IM 6–8 MATH™ v.III

Unit 1
Scale Drawings

7

Lesson 4

Scaled Relationships

Illustrative Mathematics®

Kendall Hunt

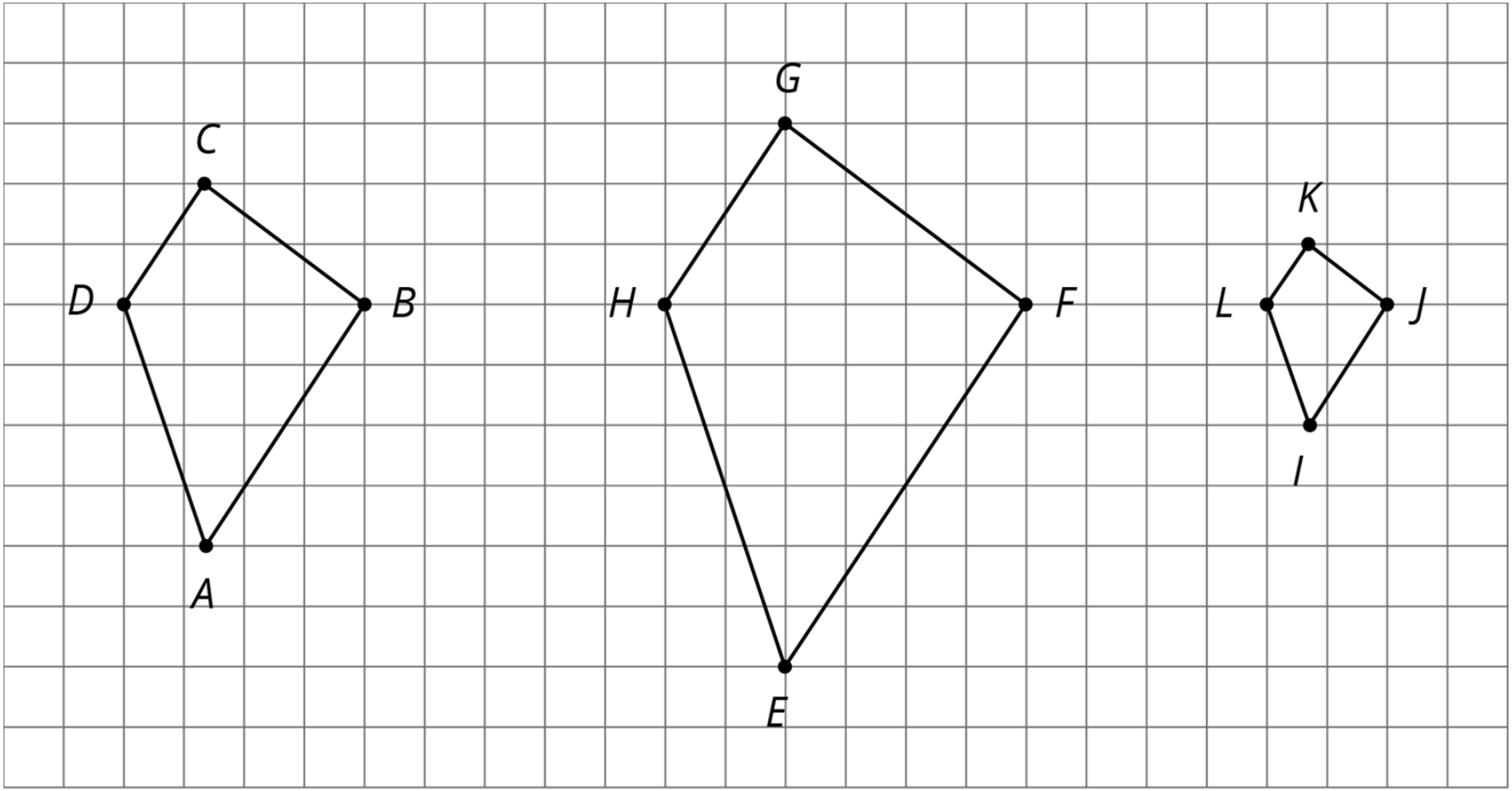
Learning Goal

Let's find relationships between scaled copies.

Three Quadrilaterals (Part 1)

Warm-up: Notice and Wonder

Each of these polygons is a scaled copy of the others.



