

Name _____

Lines, Angles, and Shapes

Dear Family,

Your child is learning about *geometry*. In addition to learning about the special names given to pairs of lines (parallel, intersecting, and perpendicular), he or she is learning how to recognize and classify different plane figures, including different types of polygons, triangles, and quadrilaterals. A plane figure is a figure that has two dimensions: length and width.

Find the Shape

Materials 14 index cards and pencil

Step 1 Write the following terms twice, one per index card, so that there are two cards with each shape: equilateral triangle, isosceles triangle, scalene triangle, parallelogram, trapezoid, square, rectangle.

Step 2 Mix up the cards and place them face down.

Step 3 Players take turns choosing a card, reading the shape on the card aloud, and then thinking of a real-world example of the figure. If the player can correctly identify a real-world example of the figure, he or she keeps the card. If the player cannot think of a real-world example, he or she must replace the card, and it is the other player's turn.

The player with the most cards at the end of the game is the winner!

Observe Your Child

Ask your child to explain and justify his or her choice of a real-world example.

Review What You Know

Vocabulary

Choose the best term from the box.
Write it on the blank.

- angle
- quadrilateral
- polygon
- triangle

1. A _____ is a closed figure made up of straight line segments.
2. A polygon with three sides is a(n) _____.
3. A(n) _____ is formed by two rays with the same endpoint.

Shapes

Choose the best term to describe each shape. Use each term once.

Rectangle

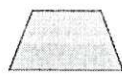
Rhombus

Trapezoid

4.



5.



6.



Lines

Use geometric terms to describe what is shown.

7.



8.

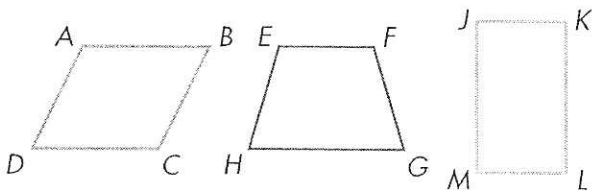


9.



Problem Solving

10. **Generalize** Which generalization about these figures is **NOT** true?



- (A) Each figure is a quadrilateral.
- (B) Each figure has two pairs of parallel sides.
- (C) Each figure has at least two sides of equal length.
- (D) Each figure has 4 angles.

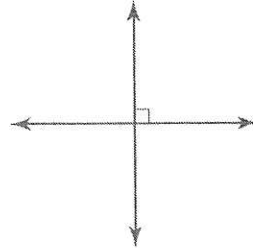
My Word Cards

Use the examples for each word on the front of the card to help complete the definitions on the back.

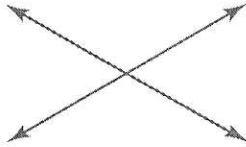
parallel lines



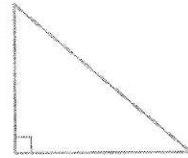
perpendicular lines



intersecting lines



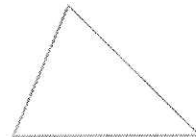
right triangle



obtuse triangle



acute triangle



equilateral triangle



isosceles triangle



My Word Cards

Complete each definition. Extend learning by writing your own definitions.



_____ are lines that intersect to form right angles.

_____ are lines that never intersect.

A _____ is a triangle that has one right angle.

_____ are lines that pass through the same point.

An _____ is a triangle that has three acute angles.

An _____ is a triangle that has one obtuse angle.

An _____
_____ is a triangle with at least two sides that are the same length.

An _____
_____ is a triangle with three sides that are the same length.

My Word Cards

Use the examples for each word on the front of the card to help complete the definitions on the back.

scalene triangle



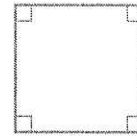
parallelogram



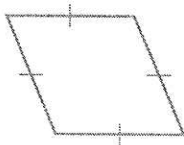
rectangle



square



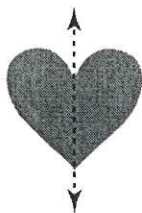
rhombus



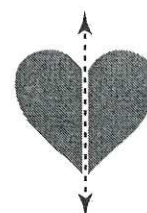
trapezoid



line symmetric



line of symmetry



My Word Cards

Complete each definition. Extend learning by writing your own definitions.

A _____
is a quadrilateral that has two pairs of parallel sides.

A _____
is a triangle with no sides that are the same length.

A _____
is a quadrilateral that has four right angles and all sides are the same length.

A _____
is a quadrilateral that has four right angles.

A _____
is a quadrilateral with only one pair of parallel sides.

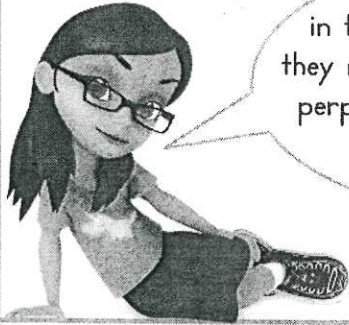
A _____
is a quadrilateral that has opposite sides that are parallel and all of its sides are the same length.

The line on which a figure can be folded so both halves are the same is called a _____.

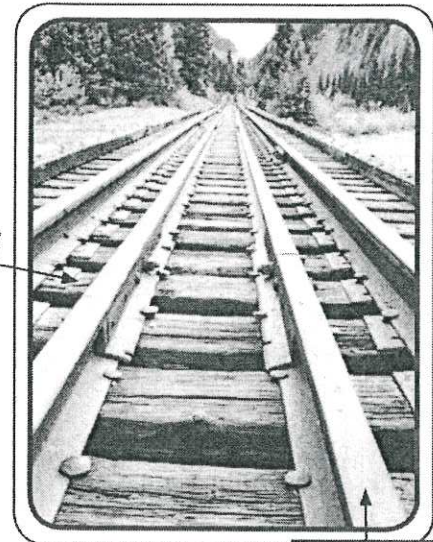
A figure is _____ if it can be folded on a line to form two halves that fit exactly on top of each other.

A

A line is a straight path of points that goes on and on in opposite directions. A pair of lines can be described as parallel, perpendicular, or intersecting.



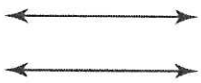
The railroad tracks in the picture are parallel because they never meet. The railroad ties are perpendicular to the railroad tracks because they intersect at right angles.



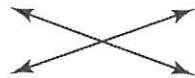
Railroad tie

Railroad track

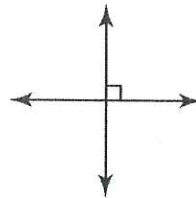
B Pairs of lines are given special names depending on their relationship.



Parallel lines never intersect.



Intersecting lines pass through the same point.



Perpendicular lines are lines that intersect to form right angles.

Perpendicular lines are also intersecting lines. But intersecting lines are not parallel lines.



Convince Me! Be Precise Find examples in your classroom where you can identify parallel lines, intersecting lines, and perpendicular lines. Explain.

★ Guided Practice

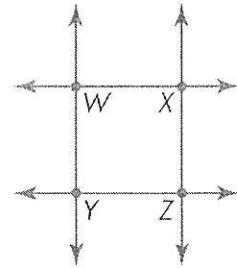
Do You Understand?

1. What geometric term could you use to describe the top and bottom edges of a book? Why?
2. The blades of an open pair of scissors look like what pair of lines? Why?

Do You Know How?

