

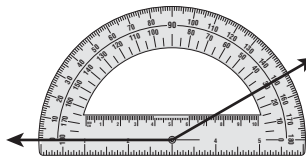


Family Letter

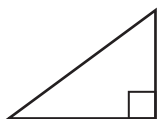
Content Overview

Dear Family,

In the first half of Unit 8, your child will be learning to recognize and describe geometric figures. One type of figure is an angle. Your child will use a protractor to find the measures of angles.

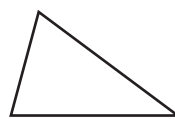


Other figures, such as triangles, may be named based on their angles and sides.



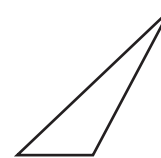
Right triangle

One right angle (90°)



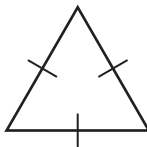
Acute triangle

All angles less than 90°



Obtuse triangle

One angle greater than 90°



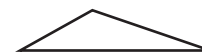
Equilateral triangle

all three sides of equal length



Isosceles triangle

two sides of equal length



Scalene triangle

three sides of different lengths

Be sure that your child continues to review and practice the basics of multiplication and division. A good understanding of the basics will be very important in later math courses when students learn more difficult concepts in multiplication and division.

If you have any questions or comments, please call or write to me.

Thank you.

Sincerely,
Your child's teacher



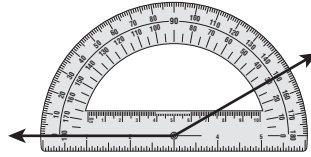


Carta a la familia

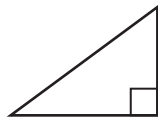
Un vistazo general al contenido

Estimada familia:

En la primera parte de la Unidad 8, su niño aprenderá a reconocer y a describir figuras geométricas. Un ángulo es un tipo de figura. Su niño usará un transportador para hallar las medidas de los ángulos.

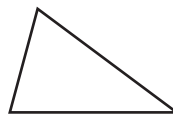


Otras figuras, tales como los triángulos, se nombran según sus ángulos y lados.



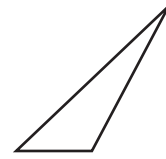
Triángulo rectángulo

Tiene un ángulo recto (90°)



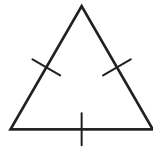
Triángulo acutángulo

Todos los ángulos son menores que 90°



Triángulo obtusángulo

Tiene un ángulo mayor que 90°



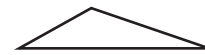
Triángulo equilátero

los tres lados tienen la misma longitud



Triángulo isósceles

dos lados tienen la misma longitud



Triángulo escaleno

los tres lados tienen diferente longitud

Asegúrese de que su niño siga repasando y practicando las multiplicaciones y divisiones básicas. Es importante que domine las operaciones básicas para que, en los cursos de matemáticas de más adelante, pueda aprender conceptos de multiplicación y división más difíciles.

Si tiene alguna pregunta o algún comentario, por favor comuníquese conmigo.

Gracias.

Atentamente,
El maestro de su niño



CA CC

En la Unidad 8 se aplican los siguientes estándares auxiliares, contenidos en los *Estándares estatales comunes de matemáticas con adiciones para California*: 4.MD.5, 4.MD.5a, 4.MD.5b, 4.MD.6, 4.MD.7, 4.G.1, 4.G.2 y todos los de prácticas matemáticas.

VOCABULARY

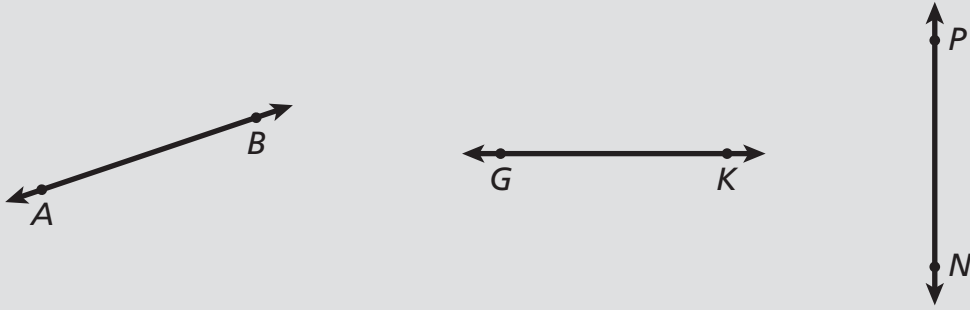
point
line
line segment
endpoint

► Points, Lines, and Line Segments

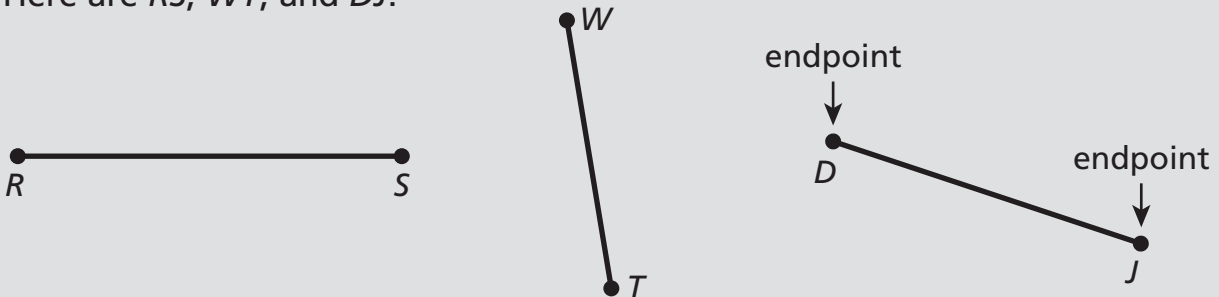
A **point** is shown by a dot. It is named by a capital letter

•X

A **line** is a straight path that goes on forever in both directions. When you draw a line, you put arrows on the ends to show that it goes on and on. Lines can be named by any two points on the line. Here are \overleftrightarrow{AB} , \overleftrightarrow{GK} , and \overleftrightarrow{PN} .



A **line segment** is part of a line. It has two ends, which are called **endpoints**. Segments are named by their endpoints. Here are \overline{RS} , \overline{WT} , and \overline{DJ} .



1. You can measure to find the length of a line segment, but you cannot measure to find the length of a line. Explain why.



VOCABULARY

angle

ray

vertex

► Drawing Points, Rays, and Angles

An **angle** is formed by two **rays** with the same endpoint, called the **vertex**.

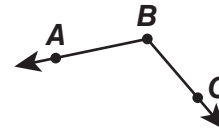
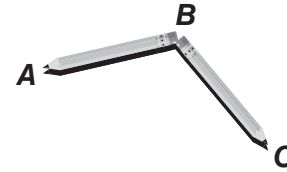
You can label figures with letters to name them. This is $\angle ABC$. Its rays are \overrightarrow{BA} and \overrightarrow{BC} .

Draw and label each figure.

2. Draw and label a point. Write the name of your point. _____

3. Draw a ray. Label the endpoint. Write the name of your ray. _____

4. Draw an angle. Label the vertex and the two rays. Write the name of your angle. _____



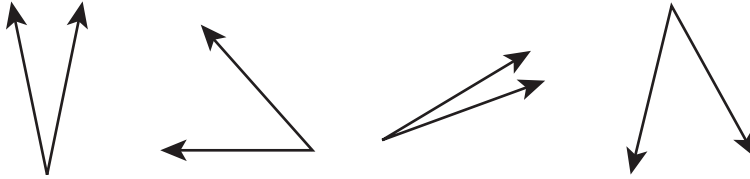
VOCABULARY
 acute angle
 right angle
 obtuse angle

► Discuss Angles

Angles can be many different sizes.

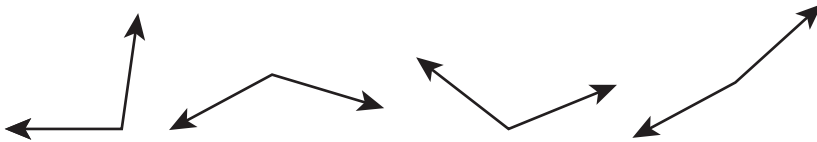


Discuss the groups of angles.



5. How are all of these **acute angles** alike?

6. How is an acute angle different from a **right angle**?



7. How are all of these **obtuse angles** alike?

8. How is an obtuse angle different from a right angle?

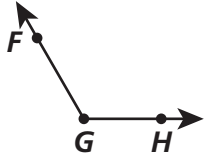
9. How is an obtuse angle different from an acute angle?



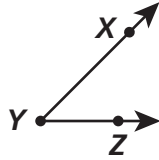
► Classify Angles

Use the letters to name each angle. Then write *acute*, *right*, or *obtuse* to describe each angle.

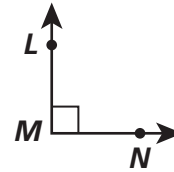
10.



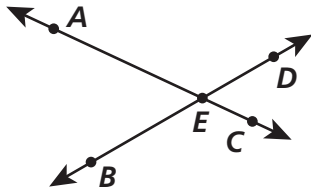
11.



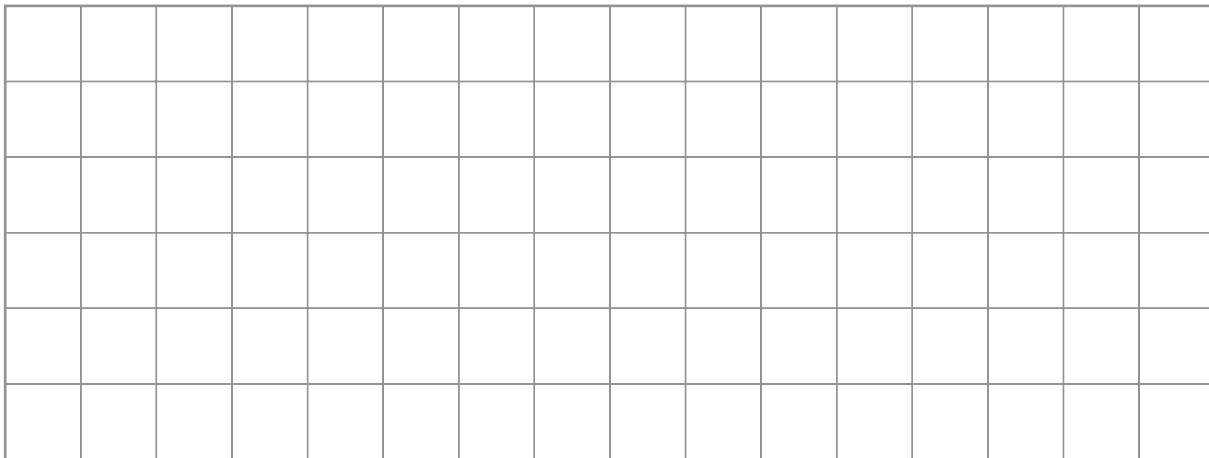
12.



13. Use the letters to name two acute and two obtuse angles in this figure. Write *acute* or *obtuse* to describe each angle.

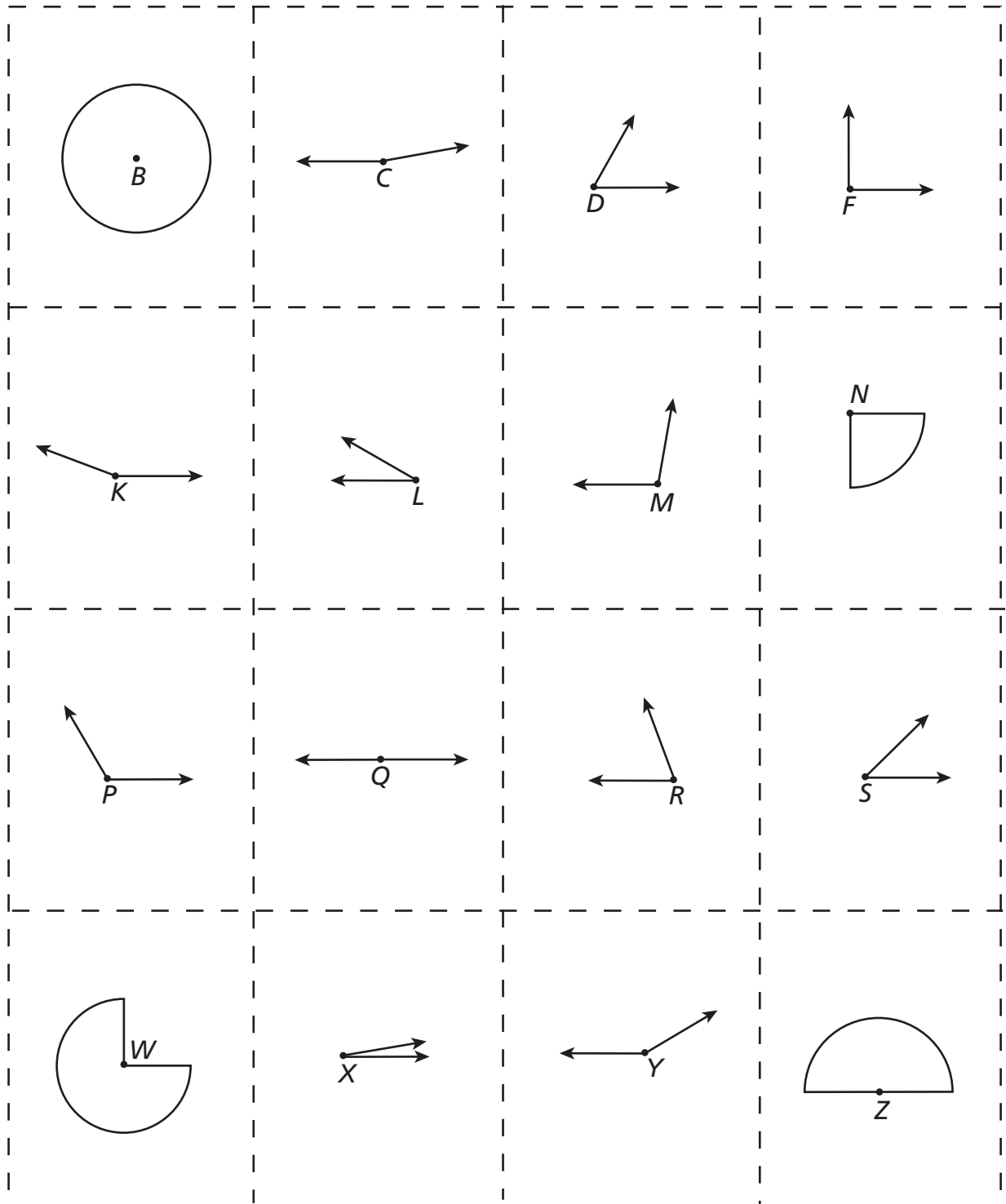


14. Draw and label a right angle, an acute angle, and an obtuse angle.



► Sort Angles

Cut along the dashed lines.





