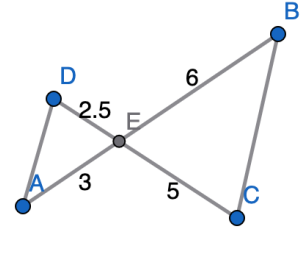
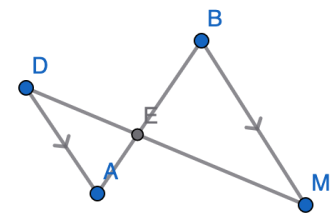
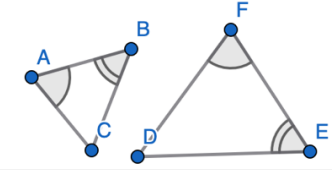
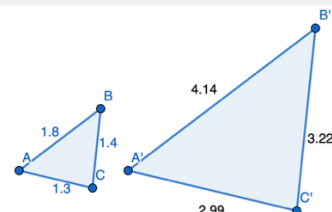
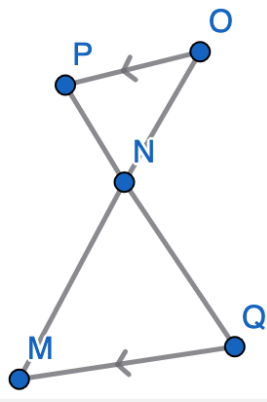


Check Your Understanding 6.3

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. $ABCDE \sim A'B'C'D'E'$. $AB = 6$, $A'B' = 9$, and $DE = 8$. Find $D'E'$.	<i>Intermediate — Spiral</i> 2. The diagram shows two similar figures. The sides of the larger figure are $(2x + 2)$ and 48. The corresponding sides of the smaller figure are $(7x - 9)$ and 60. Set up and solve a proportion to find x . Use both the scale factor and the proportion method and confirm they give the same answer.	<i>Advanced — Spiral</i> 3. A student claims: 'I used the scale factor method and the proportion method on the same problem and got different answers. That means at least one of the methods is wrong.' Evaluate this claim. What does it actually mean if the two methods give different answers?
Row 2 Spiral — Dilation and Similarity Defined → From experience to definition		
<i>Basic — Spiral</i> 4. A dilation maps $\triangle PQR$ to $\triangle P'Q'R'$. P corresponds to P', Q to Q', R to R'. The scale factor is $\frac{3}{4}$. (a) If $PQ = 20$, find $P'Q'$. (b) If $\angle PQR = 47^\circ$, find $\angle P'Q'R'$. (c) Write the similarity statement.	<i>Intermediate — Spiral</i> 5. Triangle ABC has vertices A(2, 4), B(6, 4), C(4, 8). After a dilation, $A' = (1, 2)$. (a) What is the scale factor? What is the center of dilation? (b) Find B' and C'. (c) Is the image larger or smaller? Explain why.	<i>Advanced — Spiral</i> 6. Two triangles have all three corresponding angles equal. A student says they must be congruent. Another says they must be similar but not necessarily congruent. Who is correct? Use the definition of dilation to explain.
Triangle Similarity Shortcuts → Proving similarity		
<i>Basic</i> 7. State the three triangle similarity shortcuts. For each, describe the minimum information needed.	<i>Intermediate</i> 9. Determine if the triangles are similar. If they are, write the similarity statement and state the shortcut.	<i>Advanced</i> 11. In the diagram, $MQ \parallel OP$.