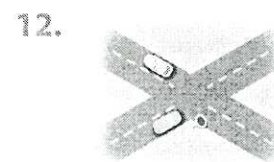
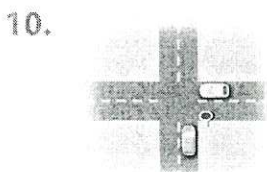
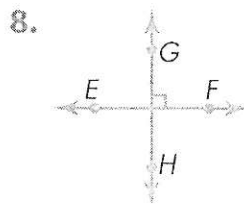
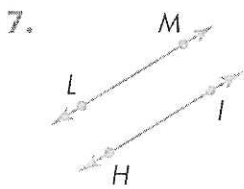
For 3–6, use the diagram.

3. Name four points.
4. Name four lines.
5. Name two pairs of parallel lines.
6. Name two pairs of perpendicular lines.



★ Independent Practice ★

For 7–12, use geometric terms to describe what is shown. Be as specific as possible.



For 13–15, draw what is described by the geometric terms.

13. Perpendicular lines

14. Intersecting lines

15. Parallel lines

Problem Solving

16. **Critique Reasoning** Bella names this line \overleftrightarrow{LM} . Miguel names the line \overleftrightarrow{LN} . Who is correct? Explain.



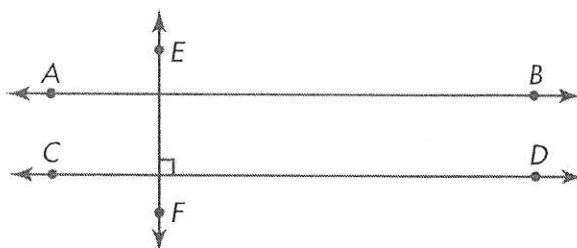
Think about math vocabulary when you write explanations.



17. **Construct Arguments** If all perpendicular lines are also intersecting lines, are all intersecting lines also perpendicular lines? Explain.

18. Draw three lines so two of the lines are perpendicular and the third line intersects the perpendicular lines at exactly one point. Label the lines with points.

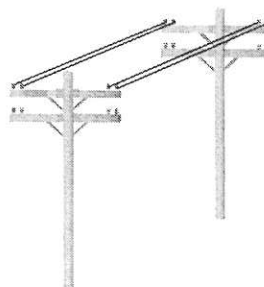
19. **Higher Order Thinking** \overleftrightarrow{AB} is parallel to \overleftrightarrow{CD} , and \overleftrightarrow{CD} is perpendicular to \overleftrightarrow{EF} . If a line through B and D is perpendicular to \overleftrightarrow{AB} , what is the relationship between \overleftrightarrow{BD} and \overleftrightarrow{EF} ?



Assessment Practice

20. Which geometric term would you use to describe the power cables shown at the right?

- (A) Perpendicular lines
- (B) Parallel lines
- (C) Intersecting lines
- (D) Points



What relationship do the power cables have to each other?



Name _____

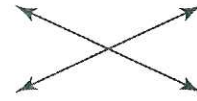
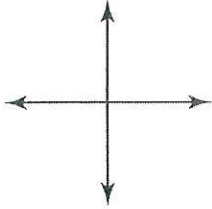
Reteach to Build Understanding

16-1

Vocabulary

1. **Intersecting lines** pass through the same point. **Parallel lines** never intersect. **Perpendicular lines** form right angles.

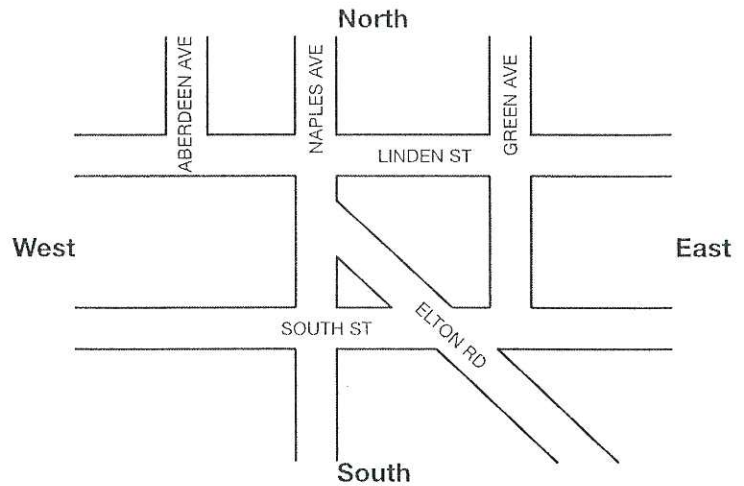
Write the best term for each pair of lines.



Examples of parallel, intersecting, and perpendicular lines can be found by looking at the streets on a map.

2. Name two streets that are parallel to Naples Avenue.

3. Name two streets that are perpendicular to Naples Avenue.



4. Name a street that intersects, but is not perpendicular to, Naples Avenue.

On the Back!

5. Look at South Street on the map. Name the streets that are parallel to, perpendicular to, and intersect, but are not perpendicular to, South Street.

1. Quentin places 58 fish in several tanks. If he places 8 fish in each tank, how many fish are not placed in the tanks but in a small fish bowl instead?

- (A) 8 fish
- (B) 7 fish
- (C) 3 fish
- (D) 2 fish

2. Which of the following best describes the answer to the subtraction problem?

$$5,821 - 4,970$$

- (A) The answer is less than 1,000.
- (B) The answer is 1,000.
- (C) The answer is a little greater than 1,000.
- (D) The answer is a lot greater than 1,000.

3. Which of the following show $\frac{3}{4}$ decomposed? Select all that apply.

- $\frac{1}{4} + \frac{1}{4} + \frac{1}{4}$
- $\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4}$
- $\frac{2}{4} + \frac{1}{4}$
- $\frac{2}{4} + \frac{2}{4}$
- $\frac{3}{4} + \frac{3}{4} + \frac{3}{4}$

4. What is $4,216 + 2,947 - 2,318$?

- (A) 4,845
- (B) 4,216
- (C) 2,947
- (D) 2,318

5. Clint's grandfather has 8,880 bottle caps boxed in his basement. How many bottle caps does Clint's grandfather have rounded to the nearest thousand?

6. If Jane rides her bike 15 miles each day for 12 weeks, how many miles will Jane have ridden her bike?

7. Hugo drove 26 miles on Thursday. He drove twice as many miles on Friday. On Saturday, he drove 18 miles more than he did on Friday. How many miles did Hugo drive on Saturday?

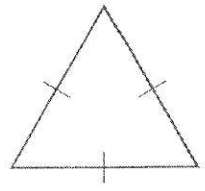
8. Write the missing number to complete the equation.

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

9. Write the missing numbers.

$$\begin{array}{r} 24 \\ \times 1\square \\ \hline 36 \\ 1\square 0 \\ 4\square \\ + \square 00 \\ \hline 4\square 6 \end{array}$$

Triangles can be classified by the line segments that make their sides.



An equilateral triangle has 3 sides the same length.

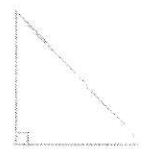


An isosceles triangle has at least 2 sides the same length.

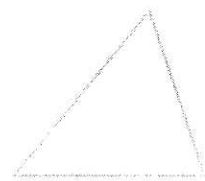


A scalene triangle has no sides the same length.

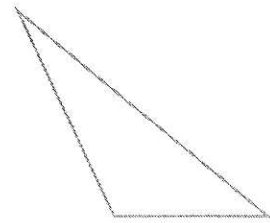
Triangles can be classified by their angle measures.