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CA CC Content Standards 4.MD.5, 4.MD.5a, 4.MD.5b,
4.MD.6, 4.G.1
Mathematical Practices MP.5, MP.7

VOCABULARY
degree
right angle
straight angle

► Introduce Degrees

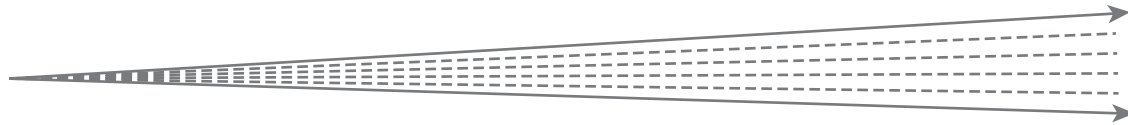
Angles are measured in units called **degrees**. One degree is the measure of one very small turn from one ray to the other.

This angle has a measure of 1 degree.



The measure of an angle is the total number of 1-degree angles that fit inside it.

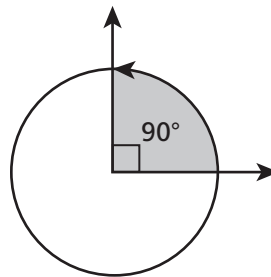
This angle measures 5 degrees.



The symbol for degrees is a small raised circle ($^{\circ}$). You can write the measure of the angle above as 5° . $5 \times 1^{\circ} = 5^{\circ}$

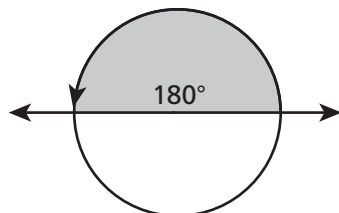
A **right angle** has a measure of 90° .

A 90° turn traces one quarter of a circle.



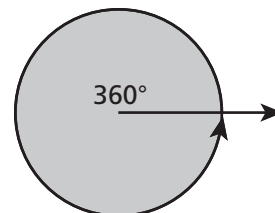
A **straight angle** measures 180° .

A 180° turn traces one half of a circle.



The angle below measures 360° .

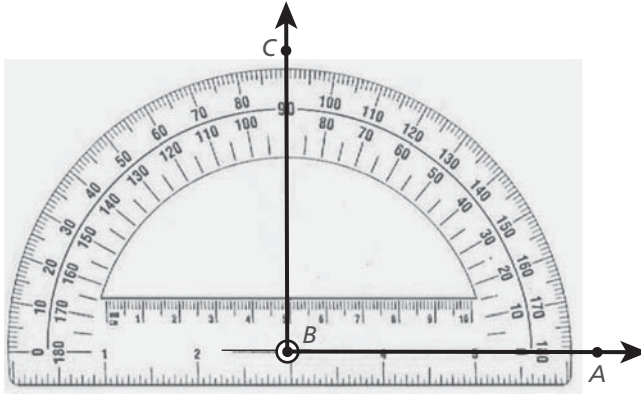
A 360° turn traces a complete circle.




VOCABULARY
 protractor

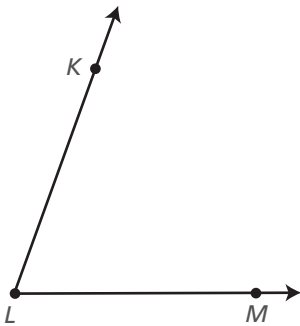
► Use a Protractor

A **protractor** is a tool that is used to measure angles in degrees. This protractor shows that $\angle ABC$ measures 90° .



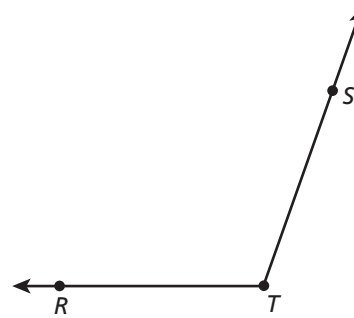
Measure each angle with your protractor. Write the measure.

1.



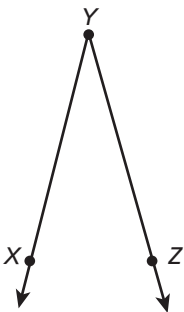
$\angle KLM = \underline{\hspace{2cm}}$

2.



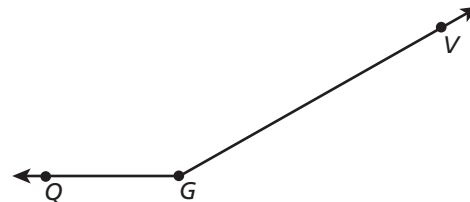
$\angle STR = \underline{\hspace{2cm}}$

3.



$\angle XYZ = \underline{\hspace{2cm}}$

4.

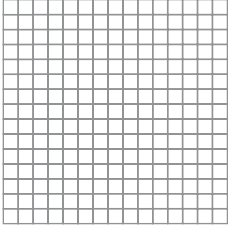


$\angle QGV = \underline{\hspace{2cm}}$

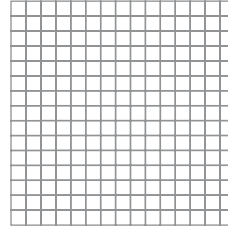
► Sketch Angles

Sketch each angle, or draw it using a protractor.

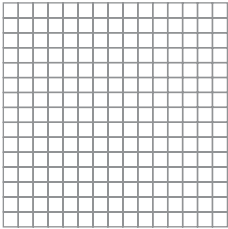
5. 90°



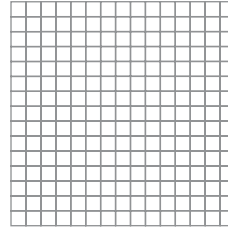
6. 45°



7. 180°



8. 360°



► Use Reasoning

Use the figures at the right to answer the following questions.

9. Name one right angle in each figure.

10. Name one straight angle in each figure.

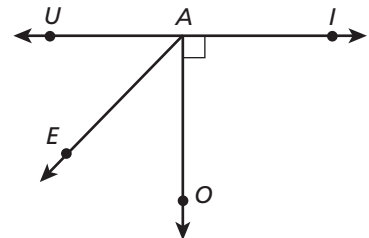
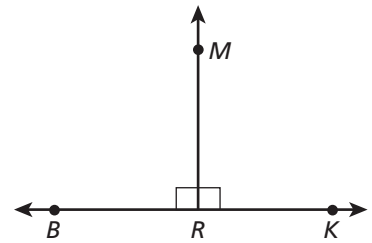
11. How much greater is the measure of $\angle KRB$ than the measure of $\angle IAO$?

12. Which angle appears to be a 45° angle?

13. The measure of $\angle IAE$ is 135° .

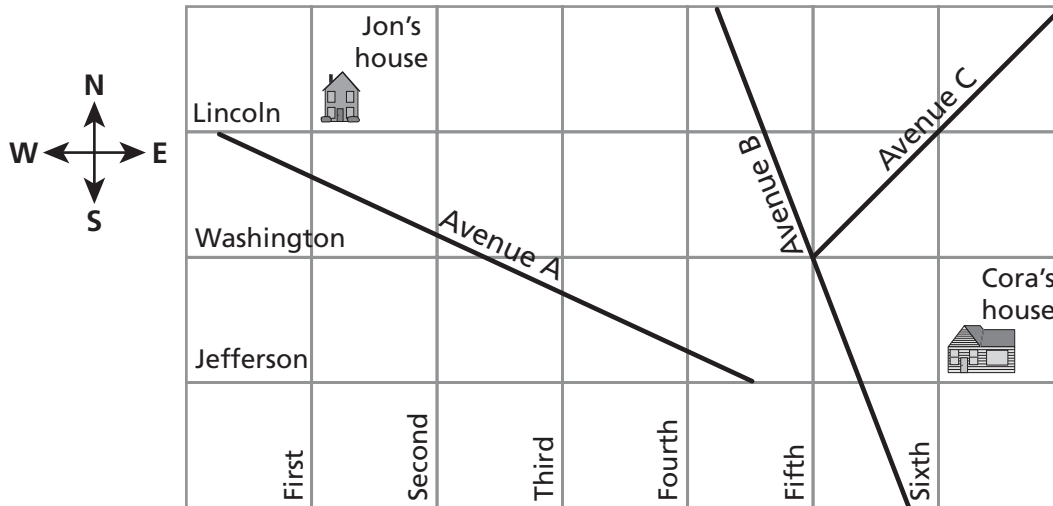
What is the measure of $\angle OAE$? _____

What is the measure of $\angle UAE$? _____



► Angles in the Real World

Here is a map of Jon's neighborhood. The east and west streets are named for presidents of the United States. The north and south streets are numbered. The avenues have letters. Jon's house is on the corner of Lincoln and First.



14. What do the arrows to the left of the map tell you?

15. Jon leaves his house and rides his bike south on First. What kind of angle does he make for each turn in this route? What is the measure of each angle?

- Jon turns southeast onto Avenue A. _____
- When he reaches Washington, he turns west. _____
- When he gets back to First, he turns south. _____

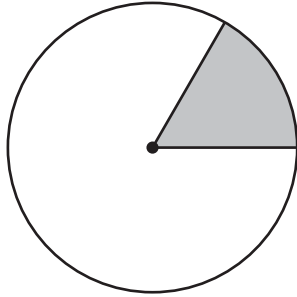
16. Jon's cousin Cora leaves Jon's house and rides east on Lincoln to Avenue B. Draw the angle Cora makes if she turns southeast. What is the measure of the angle?

VOCABULARY
circle
reflex angle

► Measure Angles in a Circle

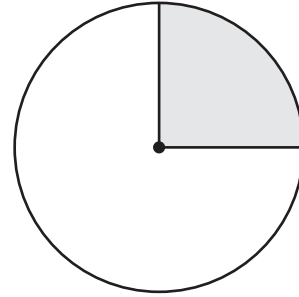
You can show all the different types of angles in a **circle**.