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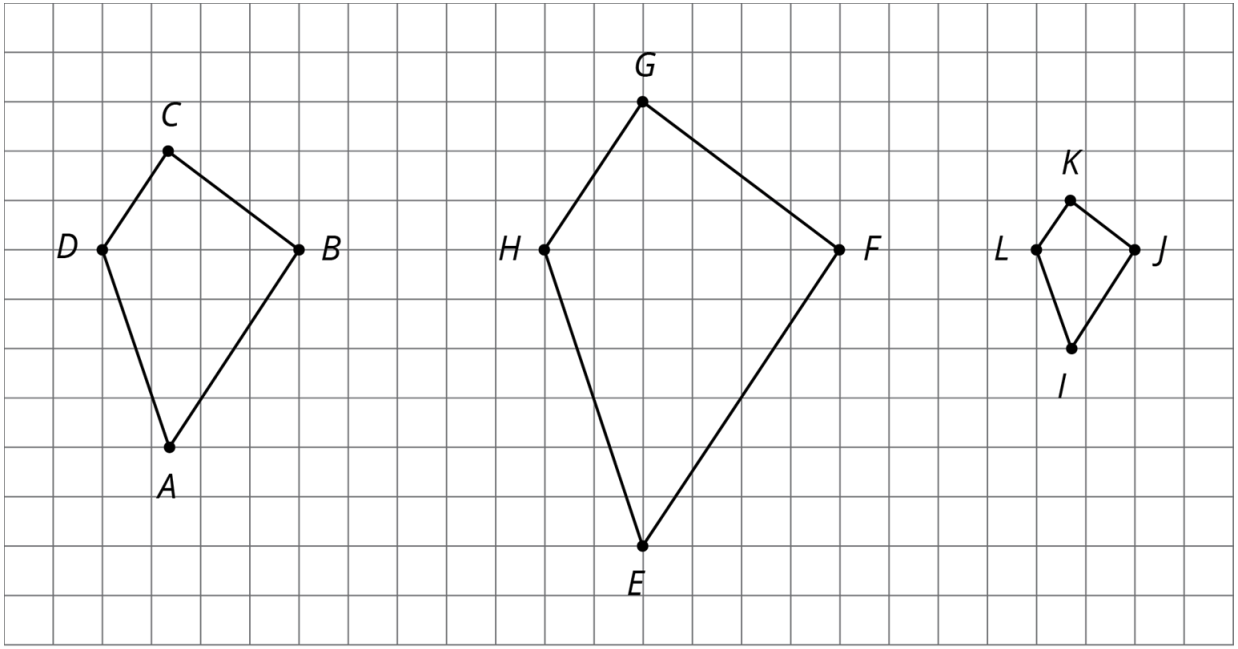
Three Quadrilaterals (Part 1)

Warm-up



1. Name two pairs of corresponding angles. What can you say about the sizes of these angles?
2. Check your prediction by measuring at least one pair of corresponding angles using a protractor. Record your measurements to the nearest 5°.

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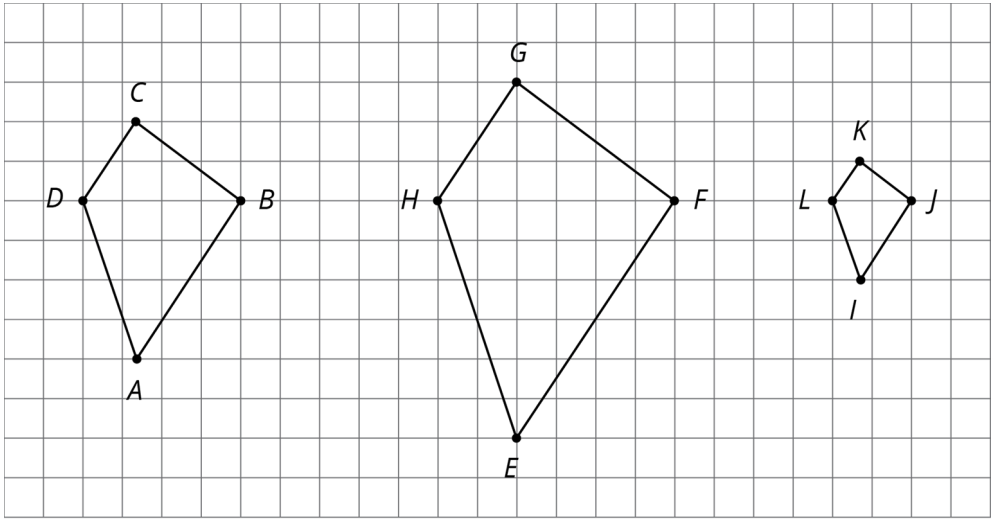
Three Quadrilaterals (Part 2)

Each of these polygons is a scaled copy of the others. You already checked their corresponding angles.