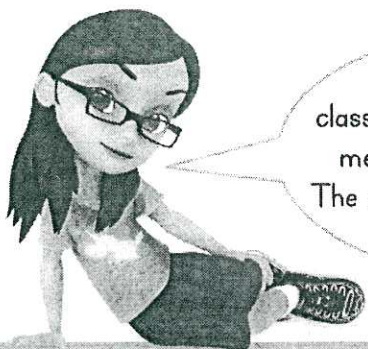
A right triangle has one right angle.



An acute triangle has three acute angles. All of its angles measure less than a right angle.



An obtuse triangle has one obtuse angle. One angle has a measure greater than a right angle.

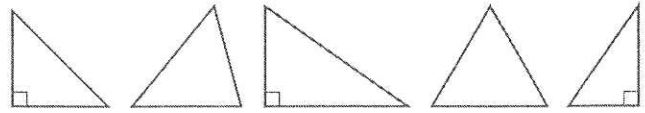


Triangles can be classified by both their angle measures and their sides. The red triangle is an obtuse, scalene triangle.

Convince Me! Be Precise Can a triangle have more than one obtuse angle? Explain.

Another Example!

The pattern follows the rule: right triangle, acute triangle, right triangle, acute triangle.... It also follows the rule: isosceles, scalene, scalene, isosceles, scalene.... Draw a triangle that could be next in the pattern and explain.



For the first rule, the next triangle is acute. For the second rule, it is scalene. So, the next triangle is an acute, scalene triangle. It can be the same as the second triangle in the pattern or it can be a different acute, scalene triangle.



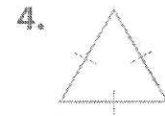
★ Guided Practice

Do You Understand?

1. Is it possible to have an obtuse acute triangle? Explain.
2. Can a triangle have more than one right angle? If so, draw an example.

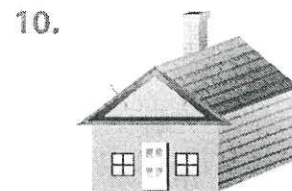
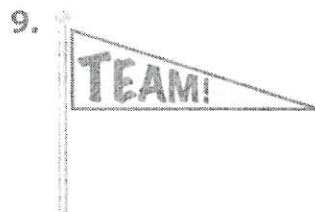
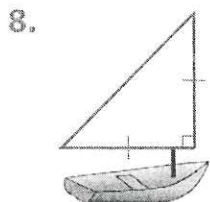
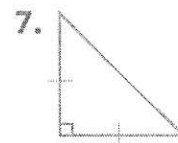
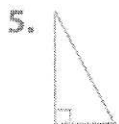
Do You Know How?

For 3–4, classify each triangle by its sides, and then by its angles.



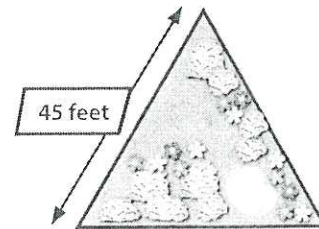
★ Independent Practice

For 5–10, classify each triangle by its sides, and then by its angles.

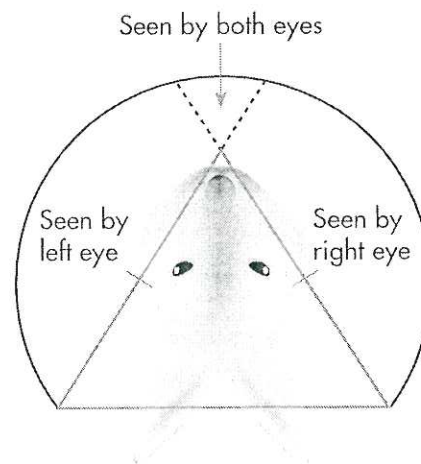


Problem Solving

11. **Reasoning** The backyard shown at the right is an equilateral triangle. What do you know about the lengths of the other two sides that are not labeled? Explain.



12. **enVision® STEM** A rabbit's field of vision is so wide that it can see predators that approach from behind. The diagram shows the field of vision of one rabbit and the field where the rabbit cannot see. Classify the triangle by its sides and its angles.

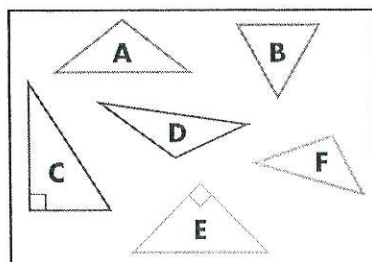


13. A pattern follows the rule: obtuse triangle, obtuse triangle, right triangle, obtuse triangle... It also follows the rule: isosceles, scalene, isosceles, scalene... Draw a triangle that could be the fifth shape in the pattern and explain.

14. **Higher Order Thinking** Mitch draws a triangle with one obtuse angle. What are all the possible ways to classify the triangle by its angle measures and side lengths? Explain.

Assessment Practice

15. Draw each triangle in its correct angle classification.



Acute	Obtuse	Right

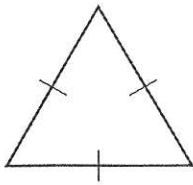
Name _____

Reteach to Build Understanding

16-2

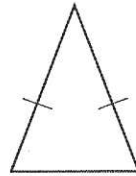
Vocabulary

1. Triangles can be classified by their side lengths.



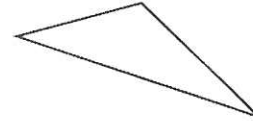
Equilateral triangle

_____ equal sides



Isosceles triangle

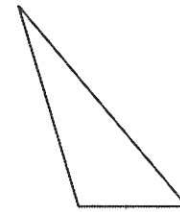
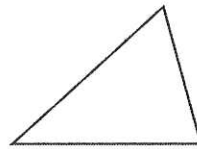
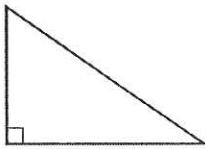
at least _____ equal sides



Scalene triangle

_____ equal sides

2. Triangles can be classified by their angle measures.

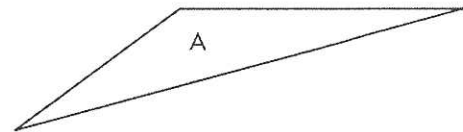


Classify each triangle.

3. Triangle A has no sides of the same length, so it is

a _____ triangle.

It has one angle greater than 90° , so it is an _____ triangle.

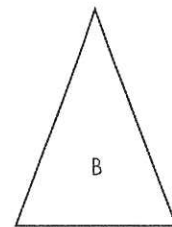


4. Triangle B has two sides of the same length, so it is

an _____ triangle.

It has three angles that are less than 90° , so it is

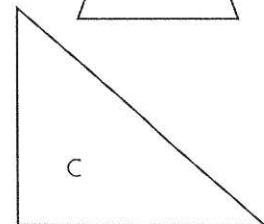
an _____ triangle.



5. Triangle C has no sides the same length, so it is a _____

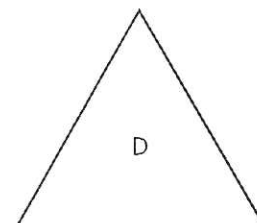
triangle.

It has one 90° angle, so it is a _____ triangle.



On the Back!