Acute angle



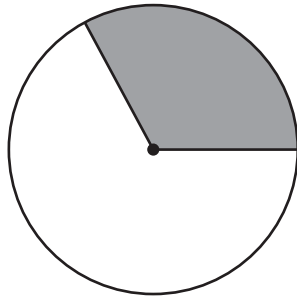
greater than 0° and less than 90°

Right angle



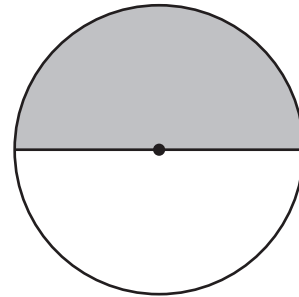
90°

Obtuse angle



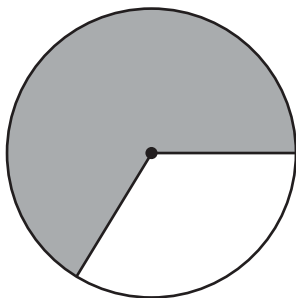
greater than 90° and less than 180°

Straight angle



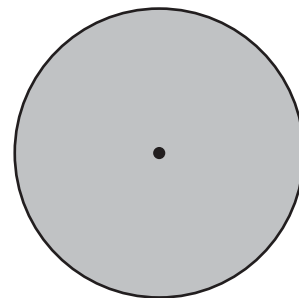
180°

Reflex angle



greater than 180° and less than 360°

Circle

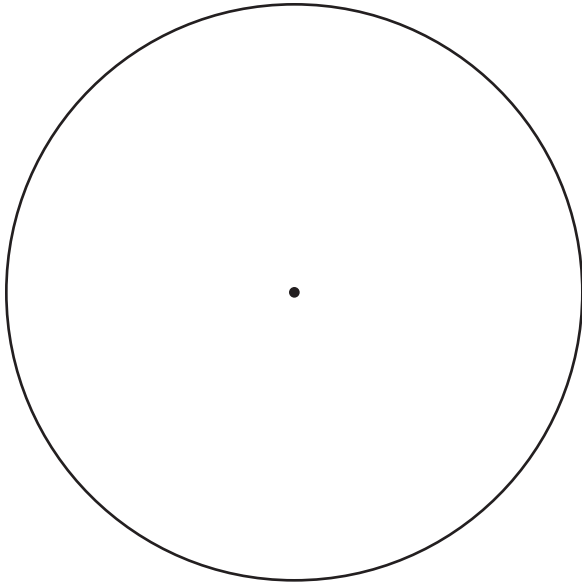


360°

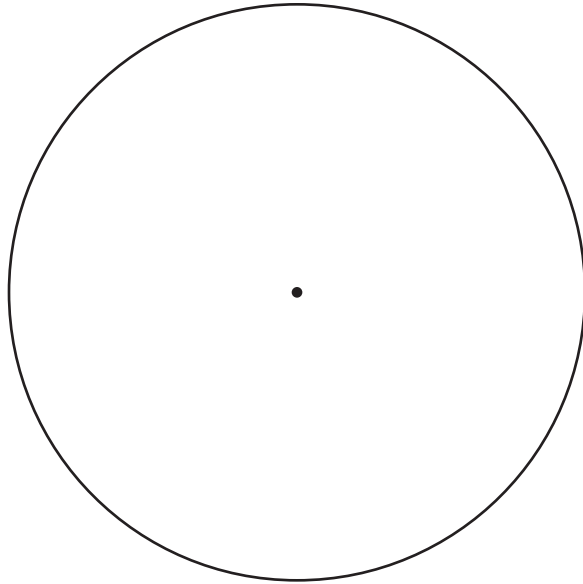
► **Draw Angles in a Circle**

Use a straightedge and a protractor to draw and shade an angle of each type. Measure and label each angle.

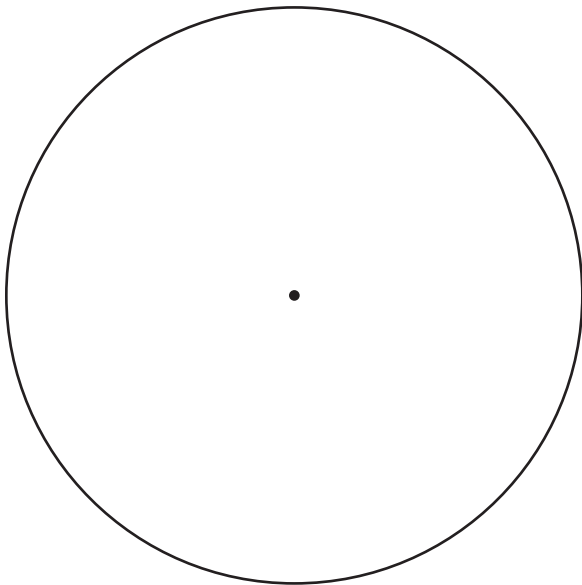
1. obtuse angle



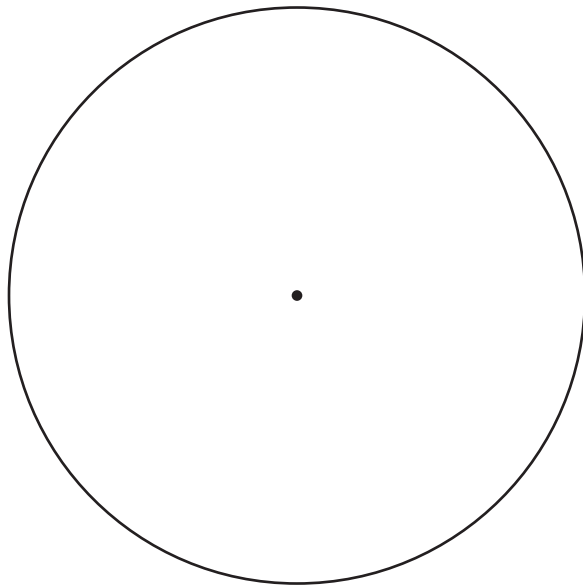
2. straight angle



3. acute angle



4. three angles with a sum of 360°



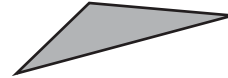
5. Write out the sum of your angle measures in Exercise 4 to show that it equals 360°

VOCABULARY
 right triangle
 obtuse triangle
 acute triangle

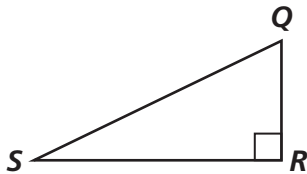
► Discuss Angles of a Triangle

The prefix *tri-* means “three,” so it is easy to remember that a triangle has 3 angles. Triangles can take their names from the kind of angles they have.

- A **right triangle** has one right angle, which we show by drawing a small square at the right angle.
- An **obtuse triangle** has one obtuse angle.
- An **acute triangle** has three acute angles.

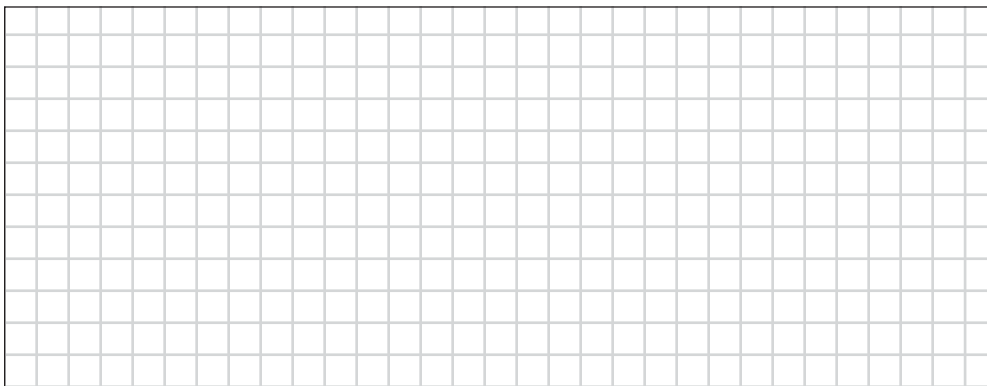


1. You can also use letters to write and talk about triangles. This triangle is $\triangle QRS$. Name its three angles and their type.



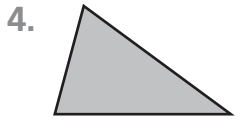
2. What kind of triangle is $\triangle QRS$? How do you know?

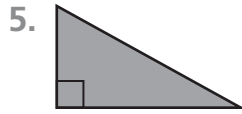
3. Draw and label a right triangle, an acute triangle, and an obtuse triangle.

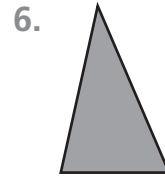


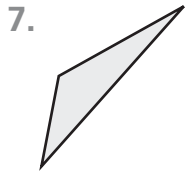
► **Identify Angles of a Triangle**

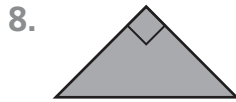
Name each triangle by its angles. Explain your thinking.

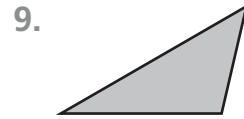


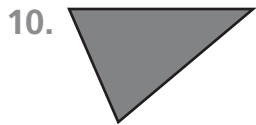


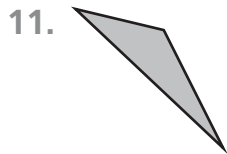


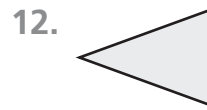


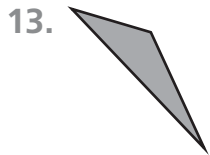


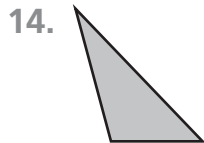


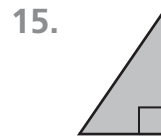












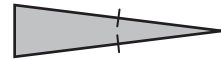
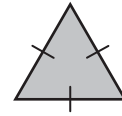
16. Describe how angles make triangles different from one another.

VOCABULARY
 equilateral
 isosceles
 scalene

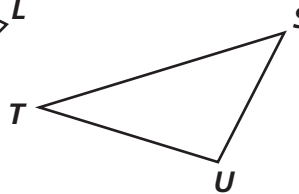
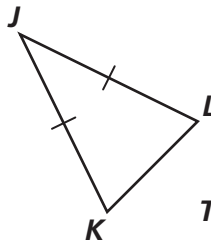
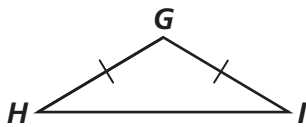
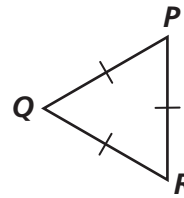
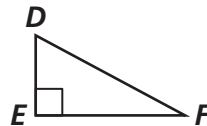
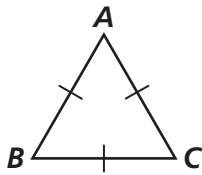
► Discuss Sides of a Triangle

Triangles can be named by their sides. Small "tick marks" on the sides of triangles tell us when sides are equal.

- The prefix *equi-* means "equal." Triangles that have three equal sides are called **equilateral**.
- Triangles that have two equal sides are called **isosceles**. The word *isosceles* comes from very old words that mean "equal legs."
- Triangles with no equal sides are called **scalene**. All triangles that are not equilateral or isosceles are scalene.



Use these triangles to answer the questions.



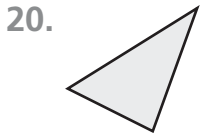
17. Write the letter names of the scalene triangles.

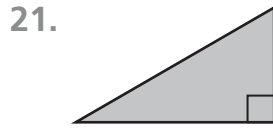
18. Write the letter names of the equilateral triangles.

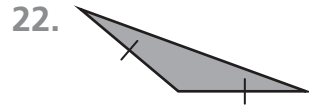
19. Write the letter names of the isosceles triangles.

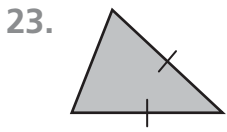
► Identify Sides of a Triangle

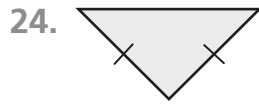
Name each triangle by its sides. Explain your thinking.

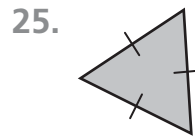




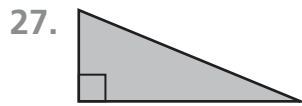




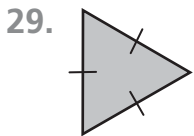


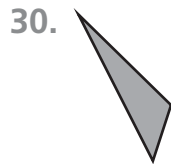














32. Explain how sides make triangles different from each other.

► Sort Triangles in Different Ways

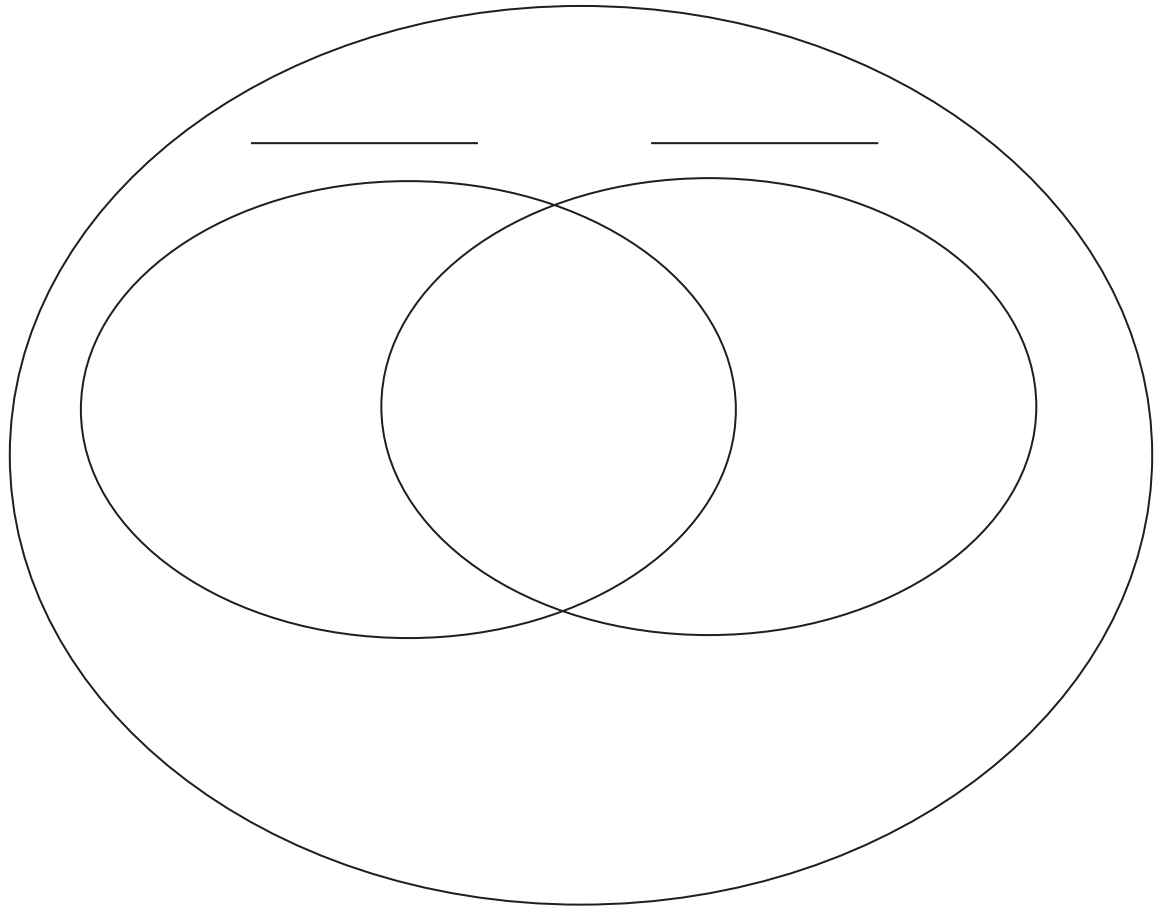
33. Write a capital letter and a lowercase letter inside each triangle below, using the keys at the right.

