1

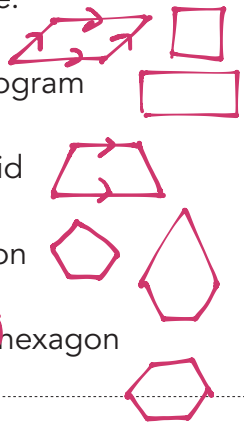
Patty Paper, Patty Paper

Introduction to Congruent Figures

WARM UP

Draw an example of each shape.

1. parallelogram
2. trapezoid
3. pentagon
4. regular hexagon



LEARNING GOALS

- Define congruent figures.
- Use patty paper to verify experimentally that two figures are congruent by obtaining the second figure from the first using a sequence of slides, flips, and/or turns.
- Use patty paper to determine if two figures are congruent.

KEY TERMS

- congruent figures
- corresponding sides
- corresponding angles

You have studied figures that have the same shape or measure. How do you determine if two figures have the same size and the same shape?

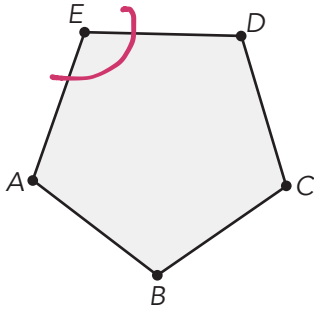
It's Transparent!

Let's use patty paper to investigate the figure shown.

Patty paper is great paper to investigate geometric properties. You can write on it, trace with it, and see creases when you fold it.

1. List everything you know about the shape.

- regular pentagon?
- 5 vertices
  vertex
- 5 obtuse angles



2. Use patty paper to compare the sizes of the sides and angles in the figure.

a. What do you notice about the side lengths?

They have the same length.

b. What do you notice about the angle measures?

They are the same.

c. What can you say about the figure based on this investigation?

It is a regular pentagon

"Patty paper was originally created for separating patties of meat! Little did the inventors know that it could also serve as a powerful geometric tool."

Trace the polygon onto a sheet of patty paper.

3. Use five folds of your patty paper to determine the center of each side of the shape. What do you notice about where the folds intersect?

ACTIVITY
1.1 Analyzing Size and Shape

Cut out each of the figures provided at the end of the lesson.

1. **Sort the figures into at least two categories. Provide a rationale for your classification. List your categories and the letters of the figures that belong in each category.**

Group 1

D, H, E, B, J, F, A

2 pairs of parallel lines

Group 2

L, K, I, C, G

3 pairs of parallel lines

2. **List the figures that are the same shape as Figure A. How do you know they are the same shape?**

B, J, H, E, F, D

3. **List the figures that are both the same shape and the same size as Figure A. How do you know they are the same shape and same size?**

E, H, J, F

Figures that have the same size and shape are **congruent figures**. If two figures are congruent, all *corresponding sides* and all *corresponding angles* have the same measure.

4. **List the figures that are congruent to Figure C.**

G, L

Figures with the same shape but not necessarily the same size are *similar figures*, which you will study in later lessons.

Corresponding sides are sides that have the same relative position in geometric figures.

Corresponding angles are angles that have the same relative position in geometric figures.

ACTIVITY
1.2 Congruent or Not?

"A *conjecture* is a hypothesis or educated guess that is consistent with what you know but hasn't yet been verified.

Persevering through multiple conjectures and investigations is an important part of learning in mathematics."

Throughout the study of geometry, as you reason about relationships, study how figures change under specific conditions, and generalize patterns, you will engage in the geometric process of

- making a conjecture about what you think is true,
- investigating to confirm or refute your conjecture, and
- justifying the geometric idea.

In many cases, you will need to make and investigate conjectures a few times before reaching a true result that can be justified.

Let's use this process to investigate congruent figures.

If two figures are congruent, you can slide, flip, and spin one figure until it lies on the other figure.