6. Classify Triangle D by its sides and by its angles.



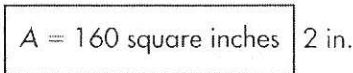
1. Luke bought a helmet for \$19.67. How much change should Luke receive if he pays the cashier \$20.00? You may use bills and coins to solve.

- (A) \$0.33
- (B) \$0.43
- (C) \$1.33
- (D) \$1.43

2. Mrs. Pierce has 100 coins in her collection. She keeps the coins in 5 boxes. Each box has the same number of coins. How many coins are in each box?

- (A) 20 coins
- (B) 25 coins
- (C) 30 coins
- (D) 35 coins

3. Lynette drew the figure shown below.



What is the perimeter of the figure?

- (A) 16 inches
- (B) 20 inches
- (C) 56 inches
- (D) 164 inches

4. How many pints are in 2 quarts?

- (A) 1 pint
- (B) 2 pints
- (C) 3 pints
- (D) 4 pints

5. A restaurant bought 13 boxes of ketchup. Each box has 32 bottles of ketchup. Write and solve a number sentence using compatible numbers to estimate the number of ketchup bottles the restaurant purchased.

6. What is the value of the 3 in 236,000?

7. A spider has 8 legs. How many legs do 6 spiders have?

8. Jack draws an angle that measures 150° . He then divides the angle into 2 equal parts. What is the measure of each smaller angle?

9. A rectangular pool has a length of 16 feet and a width of 32 feet. What is the area of the pool?

10. Find $5,120 \div 8$.

A

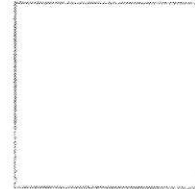
Quadrilaterals can be classified by their angles or the line segments that make their sides. Which of the quadrilaterals shown have only one pair of parallel sides? Which have two pairs of parallel sides?



A parallelogram has 2 pairs of parallel sides.



A rectangle has 4 right angles. It is also a parallelogram.



A square has 4 right angles and all sides are the same length. It is a parallelogram, a rectangle, and a rhombus.



A quadrilateral is a polygon with four sides.

B



A rhombus is a quadrilateral that has opposite sides that are parallel and all of its sides are the same length. It is also a parallelogram.



A trapezoid is a quadrilateral with only one pair of parallel sides.



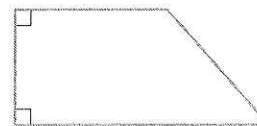
Trapezoids have only one pair of parallel sides. Parallelograms, rectangles, squares, and rhombuses all have two pairs of parallel sides.

Convince Me! Use Structure How are a parallelogram and a rectangle the same? How are they different?

Another Example!

Perpendicular sides form right angles. Can a trapezoid have perpendicular sides?

A trapezoid can have two right angles that form perpendicular sides. A trapezoid with two right angles is called a right trapezoid.



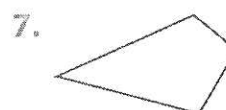
★ Guided Practice

Do You Understand?

1. What is true about all quadrilaterals?
2. What is the difference between a square and a rhombus?
3. Shane drew a quadrilateral with at least 2 right angles and at least 1 pair of parallel sides. Name three quadrilaterals Shane could have drawn.

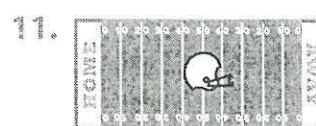
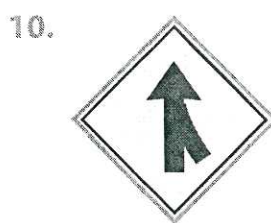
Do You Know How?

For 4–7, write all the names possible for each quadrilateral.



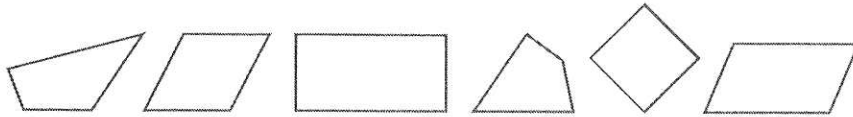
★ Independent Practice

For 8–11, write all the names possible for each quadrilateral.



Problem Solving

12. The pattern follows the rule: quadrilateral with no parallel sides, quadrilateral with two pairs of parallel sides, quadrilateral with two pairs of parallel sides, quadrilateral with no parallel sides, quadrilateral with two pairs of parallel sides... Draw quadrilaterals that could be the next three in the pattern.



13. **Critique Reasoning** Tia says every square is a rectangle, and every square is a rhombus, so every rectangle must be a rhombus. Do you agree? Explain.

14. **Number Sense** What number comes next in the pattern? The rule is "Multiply the position number by itself." Describe a feature of the pattern.

1, 4, 9, 16,

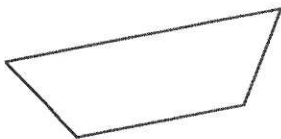
15. **Higher Order Thinking** Could you use the formula for finding the perimeter of a square to find the perimeter of another quadrilateral? Explain.

The formula for the perimeter of a square is $P = 4 \times s$.



Assessment Practice

16. Select all the possible names for the shape below.



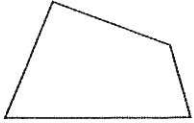
- Quadrilateral
 Rhombus
 Trapezoid
 Parallelogram
 Rectangle

17. Which shape has only 1 pair of parallel sides?

- (A) Rhombus
 (B) Square
 (C) Right trapezoid
 (D) Parallelogram

Vocabulary

1. A **quadrilateral** is any 4-sided shape. Quadrilaterals can be named for their angles and sides.



Quadrilateral



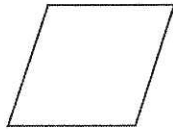
Rectangle



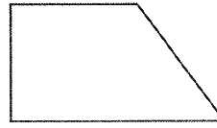
Parallelogram



Square



Rhombus



Trapezoid

A rectangle has _____ right angles and 2 pairs of parallel sides.

A parallelogram has 2 pairs of _____ sides.

A _____ has 4 right angles and all sides are the same length.

A _____ has opposite sides that are parallel and all sides are the same length.

A trapezoid has only one pair of _____ sides.

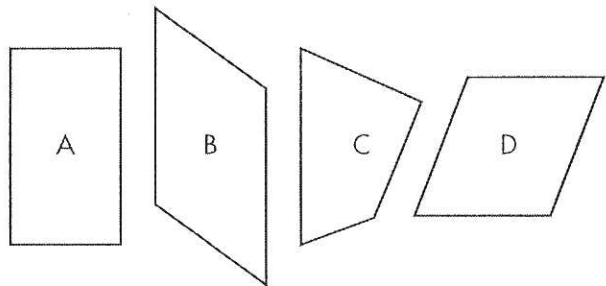
Use the quadrilaterals at the right.

2. Figures _____, _____, and _____ have opposite sides that are parallel, so they are parallelograms.

There are more specific names for two of these figures.

Figure A has 4 right angles and 2 pairs of parallel sides. Opposite sides have the same length, so it is a _____.

Figure D has all sides the same length, so it is a _____.



On the Back!

3. What is the best name for figure C shown in Exercise 2?

1. Mrs. Jackson wrote a paper that had 670,170 words. How many words did Mrs. Jackson write rounded to the nearest hundred thousand?

- (A) 600,000 words
- (B) 670,000 words
- (C) 700,000 words
- (D) 750,000 words

2. Harvey can read 17 pages in one hour. In one week, he spent 12 hours reading. How many pages did Harvey read that week?

