CHAPTER 7

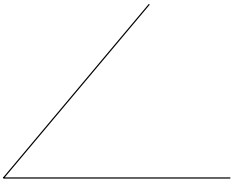
1 Estimating Angle Measures

Goal **Compare and estimate angle measures.**

You will need a protractor.

1. Estimate the size of each angle.

a)

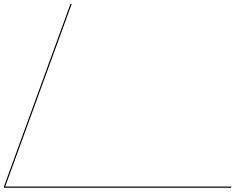


Suggested answer: about 60°

c)

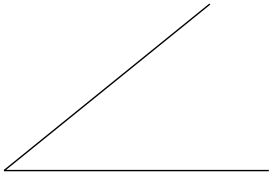
Suggested answer: about 90°

b)



Suggested answer: about 80°

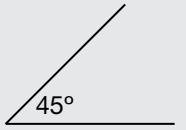
d)

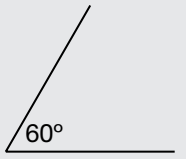


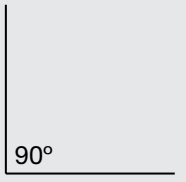
Suggested answer: about 45°

At-Home Help

You can estimate the size of an angle by comparing it to an angle that you know, such as 45°, 60°, or 90°.







2. Which angles that you know did you use to help you estimate the angles in Question 1? Give reasons for your choices.

a) Suggested answer: I used a 60° angle because the angle in part a) looks like it is greater than 45°.

b) Suggested answer: I used a 60° angle because the angle looks like it is greater than the angle in part a).

c) Suggested answer: I used a 90° angle because the angle looks like it is very close to 90°.

d) Suggested answer: I used a 45° angle because the angle looks like it is very close to 45°.

3. Measure the angles in Question 1. How close were your estimates?

a) 50°

b) 70°

c) 87°

d) 39°

Suggested answer: All my estimates were within 10° of the actual angle measurements.

CHAPTER 7

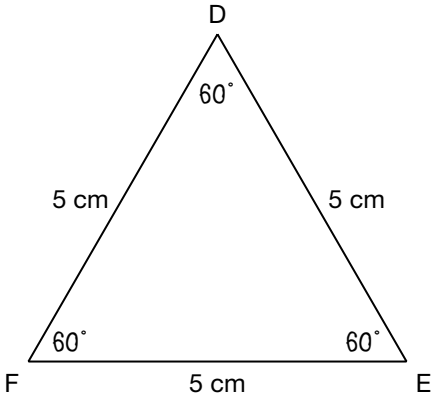
2

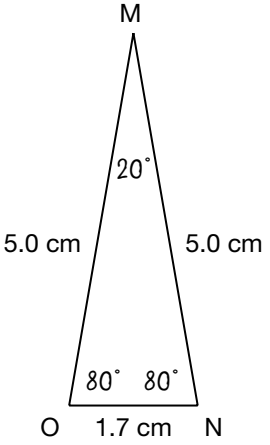
Investigating Properties of Triangles

Goal **Investigate angle and side relationships of triangles.**

You will need a ruler and a protractor.

1. a) Without using a protractor, label these angles on the triangles: 60°, 80°, 20°, 80°, 60°, and 60°.





b) Explain how you know the angle sizes for both triangles.

Suggested answer: I know that an equilateral triangle has all angles the same size. So the angles must be 60°. I know that an isosceles triangle has two angles that are the same size and the third angle is different. So the two angles that are the same size are 80°. The third angle must be 20°.

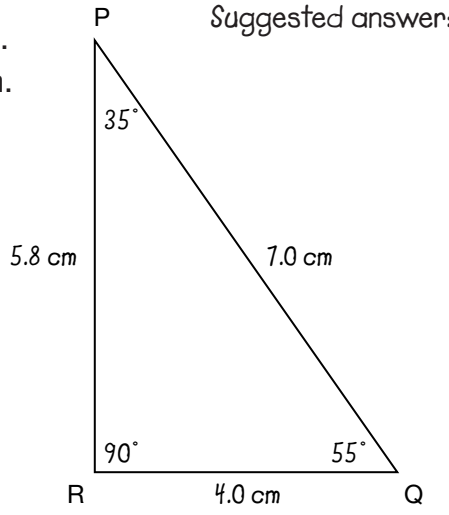
c) Measure the angles with a protractor to check your answer.

2. The angles in triangle PQR are 90°, 35°, and 55°. The side lengths are 5.8 cm, 7.0 cm, and 4.0 cm.

a) Without using a ruler or protractor, label the angle sizes and side lengths.