Basic	Intermediate	Advanced
8. For each pair of triangles, determine which shortcut applies (AA, SAS~, SSS~) or state why no shortcut applies. (a) $\triangle ABC$: $\angle A = 40^\circ$, $\angle B = 60^\circ$. $\triangle DEF$: $\angle D = 40^\circ$, $\angle F = 80^\circ$. (b) $\triangle PQR$: $PQ = 6$, $QR = 8$, $PR = 10$. $\triangle XYZ$: $XY = 9$, $YZ = 12$, $XZ = 15$. (c) $\triangle JKL$: $\angle J = 55^\circ$, $JK = 6$. $\triangle MNO$: $\angle M = 55^\circ$, $MN = 9$. (JK corresponds to MN.)	a.  b.  c.  d.  10. In $\triangle ABC$, $\angle A = (m - 43)^\circ$, $\angle B = 43^\circ$, $\angle C = 120^\circ$. In $\triangle PDE$, $\angle P = m^\circ$. Find m and identify if the triangles are similar.	 (a) Write a complete similarity proof for $\triangle MNQ \sim \triangle PON$. Name every reason. (b) If $MN = 8$, $NQ = 6$, and $NO = 9$, find NP. 12. A student says: 'I found a pair of triangles where two sides are in the same ratio and one angle is equal, so they must be similar by SAS~.' Explain what conditions on the angle are required for SAS~ to apply, and give a counterexample showing the student could be wrong.
Algebra Spiral Expand	Algebra Spiral Expand each expression completely. (a) $(x - 7)(x + 3)$ (b) $(5a + 2)^2$ (c) $(3y - 4)(2y + 1)$	

Answers — CYU 6.3**Row 1 Spiral**

1. Scale factor = $9/6 = 3/2$. $D'E' = 8 \times (3/2) = 12$.
2. Scale factor = $60/48 = 5/4$. Then $(2x+2)/(7x-9) = 4/5 \rightarrow 10x+10 = 28x-36 \rightarrow 46 = 18x \rightarrow x \approx 2.56$. Both methods give the same x .
3. The claim is backwards — if two correct methods give different answers, one was applied incorrectly, not that a method is wrong. Both methods are mathematically equivalent; a discrepancy signals an arithmetic or setup error in one of them.

Row 2 Spiral

- 4a. $P'Q' = 20 \times (3/4) = 15$.
- 4b. 47° — angles are preserved under dilation.
- 4c. $\triangle PQR \sim \triangle P'Q'R'$.
- 5a. A maps to A' : $(2,4) \rightarrow (1,2)$, so scale factor = $1/2$, center = $(0,0)$.
- 5b. $B' = (3,2)$, $C' = (2,4)$.
- 5c. Smaller — scale factor < 1 .
6. The second student is correct. Equal angles guarantee similar shape but not size — a dilation with any scale factor $\neq 1$ produces equal angles with different side lengths.

Triangle Similarity Shortcuts

7. AA: two pairs of equal angles. SAS~: two sides in proportion with equal included angle. SSS~: all three pairs of sides in proportion.
- 8a. $\angle C = 80^\circ = \angle F$ and $\angle A = \angle D$. AA applies.
- 8b. $6/9 = 8/12 = 10/15 = 2/3$. SSS~.
- 8c. Only one pair of equal angles and one pair of proportional sides — not adjacent sides with an included angle. No shortcut applies without more information.
9. Accept diagram-specific answers. Each must state shortcut and write similarity statement with correct vertex correspondence.
10. $\angle A + \angle B + \angle C = 180^\circ \rightarrow (m-43)+43+120 = 180 \rightarrow m = 60$. $\angle P = 60^\circ$. $\angle A = 60 - 43$ not 60. So no angles match.
- 11a. $\angle NMQ = \angle NPO$ (alternate interior angles, $MQ \parallel OP$). $\angle MNQ = \angle PNO$ (vertical angles). $\triangle MNQ \sim \triangle PON$ by AA. ■
- 11b. $MN/NP = NQ/NO \rightarrow 8/NP = 6/9 \rightarrow NP = 12$.
12. SAS~ requires the equal angle to be included between the two proportional sides. Counterexample: if the equal angle is not included, counterexamples can be constructed (analogous to SSA failing for congruence).

Algebra Spiral

- (a) $x^2 - 4x - 21$
- (b) $25a^2 + 20a + 4$
- (c) $6y^2 - 5y - 4$