- (A) 204 pages
- (B) 194 pages
- (C) 104 pages
- (D) 51 pages

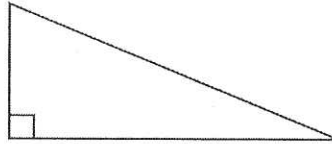
3. John has \$45.11. His sister has \$51.79. How much do they have together? You may use bills and coins to help.

- (A) \$96.80
- (B) \$96.89
- (C) \$96.90
- (D) \$96.99

4. Which lists all the factors of 21?

- (A) 1, 3, 7
- (B) 1, 3, 7, 21
- (C) 1, 3, 7, 14, 21
- (D) 0, 1, 3, 5, 7, 9, 21

5. Classify the triangle below by its sides and by its angles.



6. Wendell has 19,748 craft sticks. He uses 4,671 craft sticks to make a model house. How many craft sticks does Wendell have left?

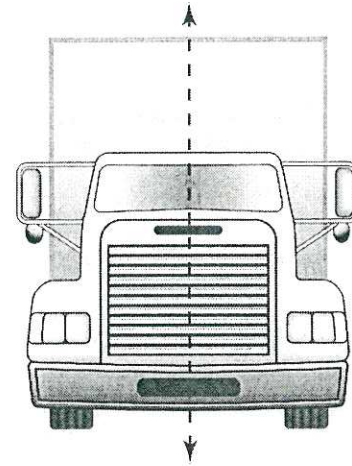
7. A rectangle has a perimeter of 64 ft. What is the area of the rectangle if its length is 19 feet?

8. Find $\frac{30}{100} + \frac{20}{100} + \frac{30}{100}$.

9. How many millimeters are equal in length to 90 centimeters?

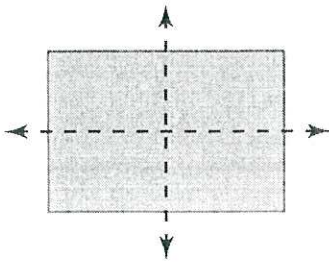
10 mm = 1 cm

A figure is line symmetric if it can be folded on a line to form two matching parts that fit exactly on top of each other. The fold line is called a line of symmetry. There is one line of symmetry drawn on the picture of the truck. How many lines of symmetry do the figures below have?



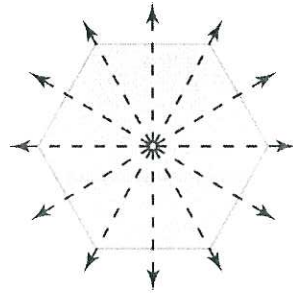
Count the lines of symmetry drawn on each figure below.

A figure can have more than one line of symmetry.



This figure is line symmetric. It has 2 lines of symmetry. It can be folded on each line of symmetry into matching parts.

A figure can have many lines of symmetry.



This figure is line symmetric. It has 6 lines of symmetry. It can be folded on each line of symmetry into matching parts.

A figure can have no lines of symmetry.



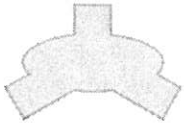
This figure is **NOT** line symmetric. It has 0 lines of symmetry. It cannot be folded to have matching parts.

Convince Me! Look for Relationships Find two capital letters that have exactly one line of symmetry. Find two capital letters that have exactly two lines of symmetry.

★ Guided Practice

Do You Understand?

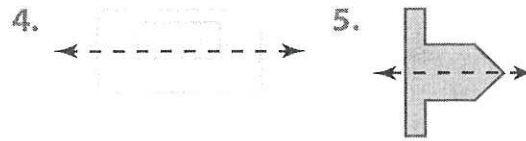
1. How many lines of symmetry does the letter R have?
2. How many lines of symmetry does the figure below have?



3. How many lines of symmetry can you find for a circle? Do you think you can count them?

Do You Know How?

For 4–5, tell if each line is a line of symmetry.

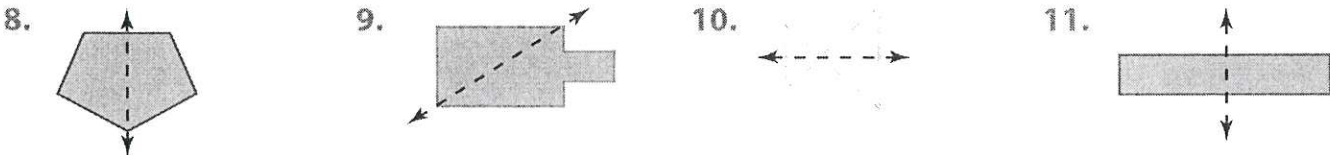


For 6–7, tell how many lines of symmetry each figure has.

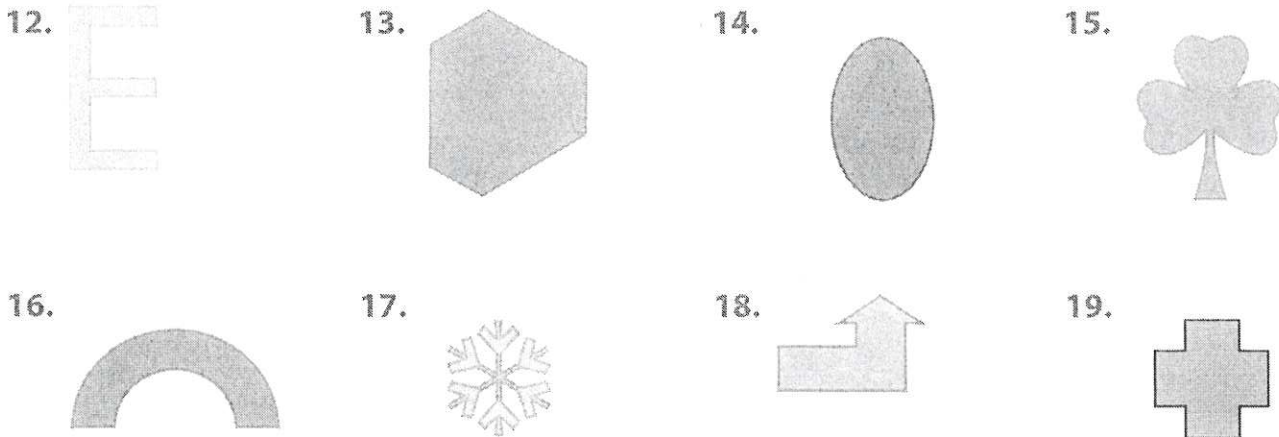


★ Independent Practice

For 8–11, tell if each line is a line of symmetry.

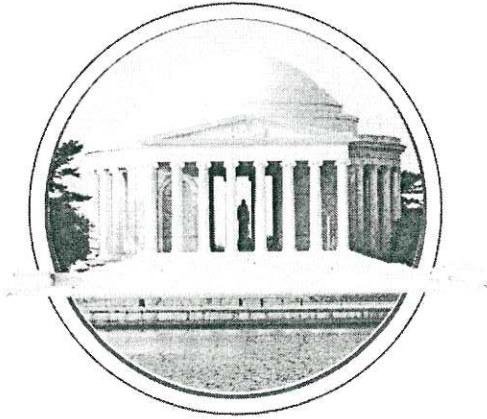


For 12–19, decide if each figure is line symmetric. Draw and tell how many lines of symmetry each figure has.



