, have the class arrange themselves numerically by the data recorded on their sticky notes before adhering them to the chalkboard.

- Invite volunteers to name the smallest and greatest numbers posted on the board. Introduce the terms "minimum" and "maximum." If students need help differentiating between the two, point out that "minimum" contains "mini-," which pertains to small as in the word "miniature" (miniature golf, miniature pony, miniature poodle, etc.).

- Discuss with students why it is important to arrange numbers in a data set from smallest to largest or largest to smallest (makes it easier to find minimum and maximum as well as the mode).

Using the Exercises

Exercises 1–6 Remind students to arrange the data numerically before identifying the mode, minimum, maximum, and range.

Exercises 7–8 Again, ask students to arrange the data numerically before solving each problem.

Using student page R75.

- Point out to students the algorithm used to determine range on page R75. Ask them to determine the range of the class data set.
- Next, show students how to find the mode, or the number that occurs the most.

Assess and Close

Pass out a piece of notebook paper and a number cube to each student. Instruct students to fold the piece of paper in half and then unfold it. Tell students to roll their number cube five times, recording the number rolled each time in the first region of their notebook paper. Next, they are to identify the minimum, maximum, mode, and range of their data set. Repeat the experiment in the second area of the paper, but this time by rolling the number cube ten times.

Concepts and Skills Bank

13 Circle Graphs

Lesson Planner

Objective

Explore how data is represented in circle graphs.

Vocabulary

circle graphs

Materials: class list (1 per student), blank piece of paper (1 per student – optional)

Manipulatives: compasses, or cardboard circles for tracing

Activate Prior Knowledge

Take a poll on how students get to school. Create a tally chart based on their responses. Then, create a circle graph using the data from the tally chart.

- Ask students questions about the circle graph, such as: **What is the most/least popular way to get to school? How many people ride the bus to school? How many more people ride in a bus than in a car to school? How many people answered the survey?**
- Compare the class circle graph to the one shown on page R76. How are they different/alike?

Using student page R76.

- Ask students to take a survey of their classmates. Each student should devise a question to ask his/her classmates, along with three to five possible answers from which the students can choose. Have students make a tally chart to collect the data.

13 Circle Graphs

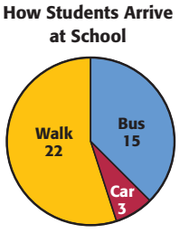
Circle Graphs are used to compare parts of a whole.

EXAMPLE

1 **What is the most common way students arrive at school?**

The circle is divided into three parts. The parts are not equally divided. The sector or part that is the largest represents students that walk to school.

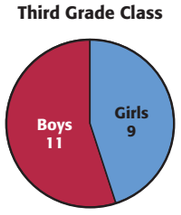
So, the most common way students arrive at a school is by walking to school.



Exercises

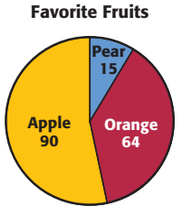
For Exercises 1–3, use the circle graph at the right.

1. Are there more boys or more girls in the class? boys
2. How many students are in the class altogether? 20 students
3. What would happen to the graph if there were 10 boys and 10 girls? Both parts would be equal.



For Exercises 4–6, use the circle graph at the right.

4. Which fruit is liked the least? pear
5. How many students like oranges? 64 students
6. How many more students like apples than pears? 75 students
7. Create a circle graph with 3 sectors. Which part represents the most? See students' work.



- Have the students make their circle graphs using the data they collected. Compasses or cardboard circles for tracing will aid students with drawing their circle graphs.
- Finally, remind students to label each sector of their circle graphs and to give them titles.

Using the Exercises

Exercises 1–6 Advise students to look carefully at the labels for the different sectors. Also, students should look for key words in the questions to determine which operation to use; for example, the word "altogether" signals that addition is needed to solve the problem.

Exercise 7 Make available compasses or cardboard circles for students to trace when creating their circle graphs.

Assess and Close

Q & A Once students have created their own circle graphs using their surveys, have them write three questions about their circle graphs along with the answers to them. Tell students that subtraction must be used to answer at least one of their questions.