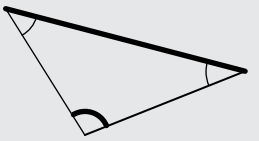
b) Measure the angles and side lengths to check your answers.

Suggested answer:

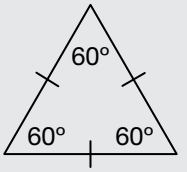


At-Home Help

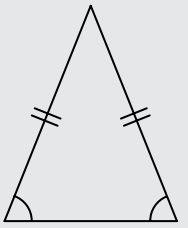
In a triangle, the largest angle is opposite the longest side and the smallest angle is opposite the shortest side.



In equilateral or isosceles triangles, the sides opposite the equal angles are also equal.



equilateral



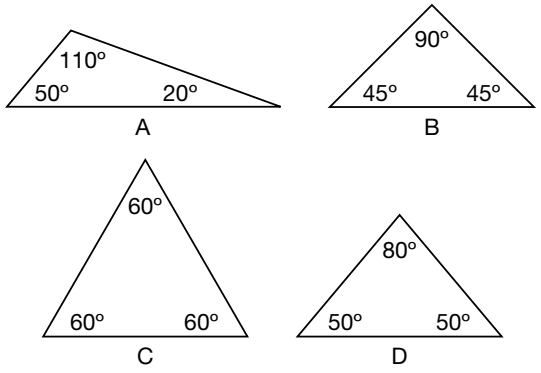
isosceles

CHAPTER 7

3 Communicate About Triangles

Goal **Communicate and explain geometric ideas.**

1.



a) Add the angle measures for each triangle.

A: 110° + 50° + 20° = 180°
B: 90° + 45° + 45° = 180°
C: 60° + 60° + 60° = 180°
D: 50° + 50° + 80° = 180°

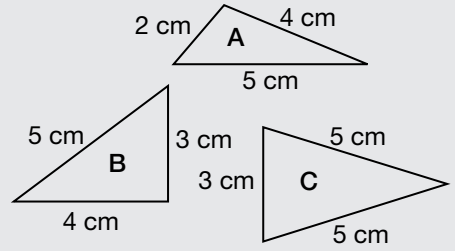
b) Make a hypothesis about the sum of all the angles in a triangle. Use the Communication Checklist.

Suggested answer:
When I add all the angles in a triangle, the sum is always 180°. I think this is always true.

At-Home Help

A **hypothesis** is a statement that you think you can test. For example, a hypothesis for the triangles below might be:

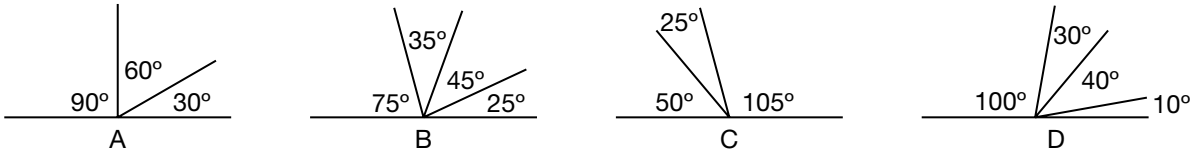
When I add the lengths of two sides of a triangle, the sum is always greater than the length of the other side. I think this is always true.



A hypothesis must be checked with other examples to see if it is still true. Use the Communication Checklist.

Communication Checklist
☑ Did you use math language?
☑ Did you explain your thinking?
☑ Did you include diagrams?

2.



a) Add the angle measures on each line.

A: 30° + 60° + 90° = 180°
B: 25° + 45° + 35° + 75° = 180°
C: 105° + 25° + 50° = 180°
D: 10° + 40° + 30° + 100° = 180°

b) Make a hypothesis about the sum of the angles on a straight line. Use the Communication Checklist.

Suggested answer:
When I add all the angles on a straight line, the sum is always 180°.
I think this is always true.

CHAPTER 7

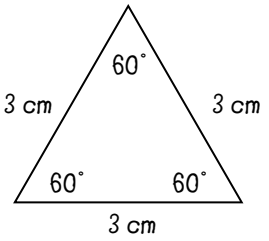
4 Constructing Polygons

Goal **Construct polygons based on angle measures and side lengths.**

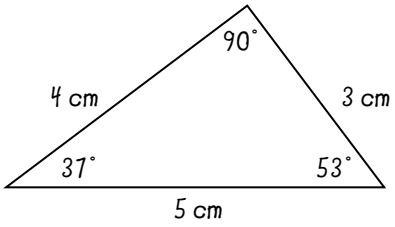
You will need a ruler and a protractor.