Problem Solving

20. The Thomas Jefferson Memorial is located in Washington, D.C. Use the picture of the memorial at the right to decide whether the building is line symmetric. If so, describe where the line of symmetry is.



21. Name the type of triangle outlined in green on the picture of the memorial.

22. **Construct Arguments** How can you tell when a line is **NOT** a line of symmetry?

23. **Higher Order Thinking** How many lines of symmetry can a parallelogram have? Explain.

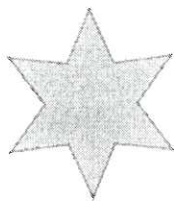
Assessment Practice

24. Which figure has six lines of symmetry? Draw lines as needed.

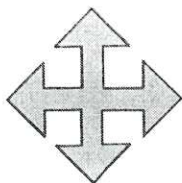
(A)



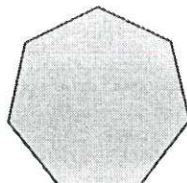
(C)



(B)

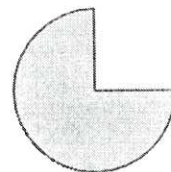


(D)



25. Which figure is **NOT** line symmetric?

(A)



(C)



(B)



(D)



Name _____

Reteach to Build Understanding

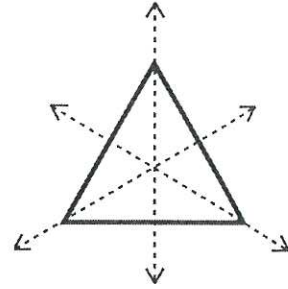
16-4

Vocabulary

1. If a figure can be folded on a line to form two matching parts that fit exactly on top of each other, then it is **line symmetric**.

The fold line is called a **line of symmetry**.
A figure can have more than one line of symmetry.

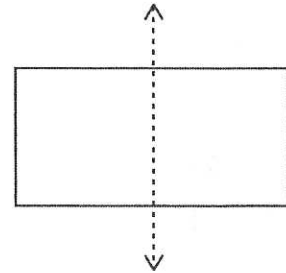
How many lines of symmetry does the triangle at the right have? _____



2. Is the line shown on the figure at the right a line of symmetry? _____

Draw another line of symmetry on the figure, if possible.

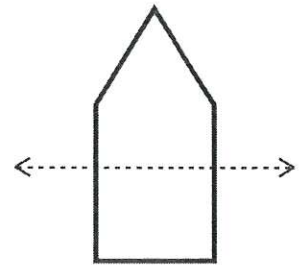
How many lines of symmetry does the figure have?



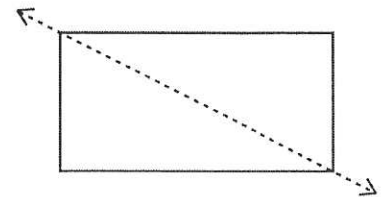
3. Is the line shown on the figure at the right a line of symmetry? _____

Draw a line of symmetry on the figure, if possible.

How many lines of symmetry does the figure have?

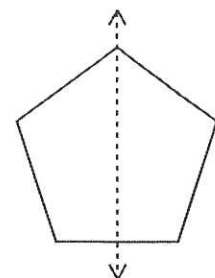


4. Is the line shown on the figure at the right a line of symmetry? Explain.



On the Back!

5. Is the figure line symmetric? Draw and tell how many lines of symmetry the figure has.



1. What is 530,938 rounded to the nearest thousand?
(A) 530,000
(B) 530,900
(C) 531,000
(D) 540,000
2. Gavin is 4 feet tall. How many inches tall is Gavin?
(A) 48 inches
(B) 36 inches
(C) 24 inches
(D) 12 inches
3. Which fraction is **NOT** equivalent to $\frac{1}{4}$?
(A) $\frac{2}{10}$
(B) $\frac{2}{8}$
(C) $\frac{3}{12}$
(D) $\frac{25}{100}$
4. Jan has five \$1 bills, 3 quarters, and 4 dimes. How much money does Jan have? You may use coins and bills to help solve.
(A) \$6.45
(B) \$6.35
(C) \$6.25
(D) \$6.15

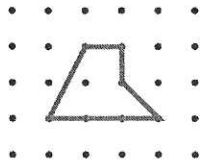
5. Jonathan draws the figure below. He says that he drew a quadrilateral. Is Jonathan correct? Explain.



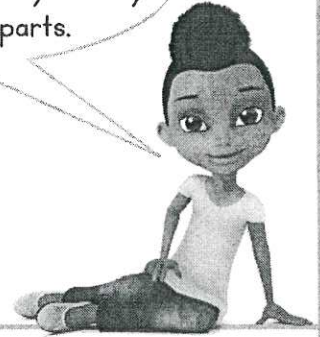
6. A camper has 6 storage compartments. Each compartment can hold 3 sleeping bags. If there are 17 sleeping bags to be stored, how many compartments will be used? How many sleeping bags will be in the compartment that is not completely filled?
.....
.....
.....
.....
7. Juan bought a sweater for \$15.95 and two shirts for \$9.00 each. How much did Juan spend on clothes? You may use coins and bills to help solve.
.....
.....

A

Sarah wants to design a line-symmetric tabletop. She sketched half of the tabletop. What are two ways Sarah can complete her design?

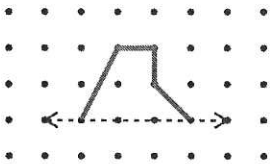


The tabletop is line symmetric if the design can be folded along a line of symmetry into matching parts.

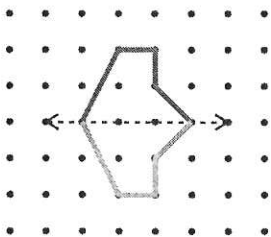


B One Way

Draw a line of symmetry.



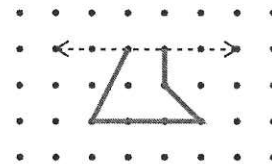
Complete Sarah's design on the opposite side of the line of symmetry.



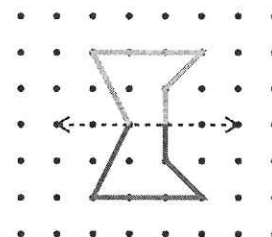
The design for the tabletop is now line symmetric.

C Another Way

Draw a different line of symmetry.

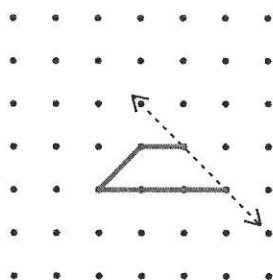
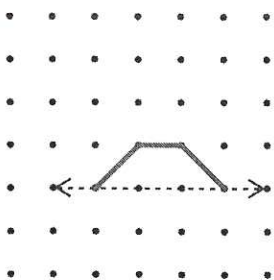


Complete Sarah's design on the opposite side of the line of symmetry.



The design for the tabletop is now line symmetric.

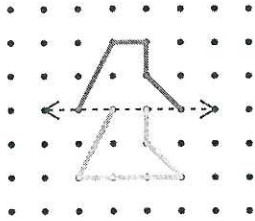
Convince Me! Model with Math Sarah sketched different designs for a smaller tabletop. Use the lines of symmetry to draw ways Sarah can complete each design.



★ Guided Practice

Do You Understand?

