Classify Two-Dimensional Figures

Name: _____

Prerequisite: Identify Parallel and Perpendicular Lines

Study the example problem that shows how to sort shapes based on parallel and perpendicular sides. Then solve problems 1–6.

Example

Mark each shape that appears to have at least one pair of parallel sides with the symbol ∥. Mark each shape that appears to have at least one pair of perpendicular sides with the symbol ⊥ .

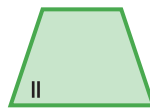Parallel sides are always the same distance apart and will never cross. Perpendicular sides form a right angle (90°).

triangle	rectangle ∥ ⊥	parallelogram ∥	trapezoid ∥	right triangle ⊥

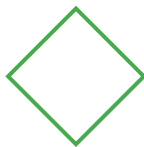**1** Look at the shapes in the example. Write the name of the shapes that belong in each group shown in the table below.

parallel sides only	perpendicular sides only	parallel and perpendicular sides

2 Which group from problem 1 does each shape shown below belong in?
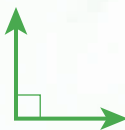
_____ _____

_____ _____

3 Draw a shape that does not belong to any of the groups in problem 1.

Solve.

A right angle is an angle that looks like a square corner and measures 90°.
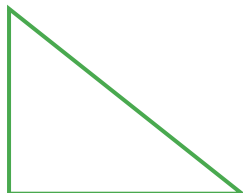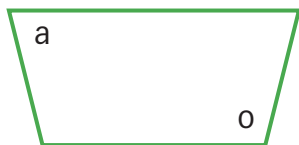
An acute angle has a smaller opening than a right angle.

An obtuse angle has a wider opening than a right angle but is not a straight line.

4 Finish marking each angle in these shapes: "a" for acute, "r" for right, and "o" for obtuse.

a

o

5 Write the name of each shape from problem 4 that belongs in each group shown in the table below.

acute and right angles	acute and obtuse angles

6 Where does each shape belong in the Venn diagram below? Write the letter of the shape in the section that it belongs in.

acute angle

right angle

parallel sides

A

B

C

D

Name: _____
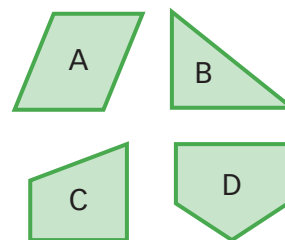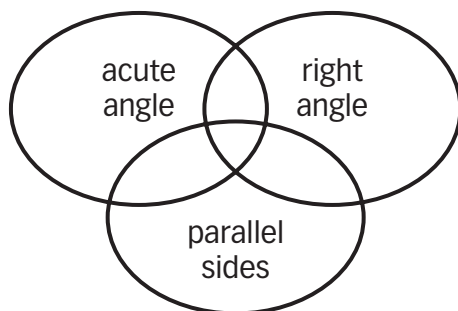
Order Shapes in a Hierarchy

Study the example showing how to order shapes in a hierarchy. Then solve problems 1–6.

Example

A hierarchy starts with the most general category and then shows how more specific groups are related. Draw a tree diagram relating the shapes in the table.

Shape	Description
plane figure	a two-dimensional shape
polygon	a closed plane figure with straight sides
triangle	a polygon with 3 sides
quadrilateral	a polygon with 4 sides
pentagon	a polygon with 5 sides

Polygons have all the properties that plane figures have. Polygons also have properties that plane figures don't have. Polygons appear right below plane figures in the hierarchy.

Triangles, quadrilaterals, and pentagons have all the properties that polygons have. They have other properties, too. Because triangles, quadrilaterals, and pentagons have different properties from each other, they appear side-by-side.

Tree Diagram

Plane Figures

Polygons

Triangles | Quadrilaterals | Pentagons
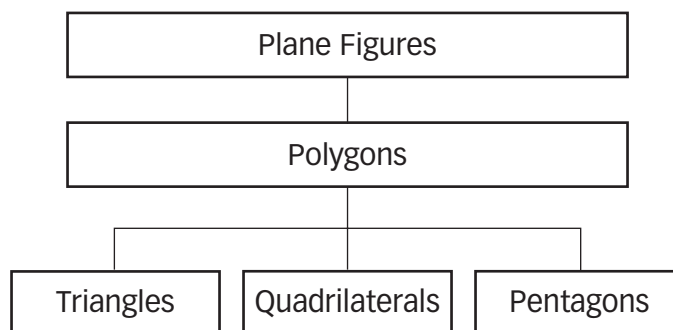
1 Fill in the blanks.
Triangles are both _____ and _____ .