1. Draw each polygon. Label all side lengths and angle measures.

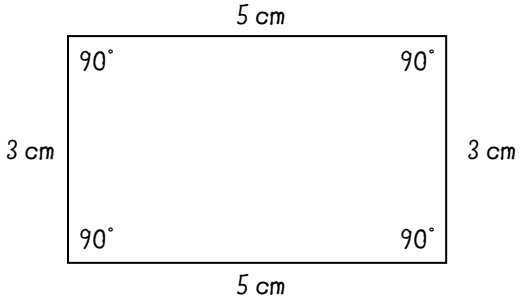
a) equilateral triangle with side lengths of 3 cm and angle measures of 60°



b) scalene triangle with side lengths of 3 cm, 4 cm, and 5 cm and one angle measure of 90°



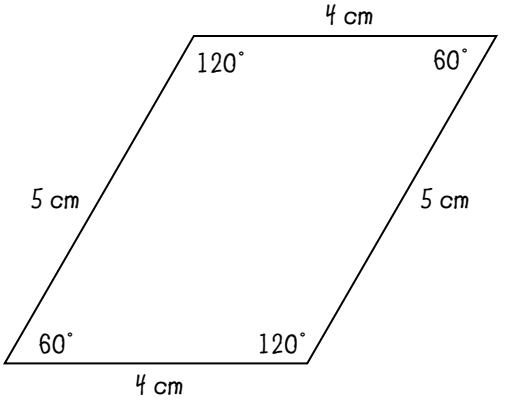
c) rectangle with side lengths of 3 cm and 5 cm



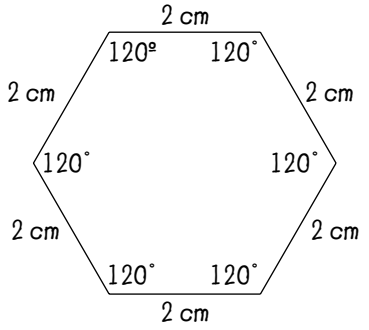
At-Home Help

To draw a scale diagram of a polygon, use appropriate tools. When angle measures and side lengths are given, use a ruler and a protractor.

d) parallelogram with angle measures of 120° and 60° and side lengths of 4 cm and 5 cm



e) regular hexagon with side lengths of 2 cm and angle measures of 120°



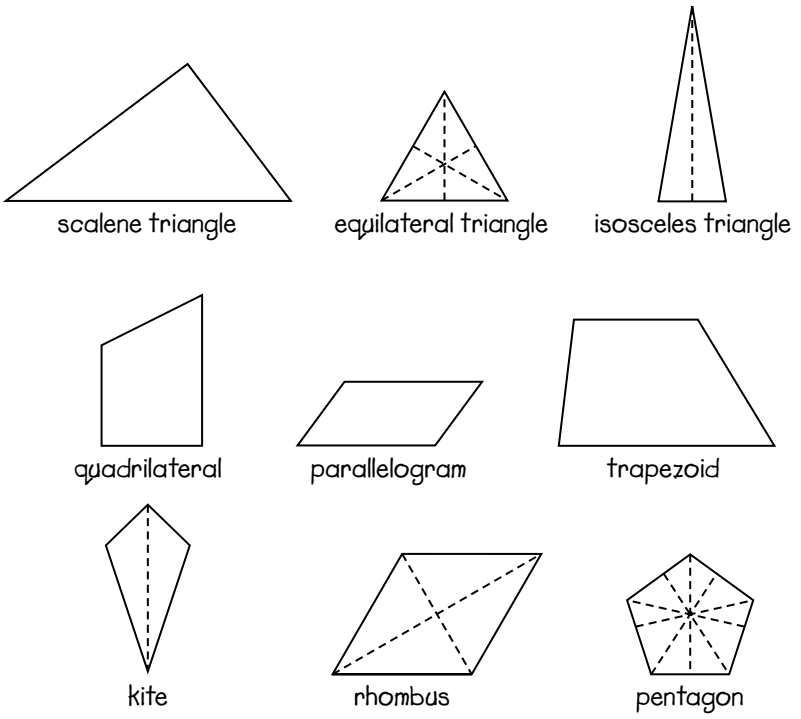
CHAPTER 7

5 Sorting Polygons

Goal **Sort polygons by line symmetry.**

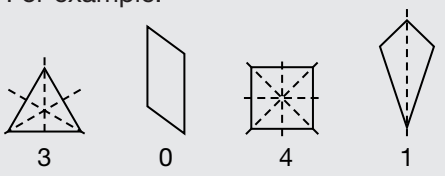
You will need a ruler.

1. a) Name each polygon. Draw all the lines of symmetry you can find.