1. The side lengths of the polygons are hard to tell from the grid, but there are other corresponding distances that are easier to compare. Identify the distances in the other two polygons that correspond to *DB* and *AC*, and record them in the table.

quadrilateral	distance that corresponds to DB	distance that corresponds to AC
$ABCD$	$DB = 4$	$AC = 6$
$EFGH$		
$IJKL$		

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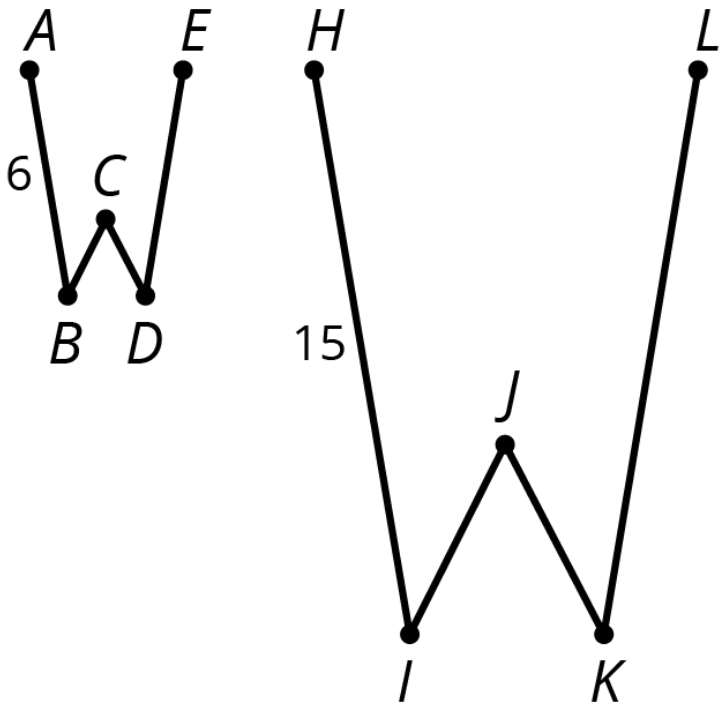
2. Look at the values in the table. What do you notice? Pause here so your teacher can review your work.

3. The larger figure is a scaled copy of the smaller figure.

   a. If $AE = 4$, how long is the corresponding distance in the second figure? Explain or show your reasoning.

   b. If $IK = 5$, how long is the corresponding distance in the first figure? Explain or show your reasoning.



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Three Quadrilaterals (Part 2)

quadrilateral	distance that corresponds to DB	distance that corresponds to AC
$ABCD$	$DB = 4$	$AC = 6$
$EFGH$	$HF = 6$	$EG = 9$
$IJKL$	$LJ = 2$	$IK = 3$

- How does the vertical distance in *ABCD* compare to that in *EFGH*? How do the horizontal distances in the two polygons compare? Do the pairs of vertical and horizontal distances share the same scale factor?
- How do the vertical distances in *EFGH* and *IJKL* compare? What about the horizontal distances?
  Is there a common scale factor? What is that scale factor?
- What scale factor relates the corresponding lengths and distances in the two drawings of the letter W?

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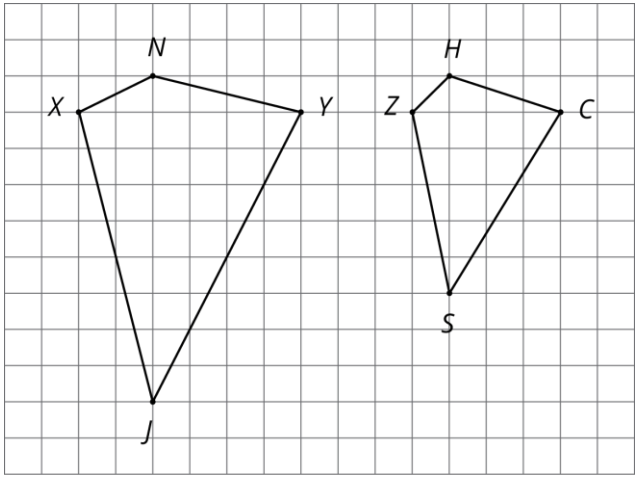
Scaled or Not Scaled?