Cut out the triangles and use the diagram below to sort them in different ways.

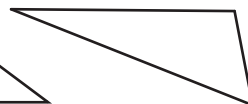
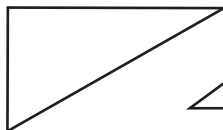
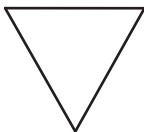
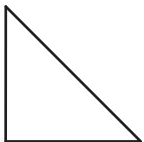
acute = a
obtuse = o
right = r

Isosceles = I
Scalene = S
Equilateral = E

Triangles



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► Possible Ways to Name Triangles

Draw each triangle. If you can't, explain why.

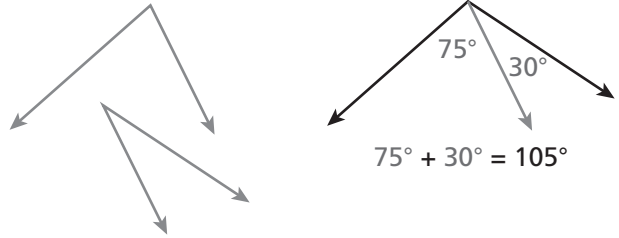
34. Draw a right scalene triangle.	35. Draw an obtuse scalene triangle.
36. Draw a right equilateral triangle.	37. Draw an acute isosceles triangle.
38. Draw an obtuse equilateral triangle.	39. Draw a right isosceles triangle.

Fill in the missing words in the sentences about triangles.

40. If a triangle has an obtuse angle, then it cannot be an _____ triangle.
41. If a triangle has a right angle, then it cannot have an _____ angle.
42. Every triangle has at least _____ acute angles.

► Add Angle Measures

Two angles can be put together to form another angle. The measure of the whole angle is the sum of the measures of the smaller angles. The measure of the whole angle shown is 105° .



What kind of angle is formed when the two angles are put together? What is its measure?

<p>1.</p> <p>_____</p>	<p>2.</p> <p>_____</p>
<p>3.</p> <p>_____</p>	<p>4.</p> <p>_____</p>

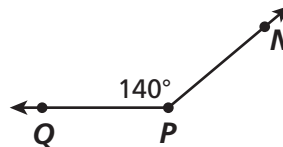
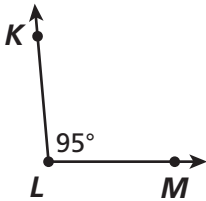
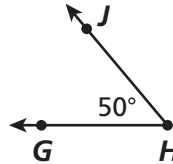
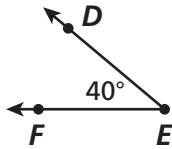
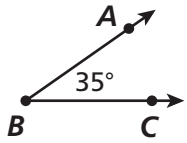
5. An angle is made from two angles with measures 80° and 70° . Write and solve an equation to find the measure of the whole angle.

Show your work.



► Put Angles Together

Use the angles shown to make other angles.



6. Which two angles would you put together to make a 75° angle?

7. Which two angles would you put together to make a 145° angle?

8. Which two angles would you put together to make a straight angle?

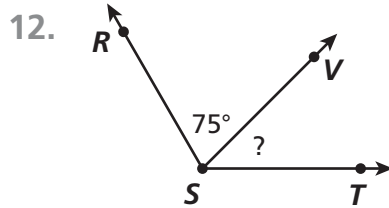
9. Which two angles would you put together to make a right angle?

10. If you put all five angles together, what would be the measure of the whole angle? What kind of figure would you form?

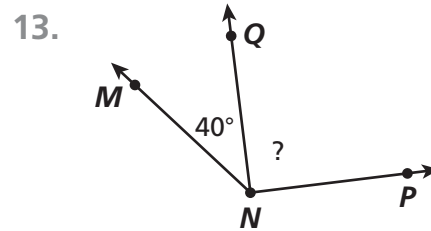
11. Use a protractor and straightedge to draw the angle formed by putting $\angle ABC$ and $\angle KLM$ together. Show its measure.

► Subtract Angle Measures

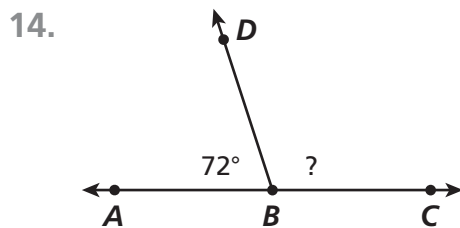
Write an equation to find the unknown angle measure.



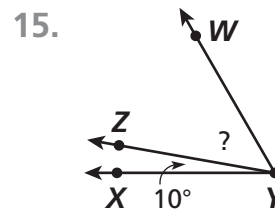
The measure of $\angle RST$ is 120° .
What is the measure of $\angle VST$?



The measure of $\angle MNP$ is 130° . What
is the measure of $\angle QNP$?



The measure of $\angle ABC$ is 180° .
What is the measure of $\angle DBC$?



The measure of $\angle XYW$ is 60° .
What is the measure of $\angle ZYW$?

16. Draw your own angle problem and share it with a partner.

17. When a right angle is made from two smaller
angles, what must be true about the smaller angles?

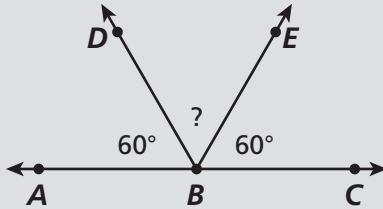
18. When a straight angle is made from two smaller
angles, what must be true about the smaller angles?



► What's the Error?

Dear Math Students,

I want to find the measure of $\angle DBE$ in the following diagram.



I wrote and solved this equation.

$$180^\circ - (60^\circ + 60^\circ) = x$$

$$180^\circ - 60^\circ + 60^\circ = x$$

$$120^\circ + 60^\circ = x$$

$$180^\circ = x$$

This answer doesn't make sense. Did I do something wrong?

Your friend,
Puzzled Penguin

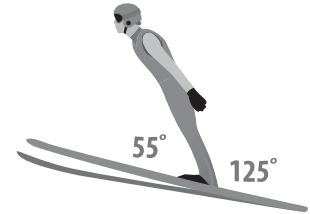


19. Write a response to Puzzled Penguin.

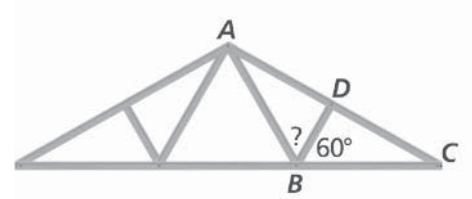
► Add Angle Measures

Use an equation to solve.

1. The ski jumper shown makes angles with her skis as shown. What is the sum of the angles?



2. In the roof framework shown, $\angle ABD$ and $\angle DBC$ have the same measure. What is the measure of $\angle DBA$? What is the measure of $\angle ABC$?

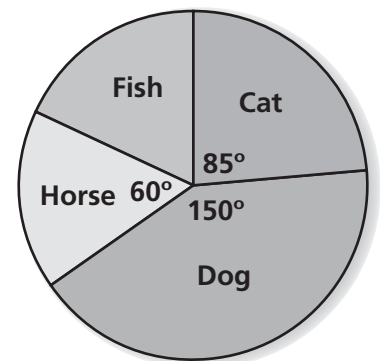


3. In the simple bridge structure shown, the measure of $\angle RSV$ is 30° and $\angle VST$ is a right angle. What is the measure of $\angle RST$?



The circle at the right represents all of the students in a class. Each section represents the students in the class who chose a certain type of animal as their favorite type of pet. The angle measures for some sections are given.

4. What is the sum of the angle measures for Cat, Dog, and Horse?



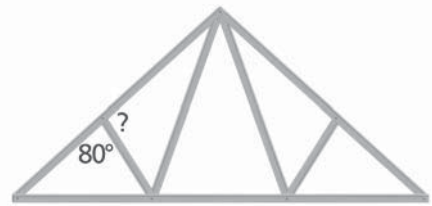
5. What is the total angle measure for the circle? What is the angle measure for Fish?



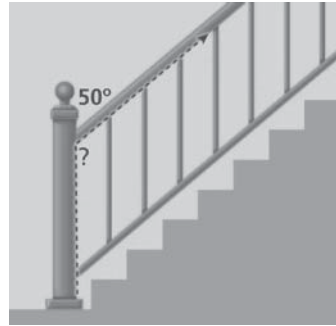
► Subtract Angle Measures

Use an equation to solve.

6. In the roof framework shown, the measure of one angle is 80° . What is the unknown angle measure?



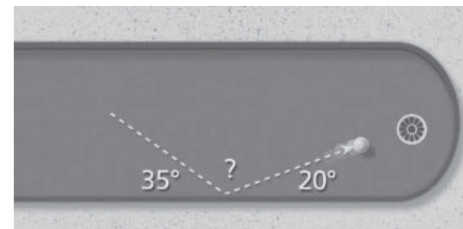
7. The railing on a stairway makes a 50° angle with the upright post. What is the unknown angle measure in the diagram?



8. When different items are poured, they form a pile in the shape of a cone. The diagram shows a pile of sand. What is the angle the sand makes with the ground?



9. In a miniature golf game, a player hits a ball against a wall at an angle with measure 35° and it bounces off at an angle of 20° . What is the unknown angle measure in the diagram?



10. In a reclining chair, you can push back from an upright position to sit at an angle. In the chair shown, the whole angle between the back of the chair and the seat of the chair is 130° . Find the unknown angle measure to find by how much the chair is reclined from upright.





Family Letter

Content Overview

Dear Family,

Your child has been learning about geometry throughout this unit. In this second half of the unit, your child will be learning how to recognize and describe a group of geometric figures called quadrilaterals, which get their name because they have four (*quad-*) sides (*-lateral*). Five different kinds of quadrilaterals are shown here.



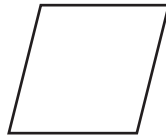
Square

4 equal sides
opposite sides parallel
4 right angles



Rectangle

2 pairs of parallel sides
4 right angles



Rhombus

4 equal sides
opposite sides parallel



Parallelogram

2 pairs of parallel sides



Trapezoid

exactly 1 pair of opposite sides parallel

If you have any questions or comments, please call or write to me.

Sincerely,
Your child's teacher



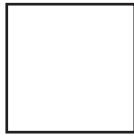


Carta a la familia

Un vistazo general al contenido

Estimada familia:

Durante esta unidad, su niño ha estado aprendiendo acerca de geometría. En esta parte de la unidad, su niño aprenderá cómo reconocer y describir un grupo de figuras geométricas llamadas cuadriláteros, que reciben ese nombre porque tienen cuatro (*quadri-*) lados (*-lateris*). Aquí se muestran cinco tipos de cuadriláteros:



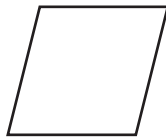
Cuadrado

4 lados iguales
lados opuestos paralelos
4 ángulos rectos



Rectángulo

2 pares de lados paralelos
4 ángulos rectos



Rombo

4 lados iguales
lados opuestos paralelos



Paralelogramo

2 pares de lados paralelos



Trapecio

exactamente 1 par de lados paralelos opuestos

Si tiene alguna pregunta o algún comentario, por favor comuníquese conmigo.

Atentamente,
El maestro de su niño

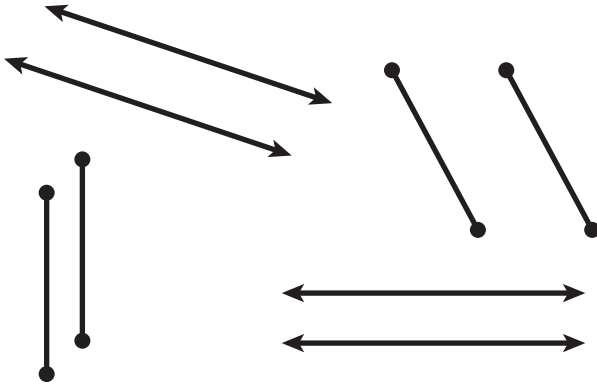


CACC

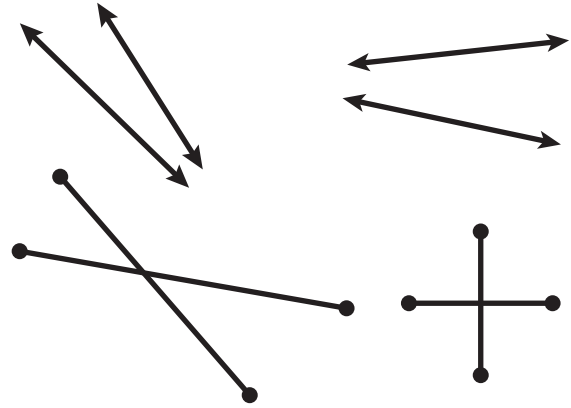
En la Unidad 8 se aplican los siguientes estándares auxiliares, contenidos en los *Estándares estatales comunes de matemáticas con adiciones para California*: 4.OA.5, 4.G.1, 4.G.2, 4.G.3 y todos los de prácticas matemáticas.