At-Home Help

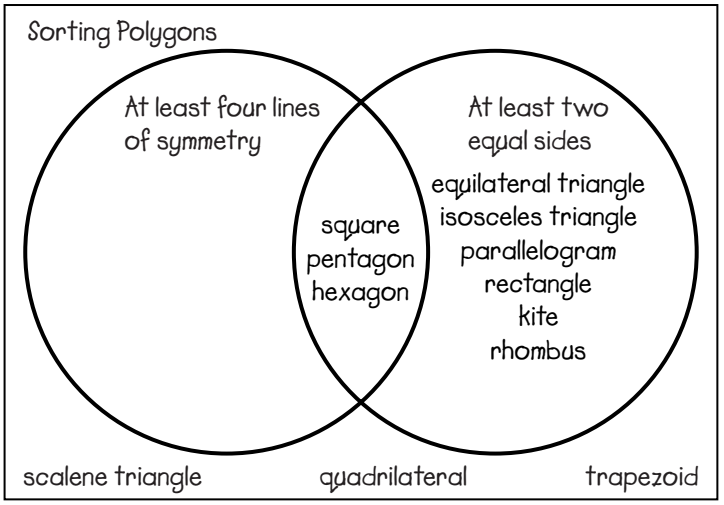
Many polygons have lines of symmetry. Different polygons have different numbers of lines of symmetry.
For example:



You can check for lines of symmetry using a transparent mirror.

b) Sort the polygons using a Venn diagram. Choose categories from the property list.

Suggested answer:



Property list
number of lines of symmetry
number of equal sides
number of equal angles
number of sides
number of angles

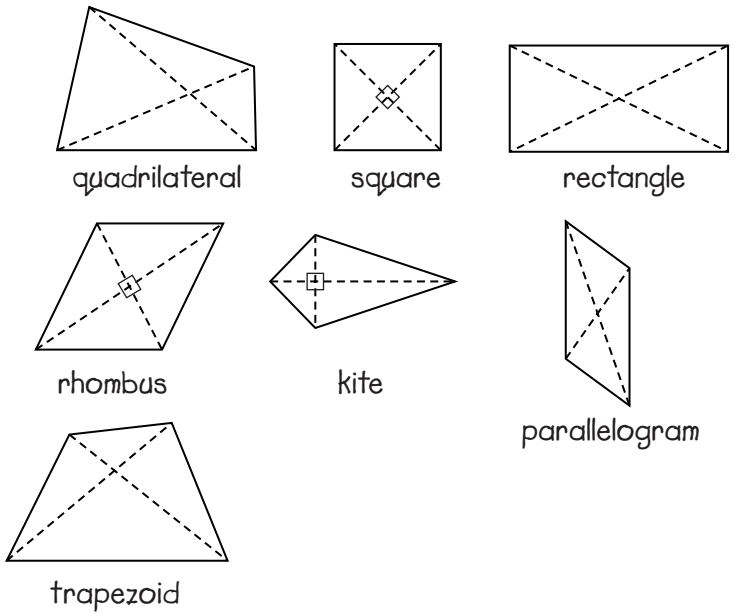
CHAPTER 7

6 Investigating Properties of Quadrilaterals

Goal **Sort and classify quadrilaterals by their properties.**

You will need a ruler and a protractor.

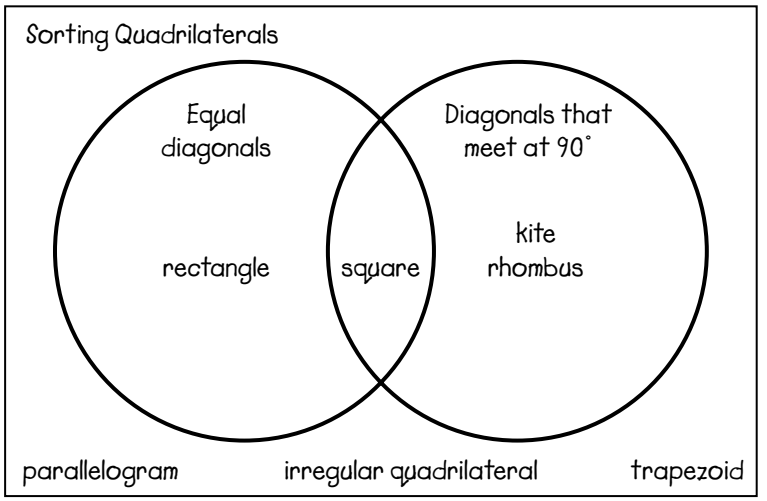
1. a) Name each quadrilateral.



b) Draw all the diagonals in each quadrilateral above. Mark any right angles you find where the diagonals meet.