1. Consider the flowers shown following the table. For each flower, make a conjecture about which are congruent to the original flower, which is shaded in the center. Then, use patty paper to investigate your conjecture. Finally, justify your conjecture by stating how you can move from the shaded flower to each congruent flower by sliding, flipping, or spinning the original flower.

Flower	Congruent to original flower?	How Do You Move the Original Flower onto the Congruent Flower?
A	No	
B	Yes	Slide up.
C	No	
D	Yes	Slide left, flip
E	Yes	Slide right, turn/spin
F	Yes	Slide down, left, spin
G	No	
H	Yes	Slide down, right, flip

A	B	C
D	ORIGINAL	E
F	G	H

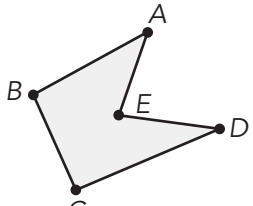
NOTES

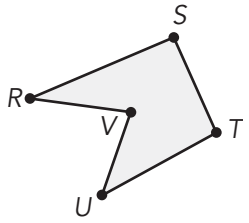
TALK the TALK

The Core of Congruent Figures

Recall that if two figures are congruent, all corresponding sides and all corresponding angles have the same measure.

1. **Use patty paper to determine which sides of the congruent figures are corresponding and which angles are corresponding.**





$\overline{AB}$ & $\overline{UT}$ $\overline{DE}$ & $\overline{RV}$ $\angle A$ & $\angle U$ $\angle E$ & $\angle V$

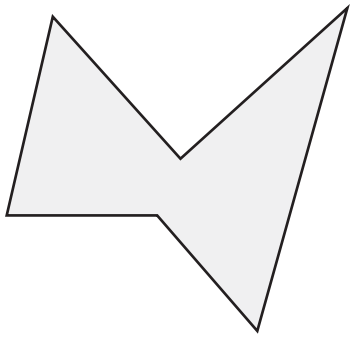
$\overline{BC}$ & $\overline{TS}$ $\overline{EA}$ & $\overline{VU}$ $\angle B$ & $\angle T$ $\angle D$ & $\angle R$

$\overline{CD}$ & $\overline{SR}$ $\angle C$ & $\angle S$

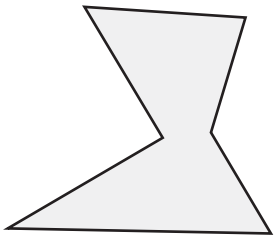
2. **How can you slide, flip, or spin the figure on the left to obtain the figure on the right?**