► Define Parallel Lines

The lines or line segments in these pairs are **parallel**.



The lines or line segments in these pairs are not parallel.



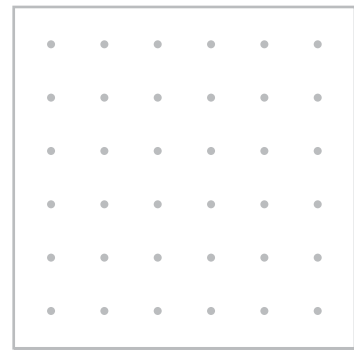
1. What do you think it means for two lines to be parallel?

► Draw Parallel Lines

2. Draw and label a pair of parallel lines.



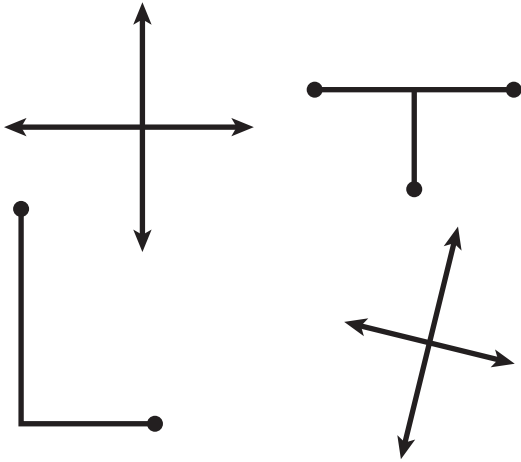
3. Draw and label a figure with one pair of parallel line segments.



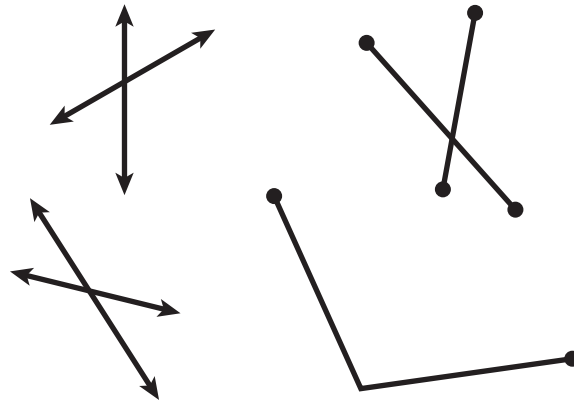

VOCABULARY
 perpendicular

► Define Perpendicular Lines

The lines or line segments in these pairs are **perpendicular**.



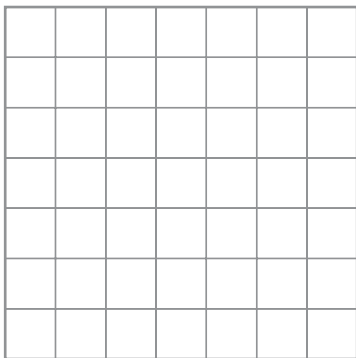
The lines or line segments in these pairs are not perpendicular.



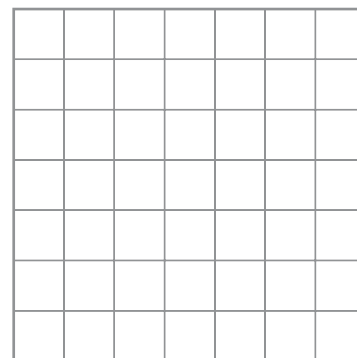
4. What do you think it means for two lines to be perpendicular?

► Draw Perpendicular Lines

5. Draw and label a pair of perpendicular lines.



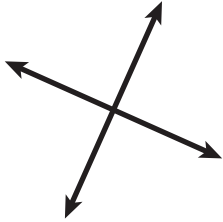
6. Draw and label a figure with one pair of perpendicular line segments.



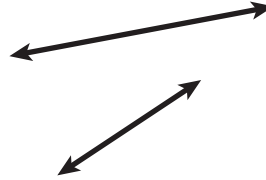
► Identify Types of Lines

Tell whether each pair of lines is parallel, perpendicular, or neither.

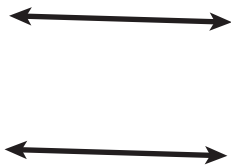
7.



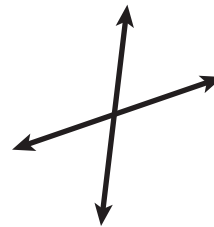
8.



9.



10.

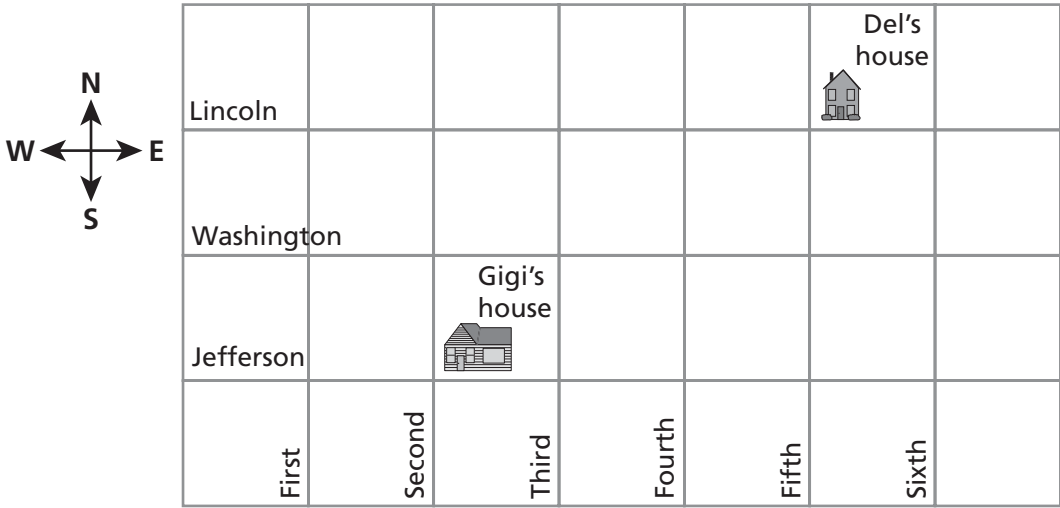


11. Draw a pair of parallel line segments.

12. First, draw a line segment 3 cm long. Then, draw a line segment 6 cm long that looks perpendicular to your first line segment.

► Lines on a Map

Use the map.



13. On Wednesday, Del leaves his house and walks West along Lincoln Street. Gigi leaves her house and walks East along Jefferson Street. What kind of lines are Lincoln Street and Jefferson Street?

14. Will Del and Gigi ever meet? If so, where?

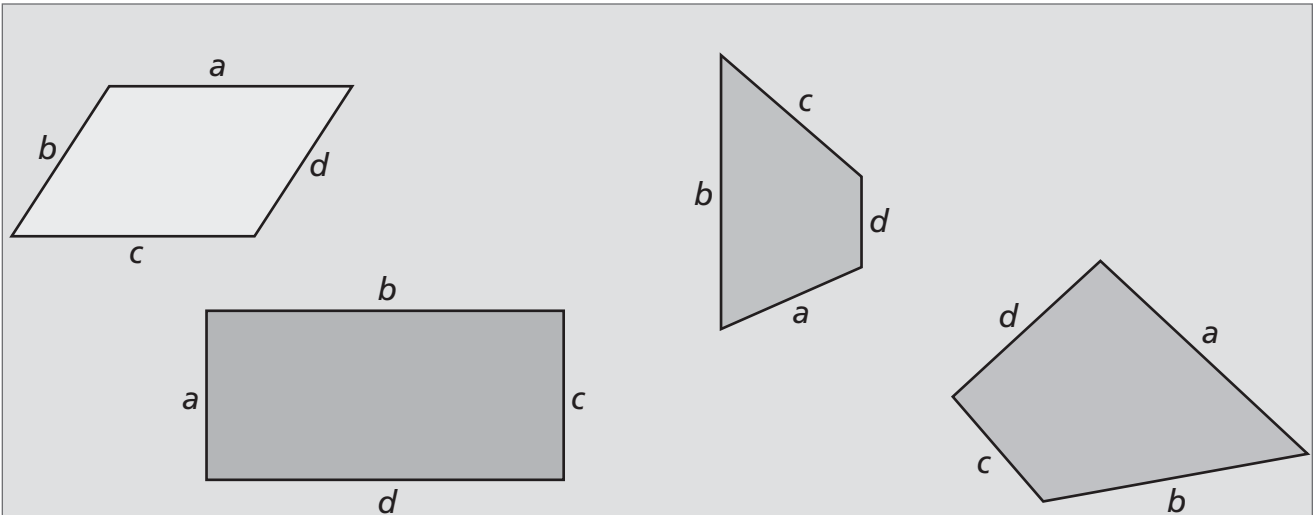
15. On Friday, Del leaves his house and walks South along Fifth Street. Gigi leaves her house and walks East along Jefferson Street. What kind of lines are Fifth Street and Jefferson Street?

16. Will Del and Gigi ever meet? If so, where?

VOCABULARY
quadrilateral
adjacent
opposite

► Identify Sides of Quadrilaterals

Look at these quadrilaterals.



In all of the quadrilaterals, the sides labeled a and b are **adjacent** to each other. The sides labeled b and c are also adjacent to each other.

1. What do you think it means for two sides to be adjacent?

2. Which other sides are adjacent to each other?

In all of the quadrilaterals, the sides labeled a and c are **opposite** each other.

3. What do you think it means for two sides to be opposite each other?

4. Which other sides are opposite each other?


VOCABULARY

 trapezoid
 parallelogram
 rhombus

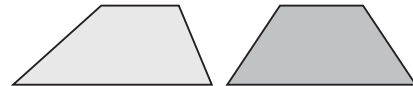
► Identify Types of Quadrilaterals

Some quadrilaterals are special because they have parallel sides or right angles. You already know about rectangles and squares. Other types of quadrilaterals are the **trapezoid**, **parallelogram**, and **rhombus**.

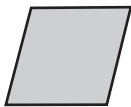
You can list each type and describe its sides and angles.

Quadrilateral: 4 sides (and 4 angles)


 Parallelogram: 4 sides
 2 pairs of opposite sides parallel

 Trapezoid: 4 sides
 exactly 1 pair of opposite sides parallel


Rhombus: 4 sides 2 pairs of opposite sides parallel 4 equal sides	Rectangle: 4 sides 2 pairs of opposite sides parallel 4 right angles
---	--


 Square: 4 sides
 2 pairs of opposite sides parallel
 4 right angles
 4 equal sides


► Draw Special Quadrilaterals

5. Draw a quadrilateral that has exactly one pair of opposite sides parallel. What type of quadrilateral is it?



6. Draw a quadrilateral that has two pairs of opposite sides parallel. What type of quadrilateral is it? Is there more than one answer?



7. Draw a quadrilateral that has two pairs of opposite sides parallel, 4 equal sides, and no right angles. What type of quadrilateral is it?

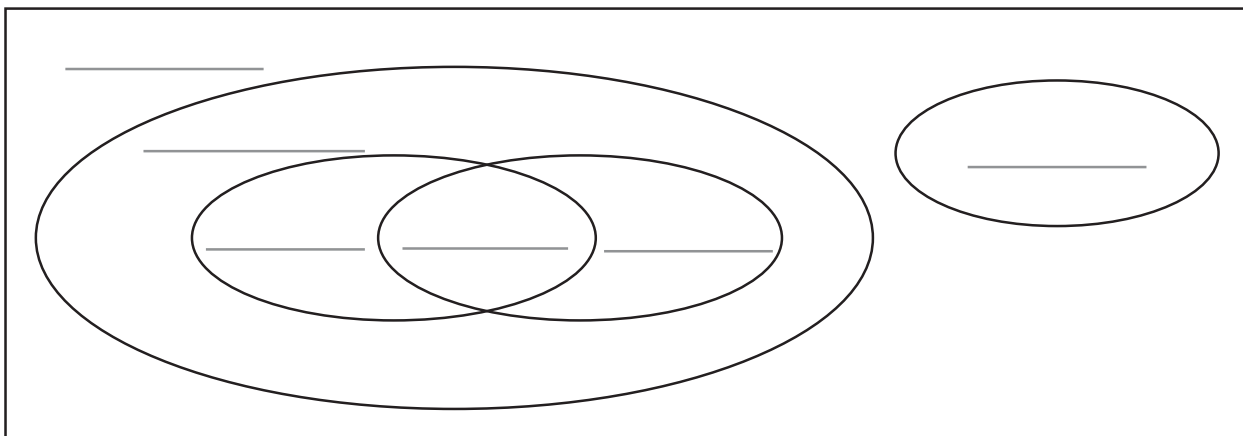


► Identify Relationships

Why is each statement below true?