2. Sort the quadrilaterals using a Venn diagram. Choose categories from the property list.

Suggested answer:



Property list
equal diagonals
unequal diagonals
diagonals that meet at 90°
diagonals that do not meet at 90°

At-Home Help

The diagonals of quadrilaterals have certain properties.

Squares have diagonals that are equal and meet at 90°. Kites and rhombuses have unequal diagonals that meet at 90°.

Rectangles have diagonals that are equal lengths that do not meet at 90°. Parallelograms and some trapezoids have unequal diagonals that do not meet at 90°.

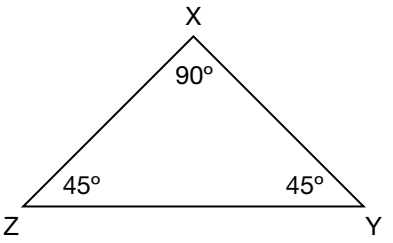
Test Yourself Page 1

Circle the correct answer.

1. Which angles that you know would you use to estimate these angles?

A. 180°, 90°, 45° **B.** 45°, 120°, 90° **C.** 45°, 90°, 60° **D.** 90°, 60°, 60°

2. The side lengths of the triangle are 10 cm and 14 cm. Which side lengths are correct?



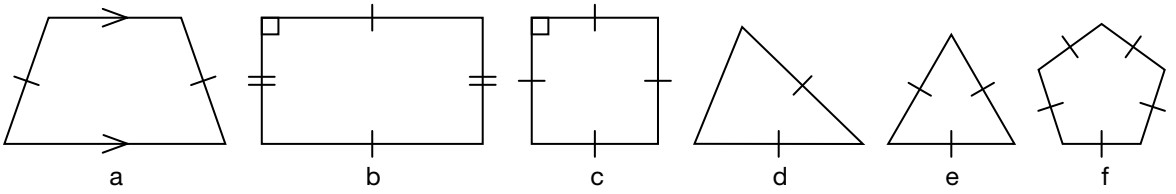
A. XZ = 14 cm, XY = 10 cm, YZ = 10 cm

B. XZ = 10 cm, XY = 14 cm, YZ = 10 cm

C. XZ = 14 cm, XY = 14 cm, YZ = 10 cm

D. XZ = 10 cm, XY = 10 cm, YZ = 14 cm

3. Which polygons have more than two lines of symmetry?



A. b, c, f **B.** a, b, f **C.** c, d, e, f **D.** c, e, f

4. What information do you need to construct a regular polygon?

A. all side lengths and all angle measures

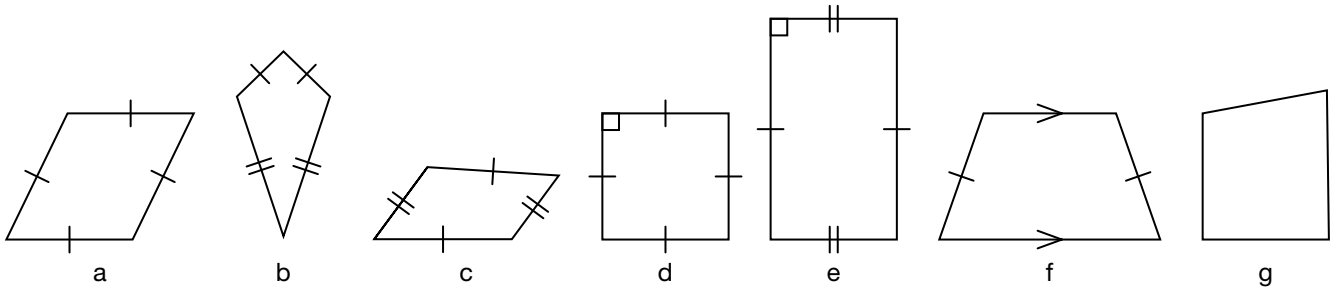
B. one side length and one angle measure

C. two side lengths and one angle measure

D. two side lengths and two angle measures

Test Yourself Page 2

Use the polygons below to answer Questions 5 to 7.



5. Which quadrilaterals have equal diagonals?

A. d, e, f **B.** b, c, g **C.** b, c, f, g **D.** a, d, e

6. Which quadrilaterals have diagonals that do not meet at 90°?

A. a, b, d **B.** a, b, c, d **C.** c, e, g **D.** c, e, f, g

7. Which quadrilaterals have diagonals that are unequal but meet at 90°?

A. b, c, d **B.** c, e **C.** a, b **D.** a, f, g