Here are two quadrilaterals.



1. Mai says that Polygon *ZSCH* is a scaled copy of Polygon *XJYN*, but Noah disagrees. Do you agree with either of them? Explain or show your reasoning.
2. Record the corresponding distances in the table. What do you notice?

quadrilateral	horizontal distance	vertical distance
$XJYN$	$XY =$	$JN =$
$ZSCH$	$ZC =$	$SH =$

3. Measure at least three pairs of corresponding angles in *XJYN* and *ZSCH* using a protractor. Record your measurements to the nearest 5°. What do you notice?
4. Do these results change your answer to the first question? Explain.

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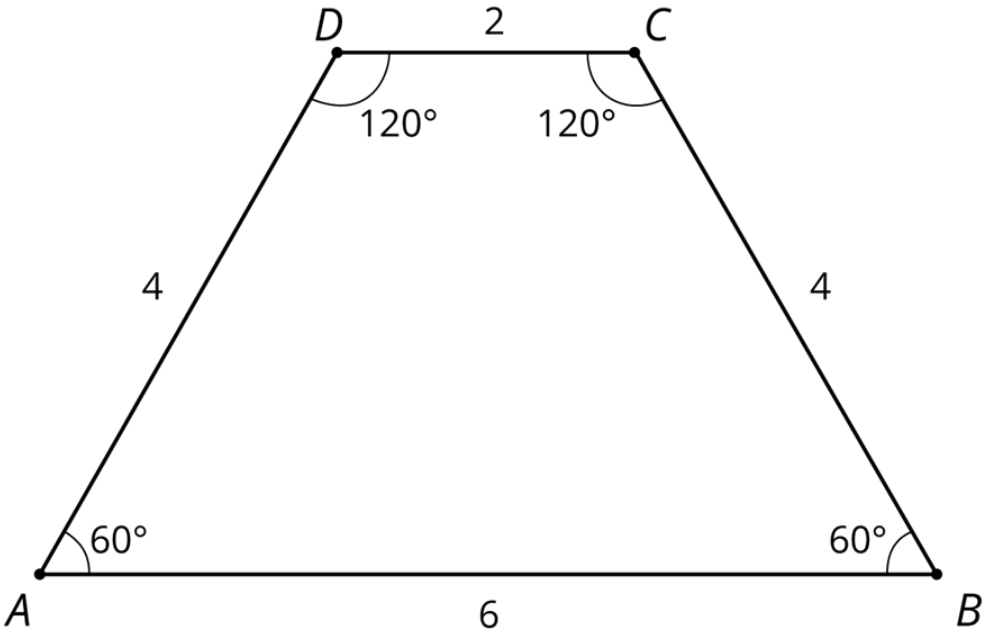
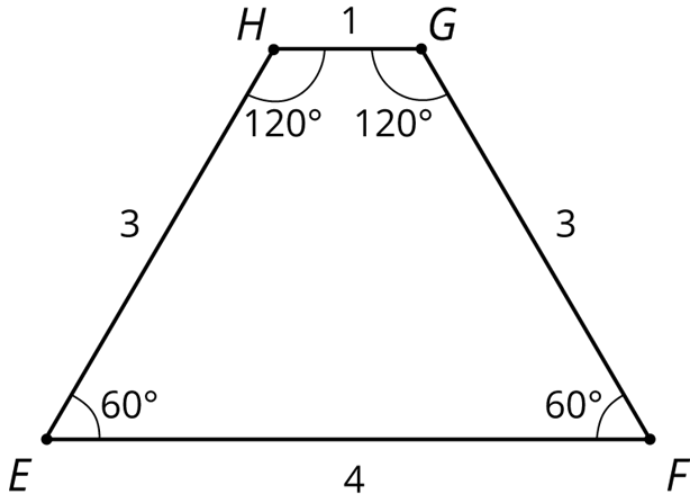
5. Here are two more quadrilaterals.

   Kiran says that Polygon *EFGH* is a scaled copy of *ABCD*, but Lin disagrees. Do you agree with either of them? Explain or show your reasoning.





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Comparing Pictures of Birds

Here are two pictures of a bird. Find evidence that one picture is *not* a scaled copy of the other.
Be prepared to explain your reasoning.