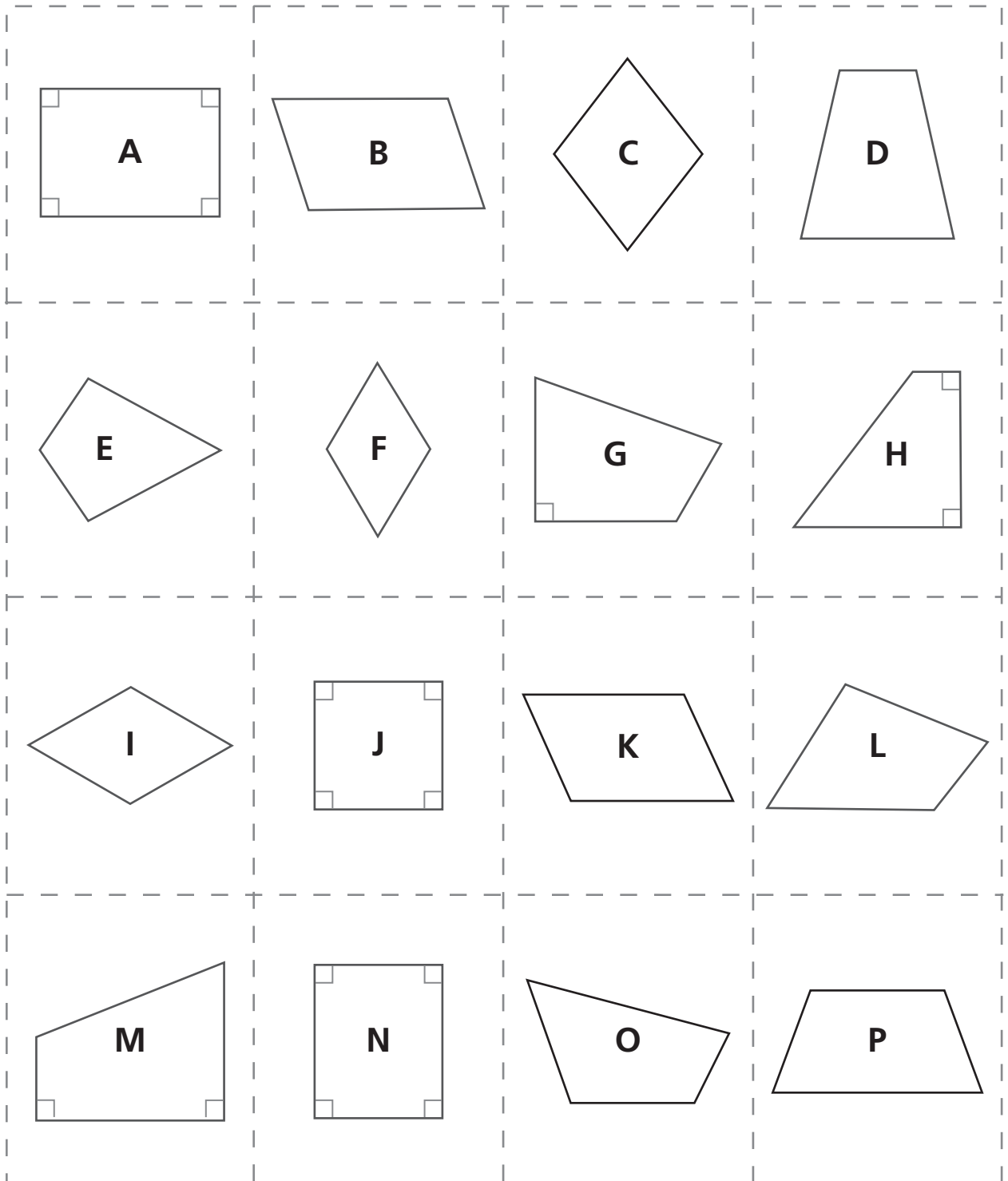
8. A rhombus is always a parallelogram, but a parallelogram isn't always a rhombus.
9. A rectangle is a parallelogram, but a parallelogram is not necessarily a rectangle.
10. A square is a rectangle, but a rectangle does not have to be a square.
11. Complete the category diagram by placing each word in the best location.

Quadrilateral
 Trapezoid
 Parallelogram
 Rectangle
 Rhombus
 Square



► Sort and Classify Quadrilaterals

Cut along the dashed lines.



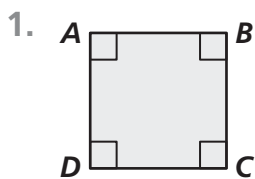


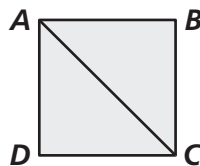
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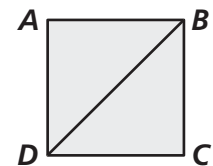
► Use Diagonals to Make Triangles

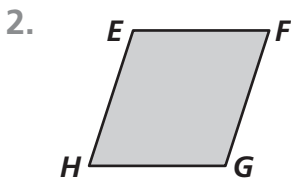
A **diagonal** connects opposite angles of a quadrilateral. You can make triangles by drawing a diagonal on a quadrilateral.

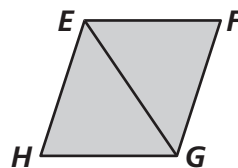
List all names for each quadrilateral in Exercises 1–3. Then use letters to name the triangles you can make with the diagonals and tell what kind of triangles they are.

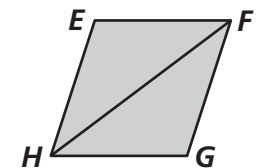




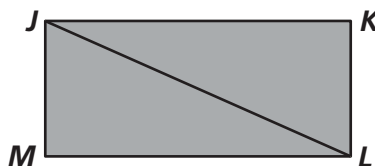


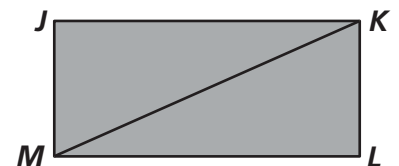






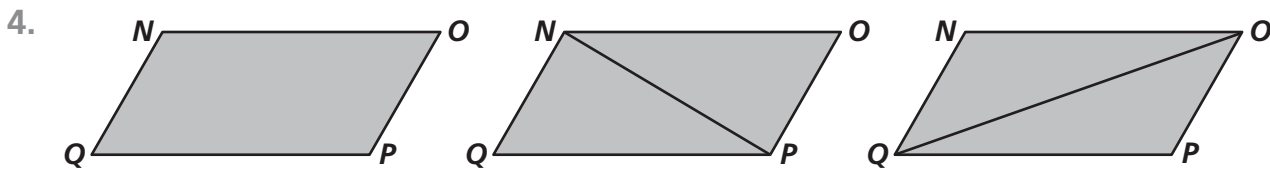


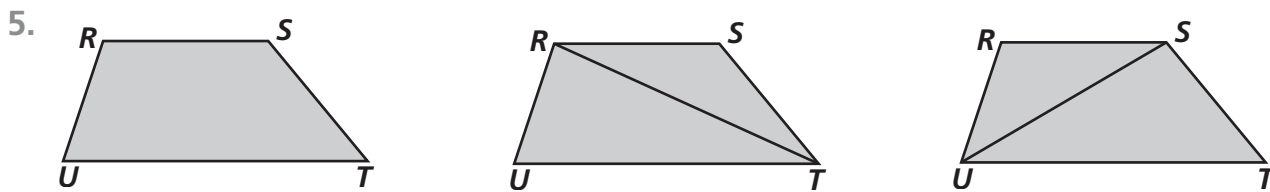


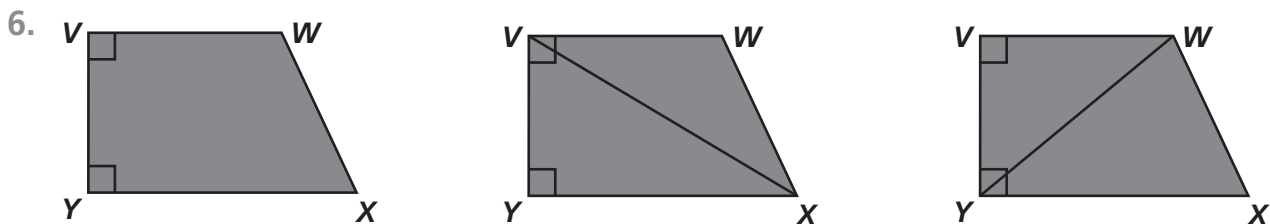


► Use Diagonals to Make Triangles (continued)

List all names for each quadrilateral in Exercises 4–6.
Then use letters to name the triangles you can make with
the diagonals and tell what kind of triangles they are.

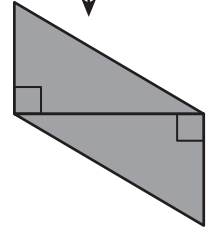
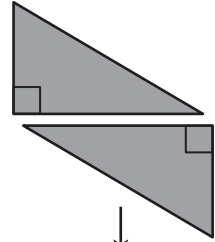
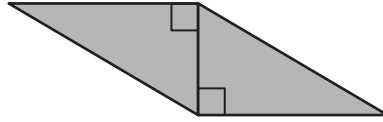
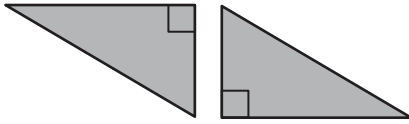
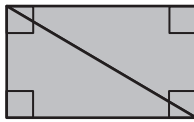
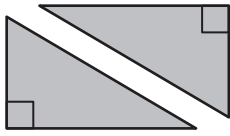






► Build Quadrilaterals With Triangles

You can make a quadrilateral by joining the equal sides of two triangles that are the same size and shape.

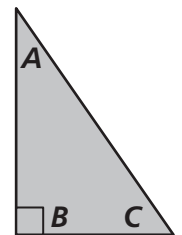
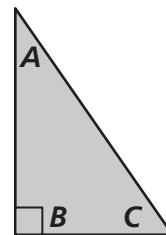
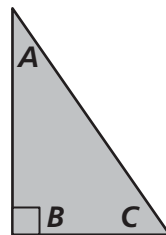
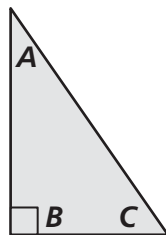
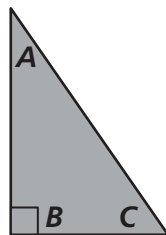
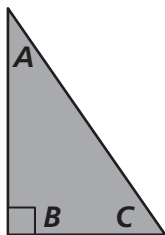


Cut out the triangles below. For each exercise, glue two of the triangles on this paper so that the stated sides are joined. Then write the name of the quadrilateral.

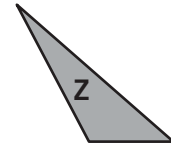
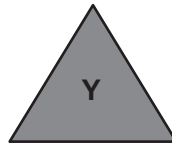
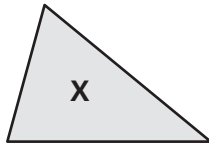
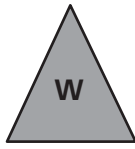
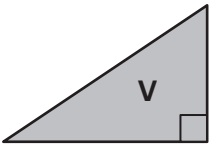
7. \overline{AB} is joined to \overline{AB}

8. \overline{AC} is joined to \overline{AC}

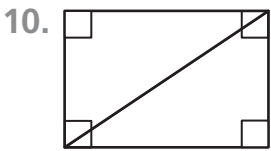
9. \overline{BC} is joined to \overline{BC}

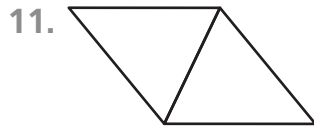


► Match Quadrilaterals with Triangles

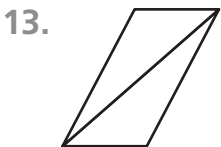


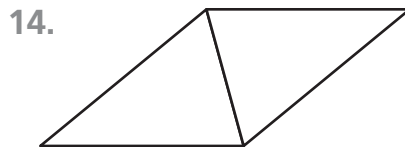
Name the triangle that is used twice to form each of the following quadrilaterals. What kind of triangle is it? Then list all names for the quadrilateral.

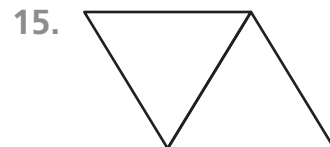












► Draw Perpendicular Lines in Triangles

A **vertex** is a point shared by two sides of a polygon.

Draw a scalene triangle ABC .

16. What is true about the sides of your triangle?

17. Draw a segment from one vertex so that it is perpendicular to the opposite side. Label the segment and mark the right angles.

18. Name the triangles formed. What kind of triangles are they?

19. Are the triangles you formed the same size and shape?

Draw an isosceles triangle JKL for Exercises 20–23.

20. What is true about the sides of your triangle?

21. Draw a segment from the vertex between the equal sides of the triangle so that it is perpendicular to the opposite side. Label the segment and mark the right angles.



► Draw Perpendicular Lines in Triangles (continued)

Use your isosceles triangle JKL to answer the questions.

