

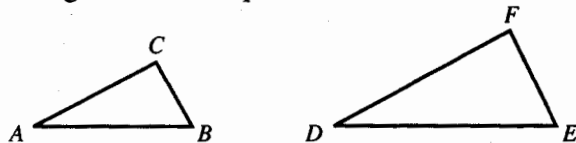
Similar Triangles

Objective: To solve problems involving similar triangles.

Vocabulary

Similar figures Two figures with the same shape are called similar.

Similar triangles Two triangles are similar when the measures of two angles of one triangle equal the measures of two angles of the other triangle. The triangles shown below are similar. Notice that the measures of the third set of angles are also equal.



$$\angle A = \angle D, \angle B = \angle E, \angle C = \angle F.$$

Corresponding angles Angles with equal measures in similar triangles.

Corresponding sides The sides opposite corresponding angles in similar triangles. It is a geometric fact that the lengths of corresponding sides of similar triangles are proportional. For the triangles shown above:

$$\frac{AB}{DE} = \frac{BC}{EF} = \frac{CA}{FD}$$

In Exercise 1, refer to the diagram shown above in the Vocabulary section.

1. In $\triangle ABC$, $\angle A = 60^\circ$ and $\angle B = 65^\circ$.
In $\triangle DEF$, $\angle E = 60^\circ$ and $\angle F = 65^\circ$.
 - a. Write the corresponding angles.
 - b. Write the corresponding sides.
 - c. Complete: $\triangle ABC \sim \triangle \underline{\quad ? \quad}$.
2. In $\triangle JKL$ and $\triangle GHI$, $\angle J = \angle G = 50^\circ$, and $\angle K = \angle H = 75^\circ$.
Write three equal ratios.

Example 1 In the diagram $\triangle ABC \sim \triangle DEF$.
Find AB and AC .

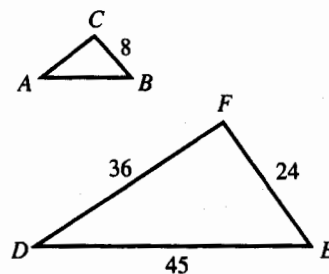
Solution Corresponding sides are proportional:

$$\frac{AB}{DE} = \frac{BC}{EF} \quad \frac{AC}{DF} = \frac{BC}{EF}$$

$$\frac{AB}{45} = \frac{8}{24} \quad \frac{AC}{36} = \frac{8}{24}$$

$$24(AB) = 360 \quad 24(AC) = 288$$

$$AB = 15 \quad AC = 12$$



Similar Triangles (continued)

Example 2 In the diagram, $\triangle ABC \sim \triangle AEF$.
Find EF and AF .

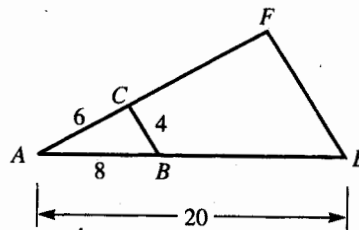
Solution Corresponding sides are proportional:

$$\frac{BC}{EF} = \frac{AB}{AE} \qquad \frac{AC}{AF} = \frac{AB}{AE}$$

$$\frac{4}{EF} = \frac{8}{20} \qquad \frac{6}{AF} = \frac{8}{20}$$

$$8(EF) = 80 \qquad 8(AF) = 120$$

$$EF = 10 \qquad AF = 15$$

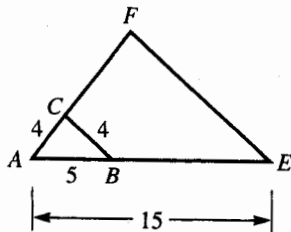


In Exercises 3–8, $\triangle ABC \sim \triangle DEF$. Find the lengths of the sides not given.

3. $AB = 5, BC = 3, AC = 4, DE = 10, EF = \underline{\quad?}, DF = \underline{\quad?}$.
4. $ED = 8, EF = 6, DF = 4, AC = 6, AB = \underline{\quad?}, BC = \underline{\quad?}$.
5. $AB = 18, BC = 21, AC = 24, DE = 12, EF = \underline{\quad?}, FD = \underline{\quad?}$.
6. $DE = 6, EF = 15, DF = 18, AC = 27, AB = \underline{\quad?}, BC = \underline{\quad?}$.
7. $AB = 20, BC = 25, CA = 30, EF = 15, FD = \underline{\quad?}, DE = \underline{\quad?}$.
8. $ED = 7, EF = 6, FD = 4, CA = 12, BA = \underline{\quad?}, BC = \underline{\quad?}$.

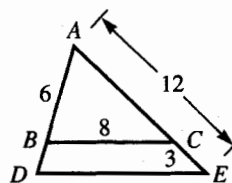
In the diagram, $\triangle ABC \sim \triangle AEF$.

9. Find EF .
10. Find AF .



In the diagram, $\triangle ABC \sim \triangle ADE$.

11. Find DE .
12. Find AC .



In the diagram, $\triangle ABC \sim \triangle EBD$.

13. Find BE
14. Find BD .