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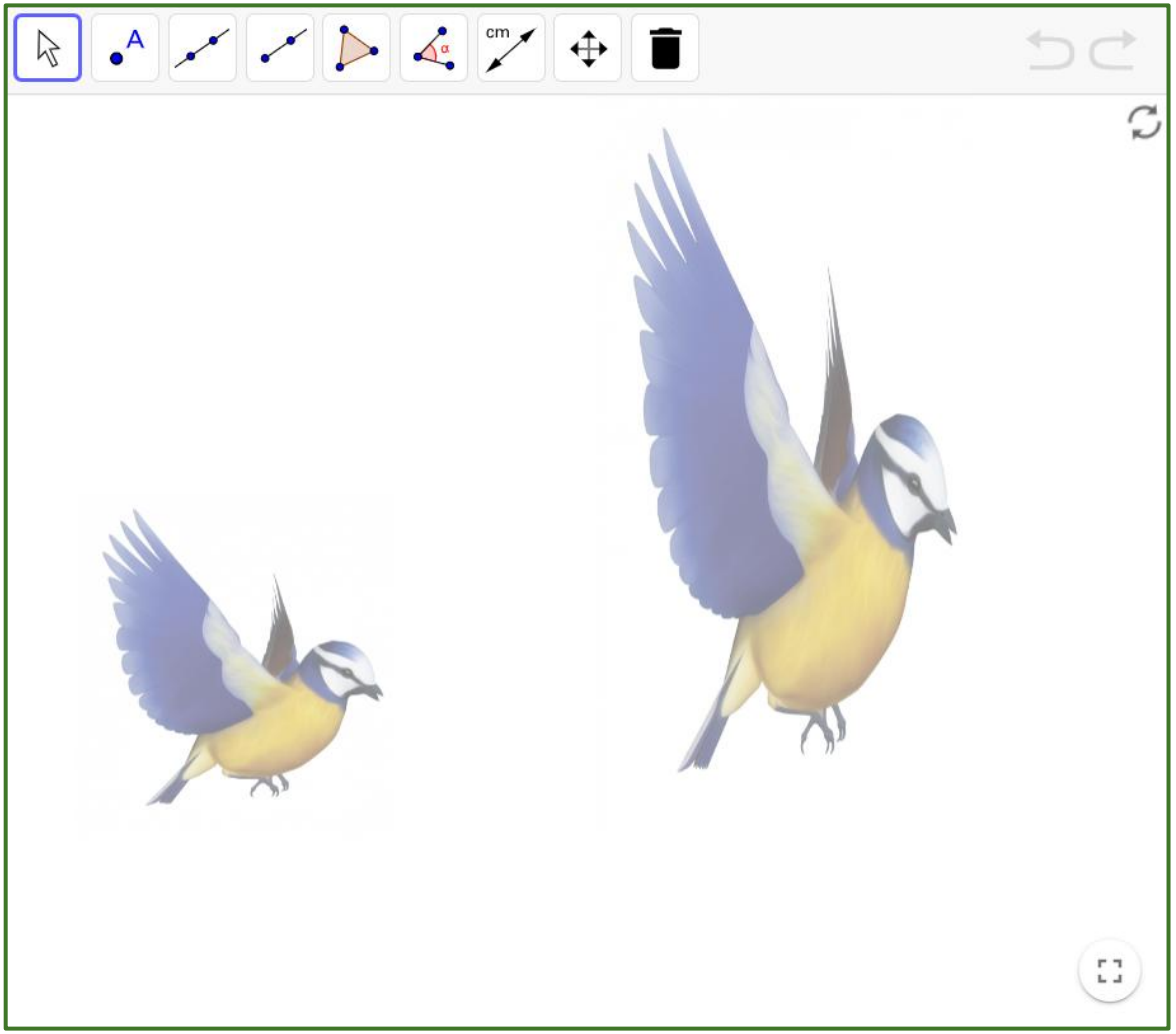
Comparing Pictures of Birds



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Lesson Synthesis

- Does a scale factor affect any other measurements other than segment lengths?
- How can we be sure that a figure is a scaled copy? What features do we check?