22. Name the segments formed by the perpendicular segment in $\triangle JKL$. What is true about the lengths of the segments?

23. Name the triangles formed. Are they the same size and shape?

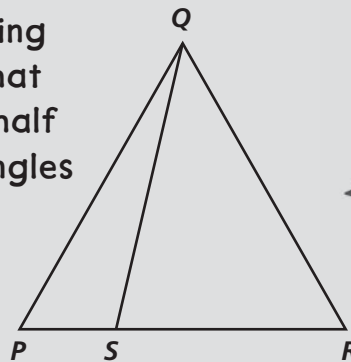
► What's the Error?

Dear Math Students,

I tried to do Exercises 20–23 again using an equilateral triangle PQR . I found that \overline{PS} and \overline{RS} that I formed are not each half the length of side \overline{PR} and the new triangles are not the same size and shape.

Did I do something wrong?

Your friend,
Puzzled Penguin

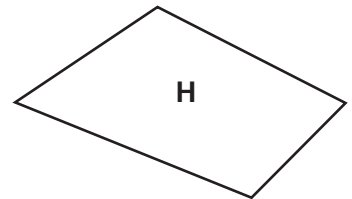
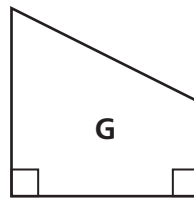
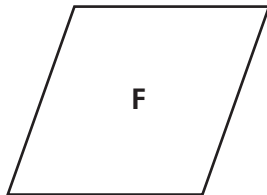
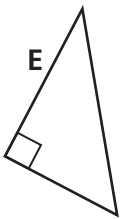
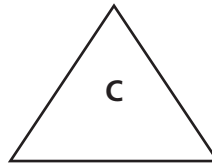
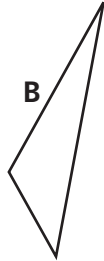
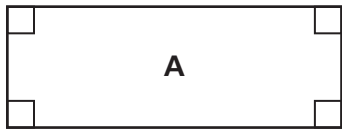


24. Write a response to Puzzled Penguin.

► Sort Polygons by Angles

Triangles and quadrilaterals are examples of **polygons**.

Use these polygons for Exercises 1–5.



1. Which figures have one or more acute angles?

2. Which figures have one or more right angles?

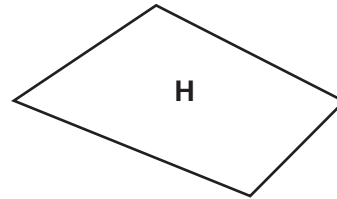
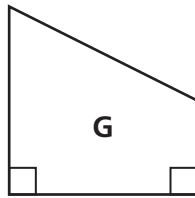
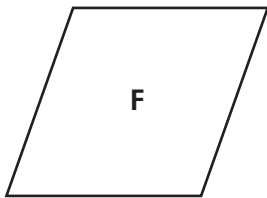
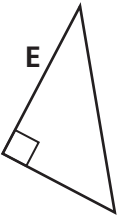
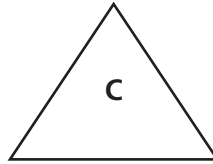
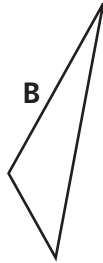
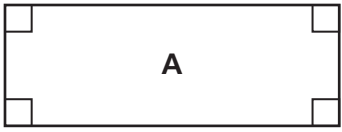
3. Which figures have one or more obtuse angles?

4. Which figures have both acute angles and right angles?

5. Which figures have both acute angles and obtuse angles?

► Sort Polygons by Sides

Use these polygons for Exercises 6–10.



6. Which figures have perpendicular sides?

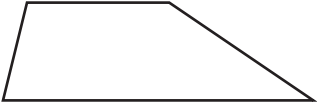
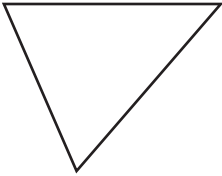
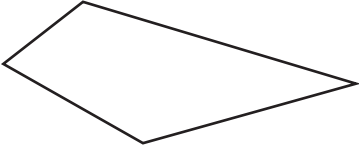
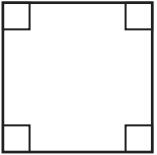
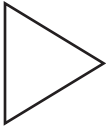
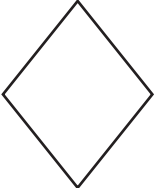
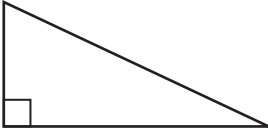
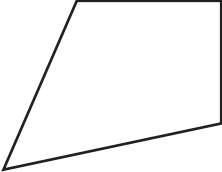

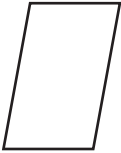
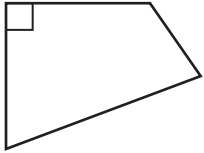
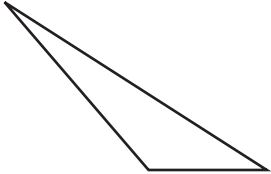

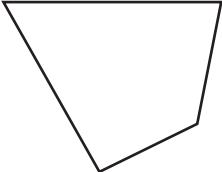

7. Which figures have exactly one pair of opposite sides parallel?

8. Which figures have two pairs of opposite sides parallel?

9. Which figures have both parallel and perpendicular sides?

10. Which figures have no parallel or perpendicular sides?

► Sort Polygons Cards

<p>A</p> 	<p>B</p> 	<p>C</p> 
<p>D</p> 	<p>E</p> 	<p>F</p> 
<p>G</p> 	<p>H</p> 	<p>I</p> 
<p>J</p> 	<p>K</p> 	<p>L</p> 
<p>M</p> 	<p>N</p> 	<p>O</p> 



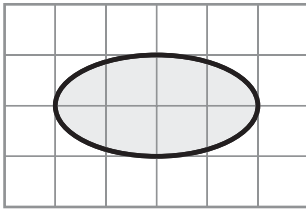
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► Identify Line Symmetry in Figures

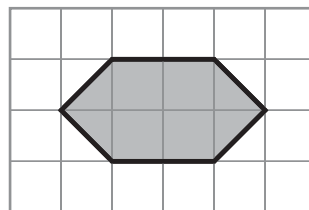
A plane figure has **line symmetry** if it can be folded along a line so the two halves match exactly. The fold is called a **line of symmetry**.

Does the figure have line symmetry? Write *yes* or *no*.

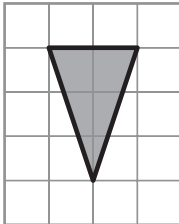
1.



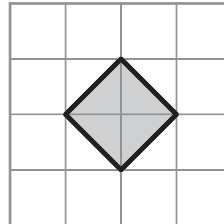
2.



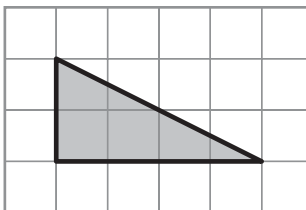
3.



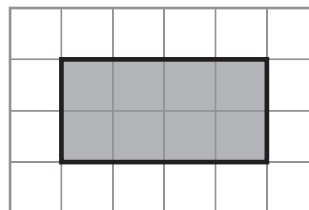
4.



5.

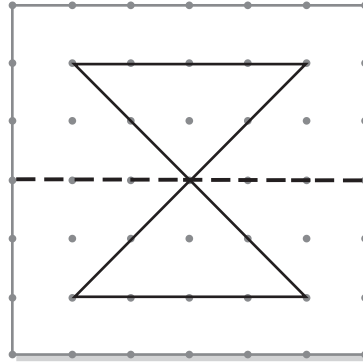
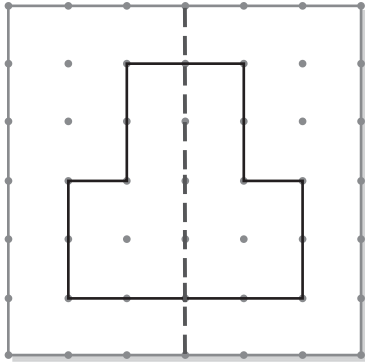


6.

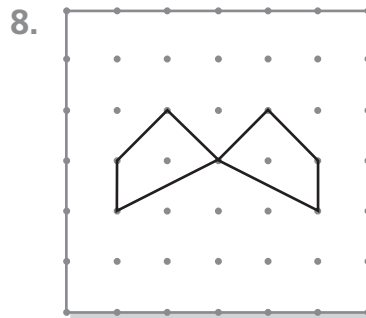
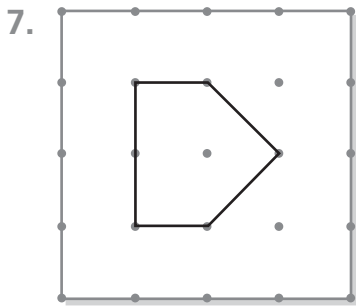


► Draw Lines of Symmetry

A line of symmetry divides a figure or design into two matching parts.

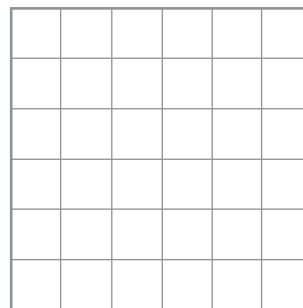


Draw the line of symmetry in the figure or design.



9. Which figures in Exercises 1–6 have more than one line of symmetry? _____

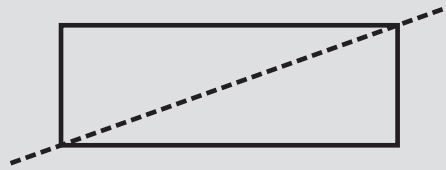
10. Choose one of the figures from your answer to Exercise 9. Draw the figure and draw all of its lines of symmetry.



► What's the Error?

Dear Math Students:

I drew the diagonal of this rectangle as a line of symmetry.



My friend told me I made a mistake. Can you help me figure out what my mistake was?

Your friend,
Puzzled Penguin

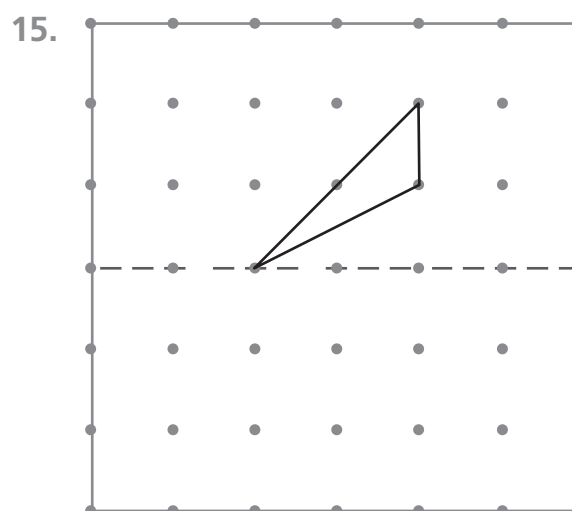
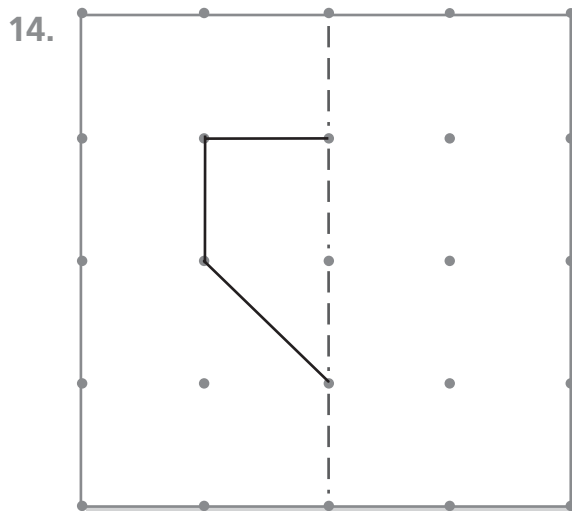
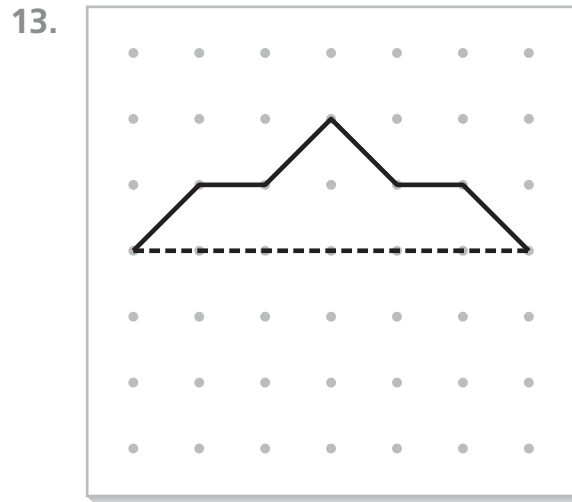
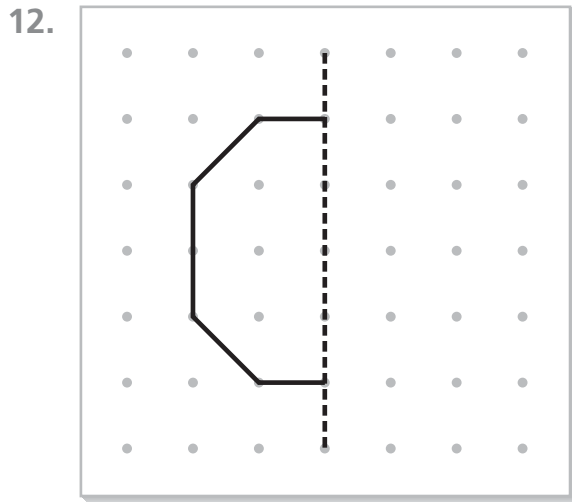


11. Write a response to Puzzled Penguin.



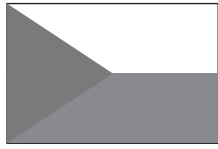
► Draw the Other Half

Draw the other half of each figure to make a whole figure or design with line symmetry.