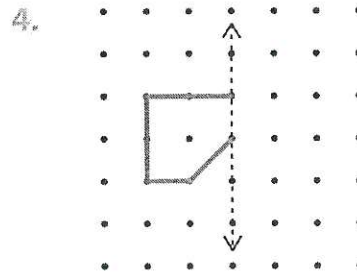
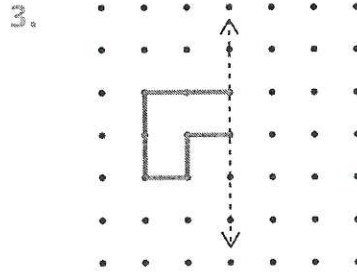
- Chandler tried to complete Sarah's design from the previous page. Describe the error Chandler made.



- How can folding a piece of paper help to determine if a line in a figure is a line of symmetry?

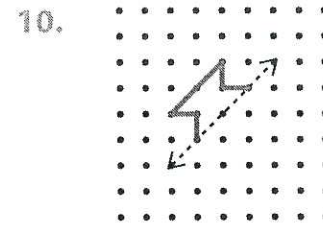
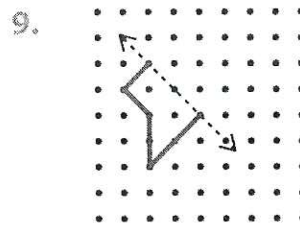
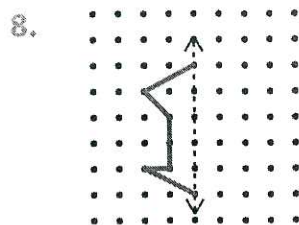
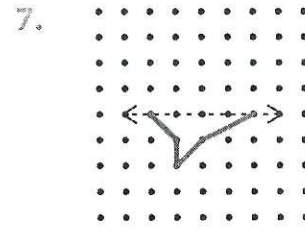
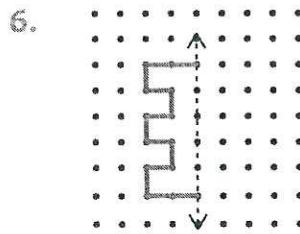
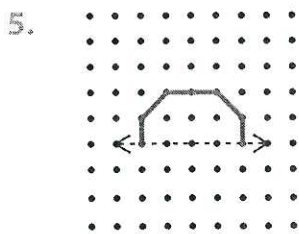
Do You Know How?

For 3–4, use the line of symmetry to draw a line-symmetric figure.



★ Independent Practice

For 5–10, use the line of symmetry to draw a line-symmetric figure.



Problem Solving

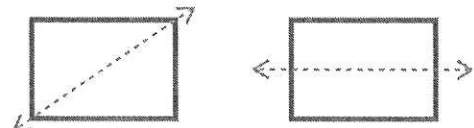
11. Draw a figure that has no lines of symmetry.
12. Vanessa drew a figure that has an infinite number of lines of symmetry. What figure could Vanessa have drawn?

13. **enVision® STEM** Dogs can smell odors that humans cannot. Dogs can be trained to alert their owners when they smell odors associated with illness. If a dog trains 2 hours every day for 1 year, how many hours has the dog trained?



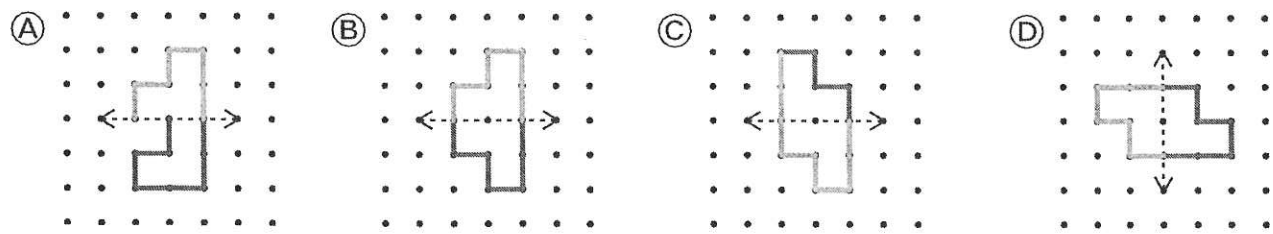
14. **Make Sense and Persevere** Clare trained for a long-distance marathon. She ran a total of 225 miles in 3 months. The first month she ran 50 miles. If she ran 25 more miles each month, how many miles did she run in her third month of training?

15. **Higher Order Thinking** Can you draw a line that divides a figure in half but is **NOT** a line of symmetry? Use the figures below to explain.



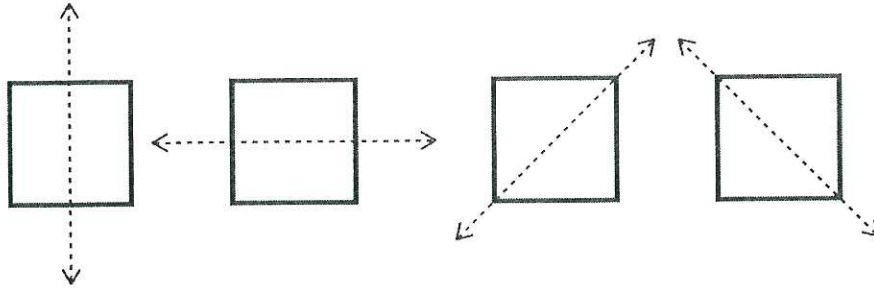
Assessment Practice

16. Which of the following figures is line symmetric about the dashed line?



Vocabulary

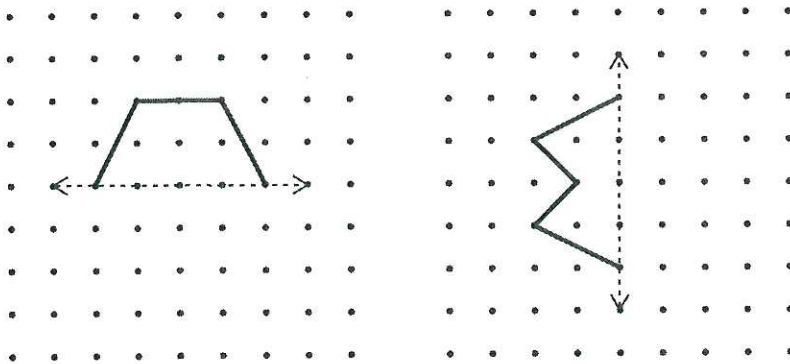
1. A **line of symmetry** is a line on which a figure can be folded so that both parts match. A figure can have more than one line of symmetry.



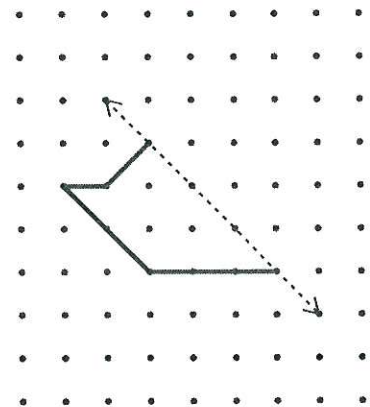
How many lines of symmetry does a square have? _____

Use the line of symmetry to draw line-symmetric figures.

2. One half of each figure is already drawn. Complete the figure on the opposite side of the line of symmetry.



3. How can you use the line of symmetry to check your drawings?



On the Back!