2 A circle is a plane figure. It does not have straight sides, so it is not a polygon. Where in the hierarchy should "Circles" go? Explain.

_____

_____

_____

_____

_____

Vocabulary

hierarchy a ranking of categories based on properties.

Solve.

**3** Mark an X in the column if the shape always has that property.

| Shape	4 sides	2 pairs of parallel sides	4 right angles
parallelogram			
rectangle			
quadrilateral			

4 Use the table in problem 3 to make a flow chart that shows the relationship between the three shapes. Order the shapes from general to specific going from left to right.
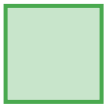
☐ ⟶ ☐ ⟶ ☐

5 Where would you include squares in the flow chart in problem 4? Explain.

_____

_____

_____

6 Fill in the Venn diagram that shows the relationship between rectangles, squares, and rhombuses. Explain what the diagram shows about squares.
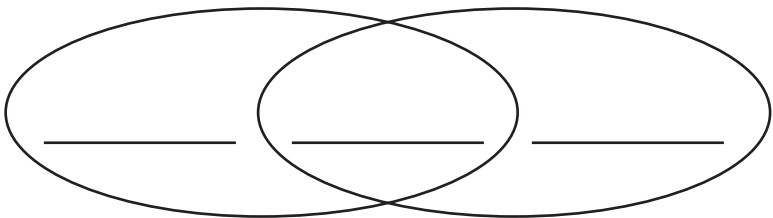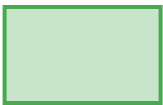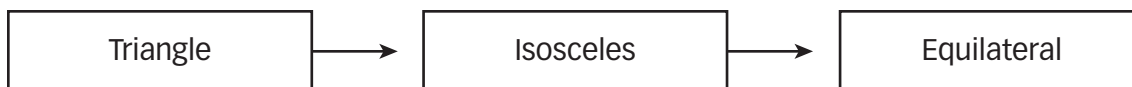
rectangle

square

rhombus

_____

_____

_____

_____

Name: _____

Classify Two-Dimensional Figures

Solve the problems.

1 Look at the flow chart below.

Triangle	→	Isosceles	→	Equilateral

Which statement is true? Circle the letter of all that apply.

A Equilateral triangles can be classified as isosceles triangles.

B Isosceles triangles have all the properties that equilateral triangles have.

C Isosceles triangles can be classified as equilateral triangles.

D Equilateral triangles have all the properties that isosceles triangles have.

Which is the most general category? The most specific?

2 Create a Venn diagram to show the hierarchy of triangles, quadrilaterals, isosceles triangles, and polygons.

In a Venn diagram, categories with nothing in common do not overlap.

3 Use the diagram in problem 2. Write two different statements that describe the relationships between the shapes.
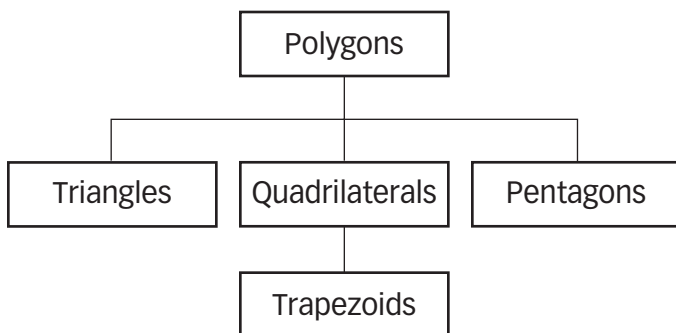
Which shapes share properties?

Solution: _____

_____

_____

_____

Solve.

4 Look at the tree diagram below.

```
                    ┌──────────────┐
                    │   Polygons   │
                    └──────────────┘
        ┌───────────────┬───────────────┐
   ┌─────────┐   ┌──────────────┐   ┌──────────┐
   │ Triangles │ │ Quadrilaterals │ │ Pentagons │
   └─────────┘   └──────────────┘   └──────────┘
                        │
                ┌──────────────┐
                │  Trapezoids  │
                └──────────────┘
```

Which statement is true? Circle the letter of the correct answer.

A All polygons are triangles, quadrilaterals, and pentagons.

B All quadrilaterals are trapezoids.

C All triangles and quadrilaterals are polygons.

D Triangles, quadrilaterals, and pentagons all have the same properties.

Dina chose **B** as the correct answer. How did she get that answer?

_____

_____

5 Chen wrote some names that can be used to classify this shape in order from LEAST specific to MOST specific.

quadrilateral, parallelogram, square, rhombus

Do you agree with what he did? Explain.

Solution: _____

_____

_____

_____