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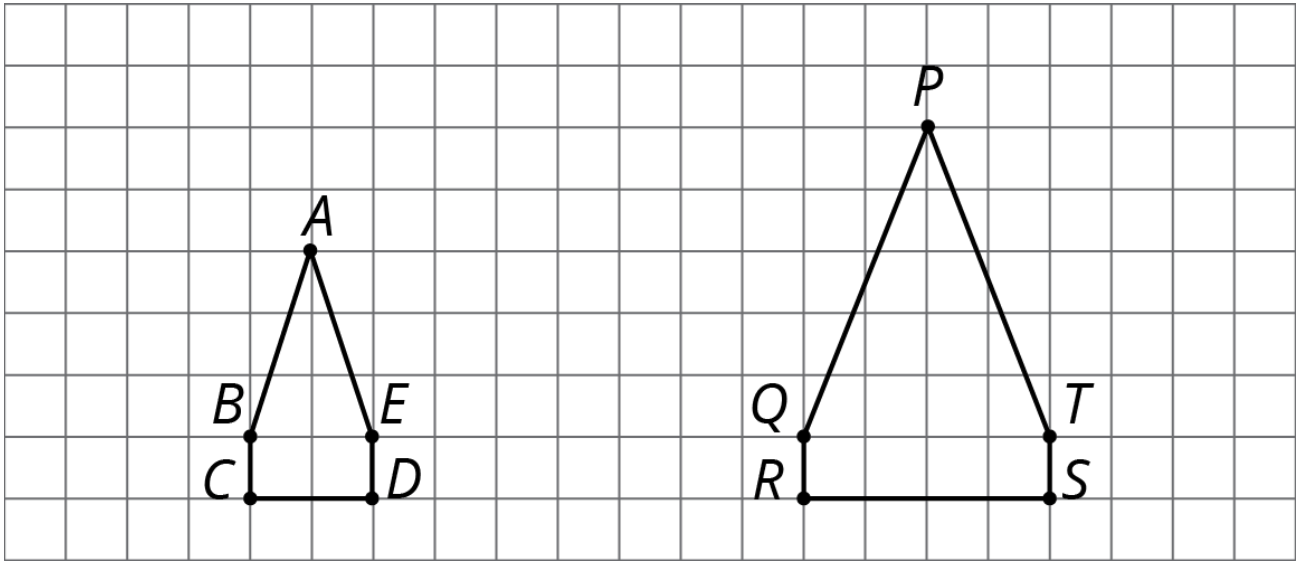
Learning Targets

- I can use corresponding distances and corresponding angles to tell whether one figure is a scaled copy of another.
- When I see a figure and its scaled copy, I can explain what is true about corresponding angles.
- When I see a figure and its scaled copy, I can explain what is true about corresponding distances.

Corresponding Polygons

Cool-down

Here are two polygons on a grid.



Is *PQRST* a scaled copy of *ABCDE*? Explain your reasoning.

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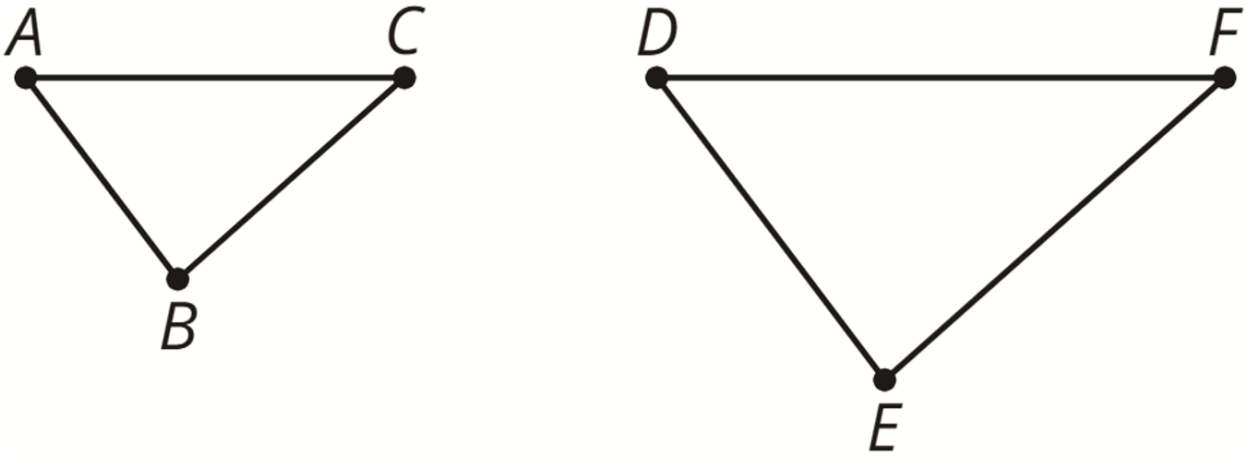
corresponding

When part of an original figure matches up with part of a copy, we call them corresponding parts. These could be points, segments, angles, or distances.

