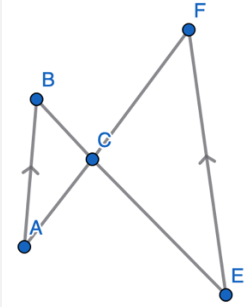


Check Your Understanding 6.4

Show all work. Before applying any property of similar triangles, first justify that the triangles are similar.

Basic	Intermediate	Advanced
Row 1 Spiral — Proportional Reasoning and Scale → The engine behind similarity		
<i>Basic — Spiral</i> 1. Two similar triangles have corresponding sides in the ratio 3:5. If the smaller triangle has a side of length 12, what is the corresponding side of the larger?	<i>Intermediate — Spiral</i> 2. Triangle A has vertices (1, 2), (5, 3), (3, 7). Triangle B has vertices (2, 1), (10, 3), (6, 11). Use the distance formula to determine whether the triangles are similar. Show all work.	<i>Advanced — Spiral</i> 3. A student measures corresponding sides of two figures and finds ratios of 2.0, 2.0, and 2.1. They conclude the figures are not similar because the ratios are not all exactly equal. Evaluate this conclusion. What should the student consider?
Row 2 Spiral — Dilation and Similarity Defined → From experience to definition		
<i>Basic — Spiral</i> 4. A triangle is dilated by scale factor 4 from the origin. The original has vertices A(1, 2), B(3, 2), C(2, 5). Find the image vertices.	<i>Intermediate — Spiral</i> 5. $\triangle ABC \sim \triangle DEF$ with scale factor 2:3 (ABC to DEF). $\angle A = 72^\circ$, $AB = 10$, $AC = 8$. (a) Find DE and DF. (b) Find $\angle D$. (c) A student writes $\triangle DEF \sim \triangle CAB$. Is this a valid similarity statement? Explain.	<i>Advanced — Spiral</i> 6. Explain why any two circles must be similar. Reference the definition of dilation in your argument.
Row 3 Spiral — Triangle Similarity Shortcuts → Proving similarity		
<i>Basic — Spiral</i> 7. For each pair, identify the similarity shortcut or state that no shortcut applies. (a) Two triangles: $\angle B = \angle E = 63^\circ$, $\angle C = \angle F = 47^\circ$. (b) Two triangles: $AB/DE = BC/EF = AC/DF = 5/8$. (c) Two triangles: two sides in ratio 3:4, included angle equal.	<i>Intermediate — Spiral</i> 8. In the figure, $\triangle ABC \sim \triangle FCE$.  (a) What shortcut justifies the similarity? Name every pair of	<i>Advanced — Spiral</i> 9. In $\triangle ABC$, DE is drawn parallel to BC where D is on AB and E is on AC. Prove that $AE/AC = DE/BC$. State the similarity shortcut you use and justify why it applies. Write a complete paragraph or flowchart proof.

Basic	Intermediate	Advanced
	<i>equal angles and state why each is equal.</i> <i>(b) If $AB = 9$, $BC = 12$, and $CE = 8$, find CF.</i>	
Indirect Measurement → Applying similarity		
<i>Basic</i> 10. A 4-foot stick casts a 2-foot shadow. At the same time, a tree casts a 10-foot shadow. How tall is the tree? Show your proportion and justify why this method works. 11. State the two assumptions required for the shadow method to produce similar triangles.	<i>Intermediate</i> 12. Describe how you could use a mirror to measure the height of a flagpole. Justify why the method works — what makes the triangles similar? Make up realistic measurements and solve for the flagpole height.	<i>Advanced</i> 13. A surveyor wants to measure the width of a river without crossing it. Describe a method using similar triangles, including a diagram. Explain precisely why your triangles are similar (cite the shortcut and all conditions). Make up measurements and solve.
Algebra Spiral Solve equations	<i>Algebra Spiral</i> Solve each equation. Show all steps. (a) $7x - 4 = 3x + 16$ (b) $2(5y - 3) = 4y + 18$ (c) $(2/5)n + 3 = (1/10)n - 1$	

Answers — CYU 6.4**Row 1 Spiral**

1. $12 \times (5/3) = 20$.
2. $AB = \sqrt{17}$, $BC = \sqrt{20}$, $AC = \sqrt{29}$. $DE = 2\sqrt{17}$, $EF = 2\sqrt{20}$, $DF = 2\sqrt{29}$. All ratios = 2. Similar by SSS~.
3. Measurement error. In the real world, instruments have limited precision. A ratio of 2.1 vs 2.0 may reflect measurement error rather than actual non-similarity. The student should consider instrument precision and whether the discrepancy is within an acceptable margin.

Row 2 Spiral

4. $A'(4,8)$, $B'(12,8)$, $C'(8,20)$.
- 5a. $DE = 10 \times (3/2) = 15$. $DF = 8 \times (3/2) = 12$.
- 5b. $\angle D = \angle A = 72^\circ$ (angles preserved under dilation).
- 5c. No — C corresponds to D, A to E, B to F, so the correct statement is $\triangle CAB \sim \triangle DEF$, not $\triangle DEF \sim \triangle CAB$. The order of vertices encodes correspondence.
6. Given any two circles with centers O_1 and O_2 and radii r_1 and r_2 : translate O_1 to O_2 , then dilate from O_2 with scale factor r_2/r_1 . This maps circle 1 exactly onto circle 2. Since a dilation (and translation) exists mapping one to the other, they are similar.

Row 3 Spiral

- 7a. AA.
- 7b. SSS~.
- 7c. SAS~.
- 8a. $\angle B = \angle FCE$ (corresponding angles, parallel lines). $\angle ACB = \angle FCE$ (vertical angles). AA similarity.
- 8b. $AB/CF = BC/CE \rightarrow 9/CF = 12/8 \rightarrow CF = 6$.
9. $DE \parallel BC \rightarrow \angle ADE = \angle ABC$ (corresponding angles). $\angle A = \angle A$ (reflexive). $\triangle ADE \sim \triangle ABC$ (AA). Corresponding sides proportional: $AE/AC = DE/BC$. ■

Indirect Measurement

10. $4/2 = h/10 \rightarrow h = 20$ feet. Both objects and their shadows form similar triangles because the sun's rays are parallel and both objects are perpendicular to the ground.
11. (1) Both objects are perpendicular to the ground. (2) The sun's rays are parallel (i.e., the sun is far enough away that we can treat the rays as parallel).
12. Accept any valid description: place mirror flat on ground, walk back until you can see the top of the flagpole in the mirror. The angle of incidence equals the angle of reflection (law of reflection). The person and flagpole are both perpendicular to the ground. These two angle conditions give AA similarity. Sample: mirror 3m from pole, person 2m from mirror, person's eye height 1.6m $\rightarrow$ flagpole = $1.6 \times (3/2) = 2.4$ m.
13. Accept any valid method (e.g., establish a baseline parallel to the river, walk perpendicular, use vertical angles or alternate interior angles to get AA). Must cite shortcut and justify all conditions. Diagram required.

Algebra Spiral

- (a) $x = 5$
- (b) $y = 4$
- (c) $n = -40/3$