Slide and turn

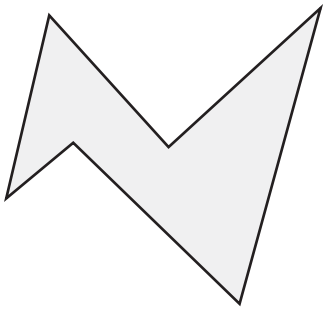
A



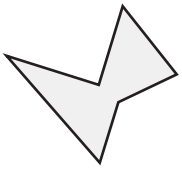
B



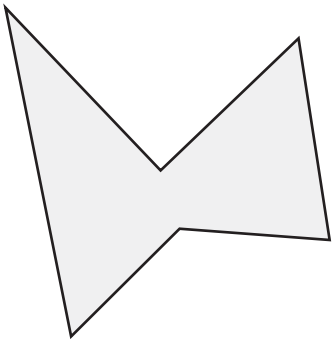
C



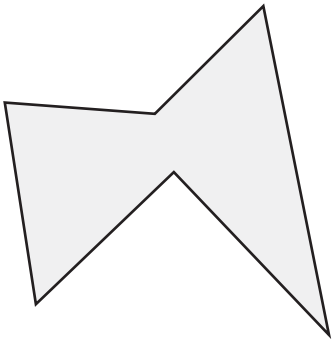
D



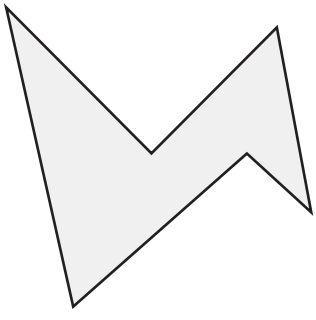
E



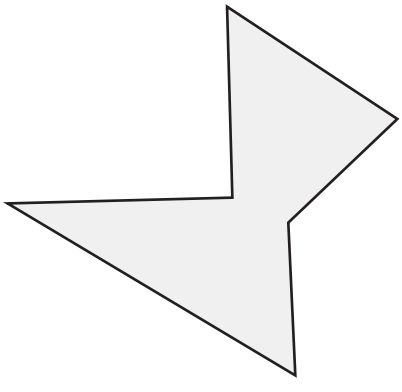
F



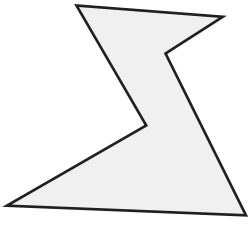
G



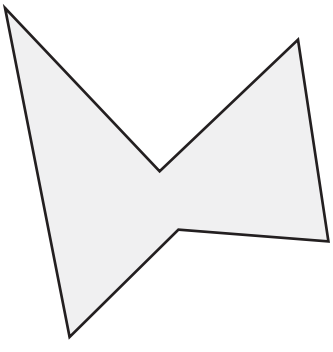
H



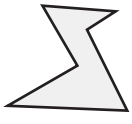
I



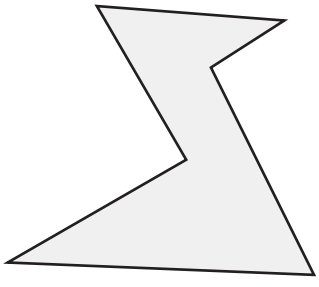
J



K



L



Assignment

Name Per

Write

Explain what a conjecture is and how it is used in math.

Remember

If two figures are congruent, all corresponding sides and all corresponding angles have the same measure.

Practice

1. Determine which figures are congruent to Figure *A*. Follow the steps given as you investigate each shape.

- Make a conjecture about which figures are congruent to Figure *A*.
- Use patty paper to investigate your conjecture.
- Justify your conjecture by stating how you can move from Figure *A* to each congruent figure by sliding, flipping, or spinning Figure *A*.