For example, point *B* in the first triangle corresponds to point *E* in the second triangle. Segment *AC* corresponds to segment *DF*.



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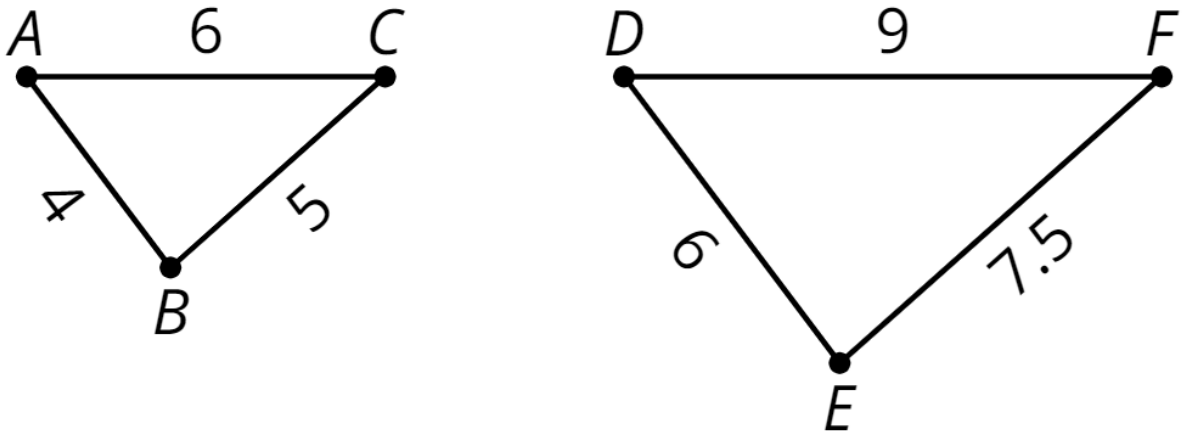
scale factor

To create a scaled copy, we multiply all the lengths in the original figure by the same number. This number is called the scale factor.

In this example, the scale factor is 1.5, because 4 • (1.5) = 6, 5 • (1.5) = 7.5 and 6 • (1.5) = 9.



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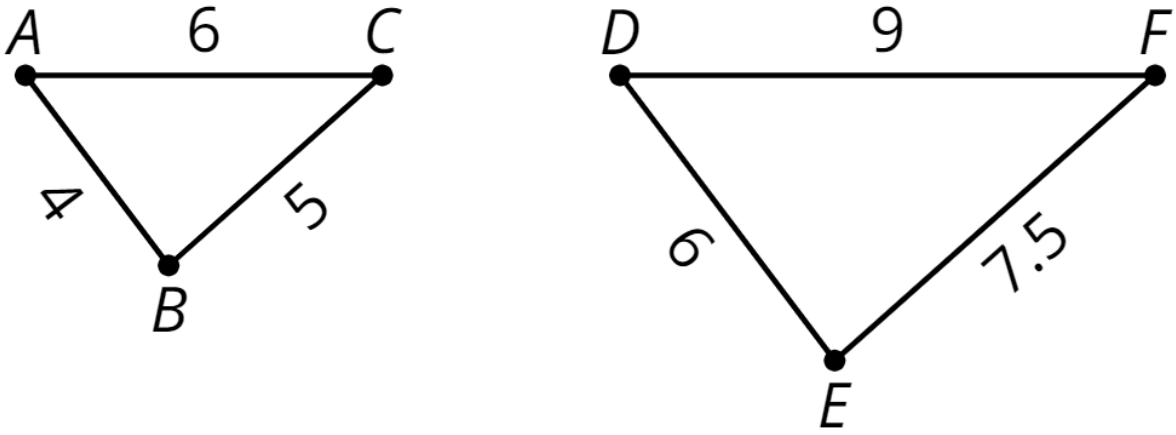
scaled copy

A scaled copy is a copy of an figure where every length in the original figure is multiplied by the same number.

For example, triangle *DEF* is a scaled copy of triangle *ABC*. Each side length on triangle *ABC* was multiplied by 1.5 to get the corresponding side length on triangle *DEF*.



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