4. Use the line of symmetry to draw a line-symmetric figure.

1. Raj uses "Add 4" as the rule to make a pattern. He starts with 48 and writes the next 8 numbers in his pattern. Which number does **NOT** belong in Raj's pattern?

- (A) 52
- (B) 56
- (C) 68
- (D) 74

2. Sarah buys a scooter for \$67.52. How much change does Sarah receive if she gives the cashier \$70? You may draw or use bills and coins to solve.

- (A) \$1.48
- (B) \$2.48
- (C) \$3.48
- (D) \$137.52

3. Which of the following decimals would be placed at one of the points on the number line shown? Select all that apply.



- 0.1
- 0.4
- 1.1
- 1.4
- 2.2

4. Michael draws a square on his paper. He says that his square cannot be classified as a rectangle. Do you agree with Michael? Explain why or why not.

5. $\angle ABC$ and $\angle CBD$ form $\angle ABD$. $\angle ABD$ is a right angle. Describe $\angle ABC$ and $\angle CBD$.



How Can You Critique the Reasoning of Others?

Abby gave the answer shown to the following question.

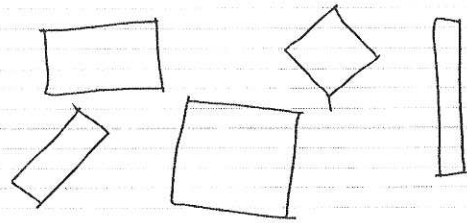
True or False? Every quadrilateral has at least one right angle.

What is Abby's reasoning to support her statement?

Abby drew quadrilaterals that have right angles.

Abby

True. Here are different quadrilaterals. They all have four sides and four right angles.



It only takes one example to show the statement is false.

How can I critique the reasoning of others?

I can

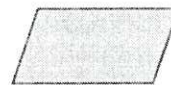
- ask questions about Abby's reasoning.
- look for flaws in her reasoning.
- decide whether all cases have been considered.

Here's my thinking.

Abby's reasoning has flaws.

She used only special kinds of quadrilaterals in her argument. For these special cases, the statement is true.

Here is a quadrilateral that has no right angles. It shows the statement is not true about **every** quadrilateral.



The statement is false.

Convince Me! Be Precise Would Abby's reasoning be correct if the question was changed to: True or False? Some quadrilaterals have at least one right angle. Explain.

★ Guided Practice

Critique Reasoning

Anthony said all multiples of 4 end in 2, 4, or 8. He gave 4, 8, 12, 24, and 28 as examples.

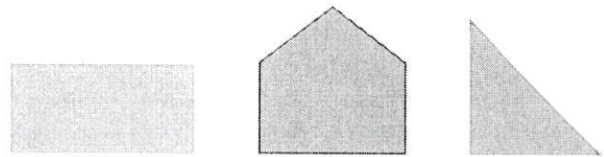
1. What is Anthony's argument? How does he support it?
2. Describe at least one thing you could do to critique Anthony's reasoning.
3. Does Anthony's reasoning make sense? Explain.

★ Independent Practice ★

Critique Reasoning

Marista said the polygons shown all have the same number of angles as they have sides.

4. Describe at least one thing you could do to critique Marista's reasoning.
5. Does Marista's reasoning make sense? Explain.
6. Can you think of any examples that prove all polygons don't have the same number of sides as angles? Explain.



When you critique reasoning, you decide whether or not another student's conclusion is logical.



Problem Solving

Performance Task

Dog Pen

Caleb is designing a dog pen for the animal shelter. He has 16 feet of fence, including the gate. His designs and explanation are shown. Critique Caleb's reasoning.

7. **Reasoning** What quantities are given in the problem and what do the numbers mean?

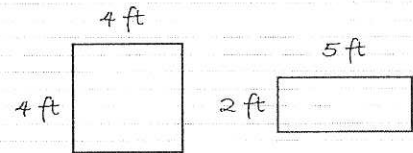
8. **Critique Reasoning** What can you do to critique Caleb's thinking?

9. **Be Precise** Did Caleb correctly calculate the perimeter of each fence? Explain.

10. **Critique Reasoning** Does Caleb's reasoning make sense? Explain.

11. **Be Precise** Explain how you know what units to use in your explanation.

Dog pens usually have right angles, so I just used rectangles.



Both my pens used 16 feet of fence. I think the square one is better, because it has more area.

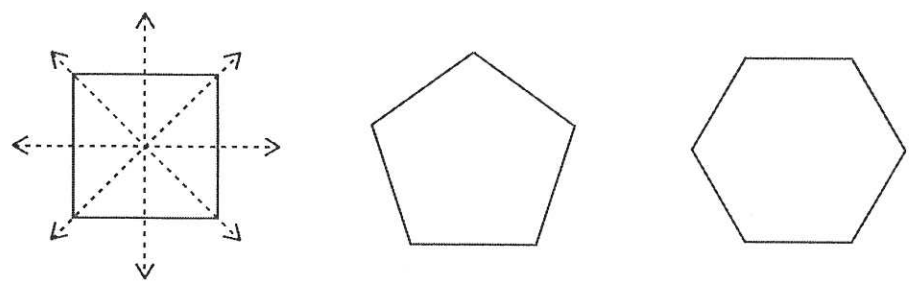
When you critique reasoning, you ask questions to help understand someone's thinking.



Name _____

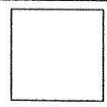
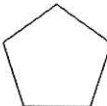
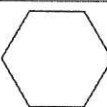
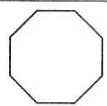
Vocabulary

1. A **line of symmetry** is a line on which you can fold a figure and have both parts match exactly. The square has 4 lines of symmetry. Draw lines of symmetry for the other figures.



2. Jared says that a regular figure (a figure that has all equal sides and equal angles) has the same number of lines of symmetry as it does number of sides or angles. Critique Jared's reasoning. Look for flaws in Jared's reasoning.

Complete the table to look at several cases.

Regular Figure	Number of Equal Sides or Equal Angles	Number of Lines of Symmetry
		
		
		
		

3. Is Jared's reasoning correct? Explain.

On the Back!

4. Draw a figure that has 4 sides but does **NOT** have 4 lines of symmetry.

1. The table below shows how much money four family members spent at a concert.

Name	Amount Spent
Brenda	\$16.70
Kirk	\$17.76
Allison	\$6.70
Lee	\$17.60

How much money did the four family members spend altogether? You may draw or use bills and coins to solve.

- (A) \$46.86
 - (B) \$56.76
 - (C) \$56.86
 - (D) \$58.76
2. Tyler drew a line that was 5 feet long. How many inches long was the line Tyler drew?
- (A) 12 inches
 - (B) 36 inches
 - (C) 48 inches
 - (D) 60 inches
3. Mrs. Pace bought 4 large-cheese pizzas for \$18 each. She also bought 5 orders of cheese sticks for \$4 each. She had a coupon that said buy 1 pizza get a second pizza of equal price $\frac{1}{2}$ off. How much was Mrs. Pace's total before tax is added?
- (A) \$92
 - (B) \$74
 - (C) \$72
 - (D) \$54

4. Write a fraction that is equivalent to $\frac{4}{12}$.

5. Taryn cuts a rectangle and a square out of wood. The figures each have a perimeter of 16 inches. What are possible side lengths of the rectangle and the square?

6. The Kings County school district has 25,093 fourth-grade students. Of these, 13,689 are girls. How many boys are in the fourth grade?

7. How many lines of symmetry does the figure below have? Draw each one.