Figure *A*

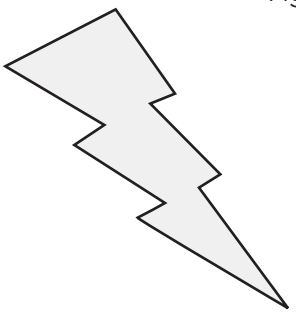


Figure *B*

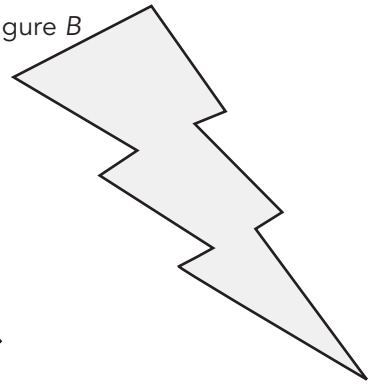


Figure *C*

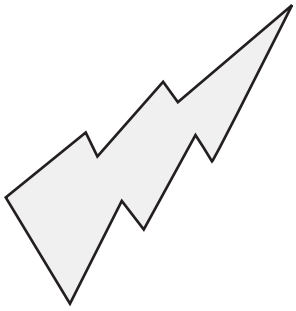


Figure *D*

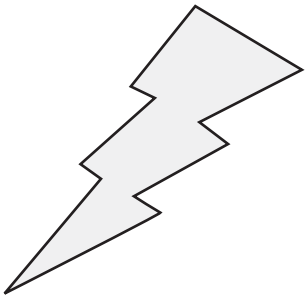


Figure *E*

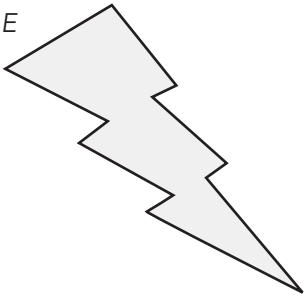
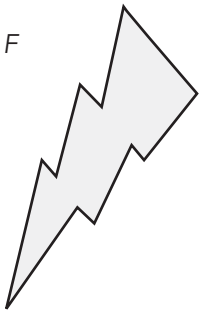
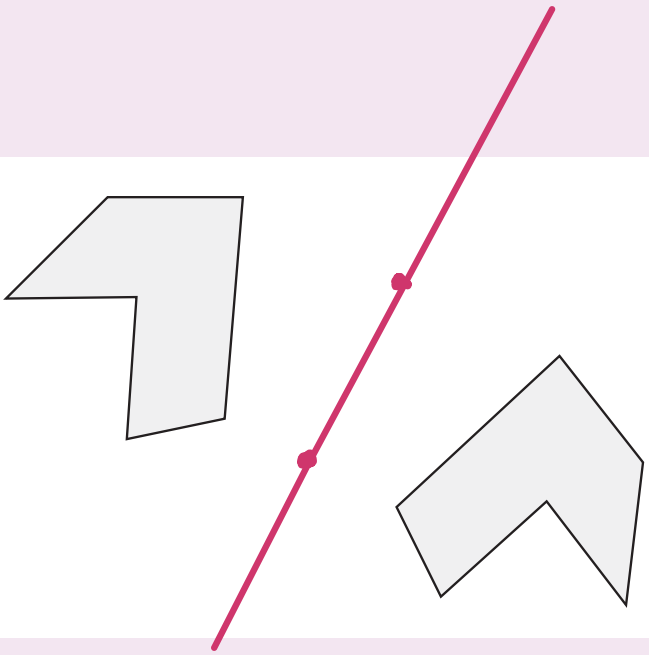


Figure *F*



Stretch

The figure on the left was reflected, or flipped, over a *line of reflection* to create the figure on the right. Determine the location of the line of reflection.



Review

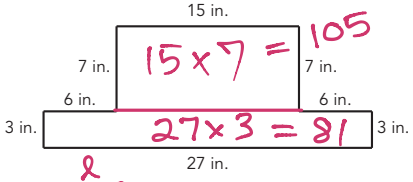
1. Determine each sum or difference.

   a. $-14 + 25 = 11$

   b. $-14 - 25 = -39$

2. Calculate the area of each figure.

   a.



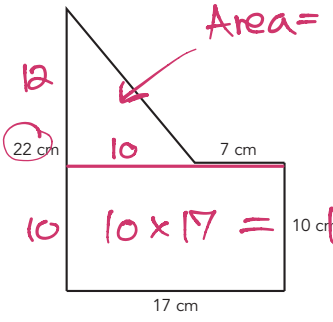
15 × 7 = 105

27 × 3 = 81

l × w = Area

105 + 81 = 186 in²

   b.



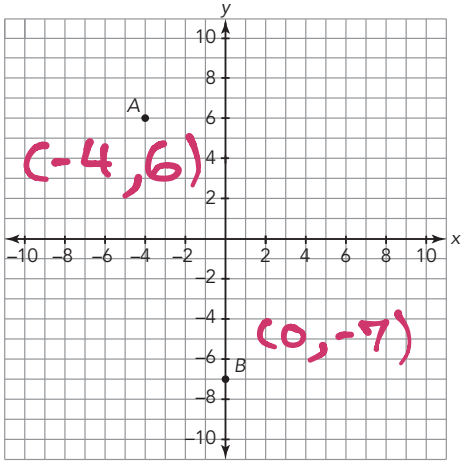
Area = $\frac{b \times h}{2} = \frac{10 \times 12}{2}$

$= 60 +$

10 × 17 = 170

230 cm²

3. Write the ordered pair for each point plotted on the coordinate plane.



(−4, 6)

(0, −7)

(x, y)