16. **Check Your Work** Copy one of your answers to Exercises 12–15 onto another piece of paper. Cut out the design and then fold it along the line of symmetry. Check that the two halves of the design match exactly.

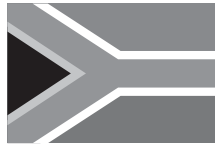
► Math and Flags of the World



Czechia



Switzerland



South Africa



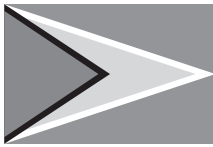
Denmark



Kuwait



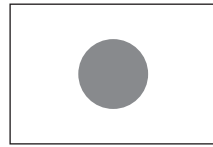
Sudan



Guyana



Paraguay



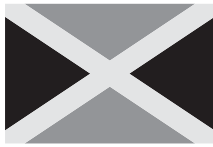
Japan



India



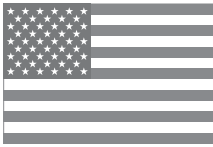
Bangladesh



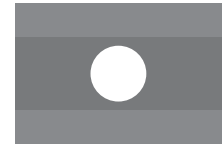
Jamaica



Trinidad and
Tobago



United States
of America



Laos

Flags are used in many different ways. Some sports teams use flags to generate team spirit, a flag might be used to start a race, or a homeowner might use a flag for decoration. States and countries also use flags as a representation of their communities. Each flag is different, both in color and design.

Use the designs on the flags to answer the questions.

1. What types of quadrilaterals are used in the Kuwait flag?

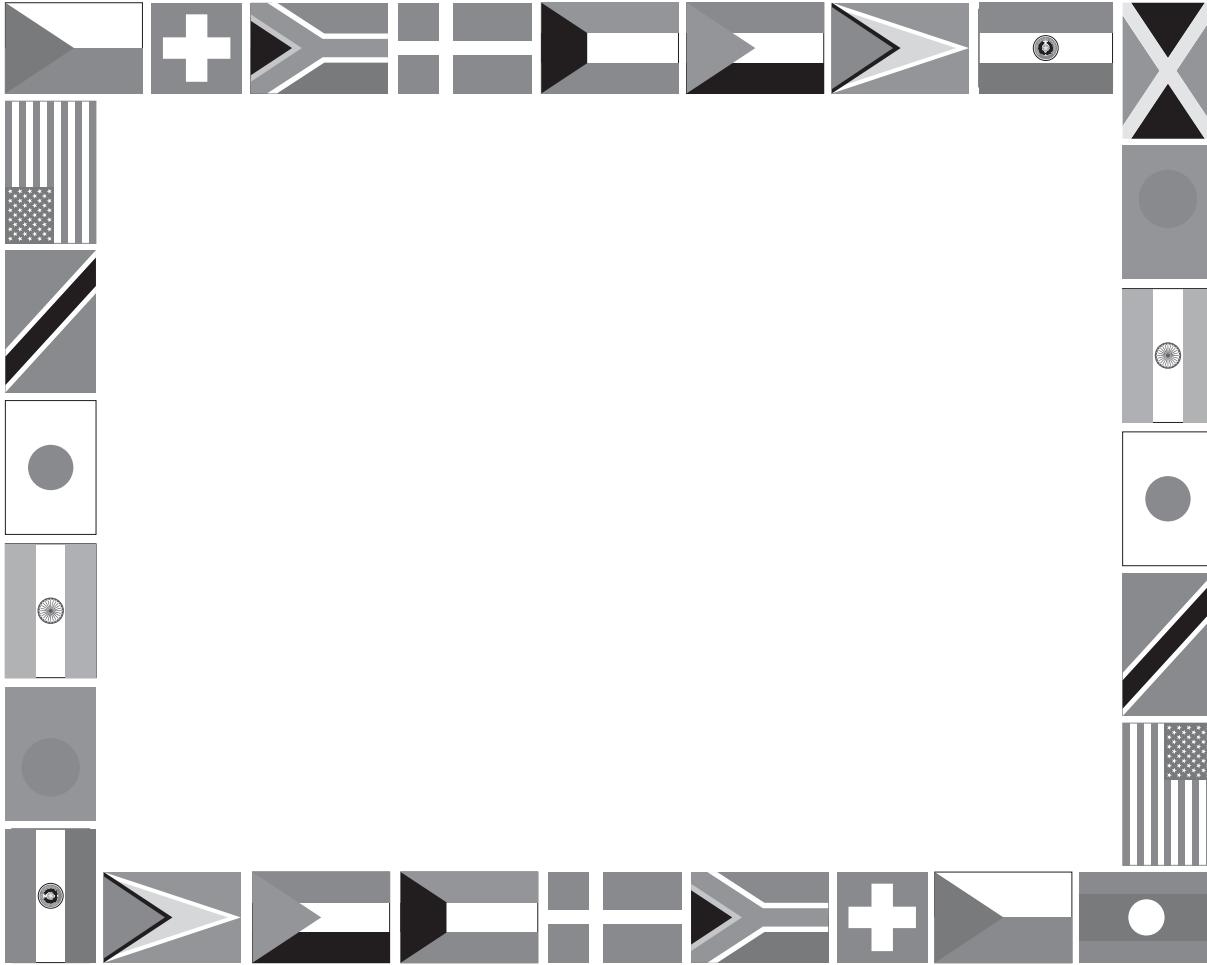
2. How many designs have no parallel lines? Name the flags.

3. How many designs have perpendicular lines? Name the flags.

4. Which designs have at least two lines of symmetry?

► Designer Flags

Design your own flag in the space below. Your flag design should include each of the following: one triangle, one pair of parallel lines, and one 30° angle.



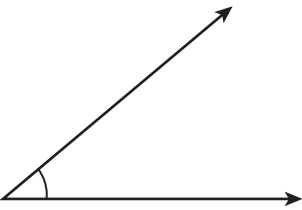
5. What type of triangle did you draw in your flag design? Explain how the sides of the triangle helped you classify the triangle.

6. Compare the flag design you made to the flag design that a classmate made. How are the two designs the same? How are they different? What shapes did you use that your classmate did not use?

1. Draw and label line segment FG .



2. Use a protractor to measure the angle.



The angle measures _____.

3. Choose the figure that has at least one pair of parallel lines. Mark all that apply.



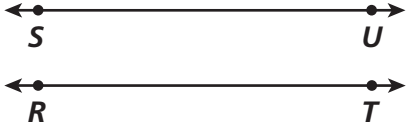
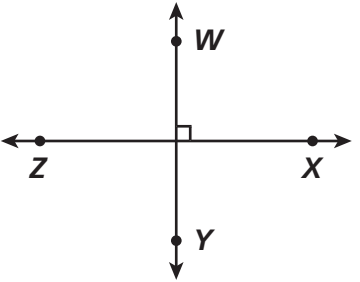
A

B

C

D

4. Use the figures. For 4a–4d, select True or False for the statement.



4a. \overleftrightarrow{ZX} and \overleftrightarrow{WY} are parallel. True False

4b. \overleftrightarrow{SU} and \overleftrightarrow{RT} are parallel. True False

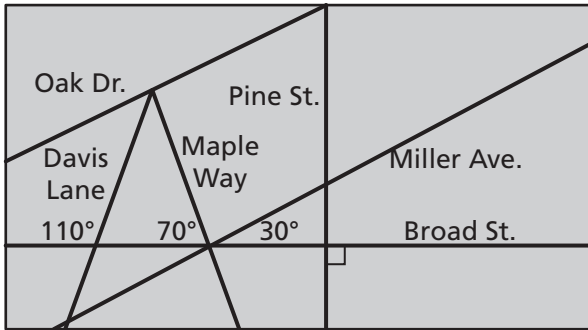
4c. \overleftrightarrow{ZX} and \overleftrightarrow{WY} are perpendicular. True False

4d. A line drawn through points R and U is perpendicular to \overleftrightarrow{RT} . True False

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5. The map below shows a section of Fatima's town.



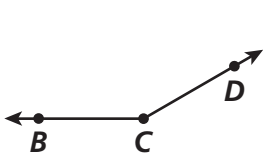
Part A

Fatima is walking on Oak Drive and Gabe is walking on Miller Ave. Could Fatima and Gabe ever meet? If so, where?

Part B

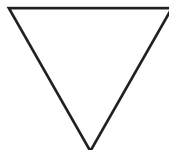
Which street is perpendicular to Broad St.? Explain how you know.

6. Choose the word that makes a true statement.



Angle BCD is a right
an acute
an obtuse angle.

7. Draw all the lines of symmetry for the figure.



8. A gear in a watch turns clockwise, in one-degree sections, a total of 300 times.

The gear has turned a total of degrees.

9. Lucy is designing a block for a quilt. She measured one of the angles. Use the numbers and symbols on the tiles to write and solve an equation to find the unknown angle measure.



40° 70° 110° 180° + -


Equation: = ?

Solution: ? =

10. Luke is drawing a figure that has exactly 2 acute angles. For 10a–10d, choose Yes or No to tell if the figure could be the figure Luke is drawing.

10a.  Yes No

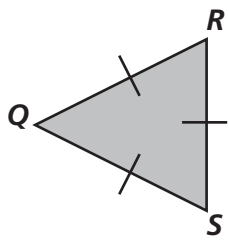
10b.  Yes No

10c.  Yes No

10d.  Yes No

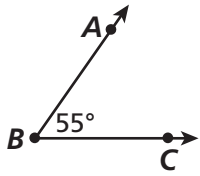
11. Triangle QRS can be classified

as an acute
a right
an obtuse triangle.

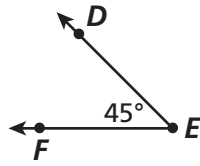




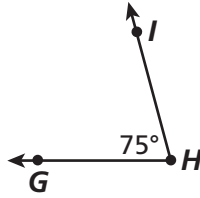
12. Choose the two angles that could be put together to make a 130° angle.



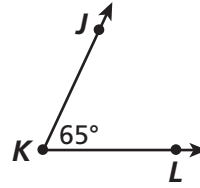
(A)



(B)



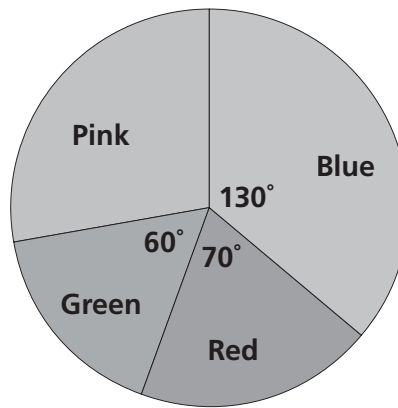
(C)



(D)

13. A sign has two pairs of parallel sides and two pairs of equal sides. What shape is the sign?

14. The circle represents all of the students in a class. Each section represents the students in the class who chose a certain color as their favorite. The angle measures for some sections are given.



Part A

What is the sum of the angle measures for Blue, Red, and Green?

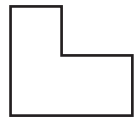
Part B

Explain how to find the angle measure for Pink. Then find the measure.

15. Draw one diagonal in the figure to form two obtuse triangles.



16. Does the figure have a line of symmetry? Explain.



17. A Ferris wheel turns 35° before it pauses. It turns another 85° before stopping again.

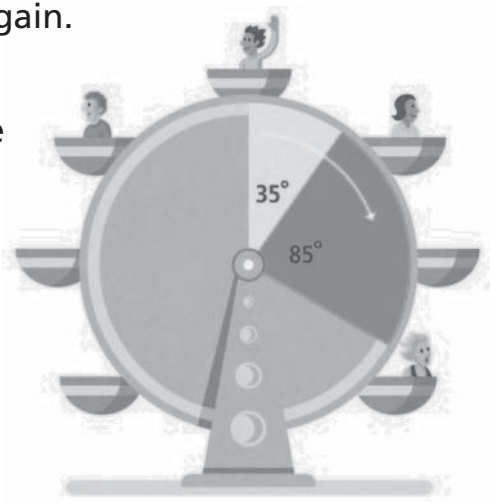
Part A

What is the total measure of the angle that the Ferris wheel turned?

Part B

How many more times will it need to repeat the pattern to turn 360° ?

Explain your thinking.





18. Cross Street, West Street, and Carmichael Street form a triangle.



How can the triangle be classified? Mark all that apply.

- scalene
- isosceles
- equilateral
- acute
- right
- obtuse

19. A stage has four sides with exactly one pair of parallel sides.

Marjorie says the shape of the stage is a quadrilateral and a rectangle. Do you agree? Explain.

20. What is the unknown angle measure in this pattern?

