

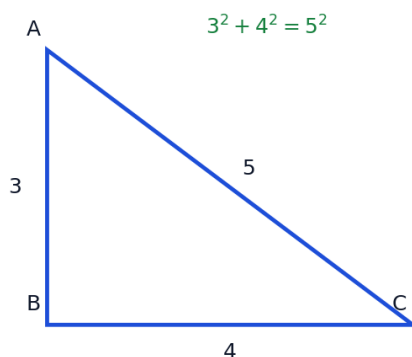
Solutions

3.1 Congruence Criteria

3.1.1. Triangle ABC has sides $AB = 3$, $BC = 4$, $AC = 5$. Triangle DEF has $DE = 3$, $EF = 4$, $DF = 5$. State a valid congruence correspondence.

Solution. $\triangle ABC \cong \triangle DEF$ by SSS. In particular, B corresponds to E .

A 3-4-5 right triangle



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For angle C, opposite = 3, adjacent = 4, and hypotenuse = 5.

3.1.2. Why is AAA insufficient for congruence?

Solution. Triangles with side lengths 3, 4, 5 and 6, 8, 10 have equal corresponding angles but different sizes.

3.1.3. Two right triangles have equal hypotenuses and one matching leg. Are they congruent?

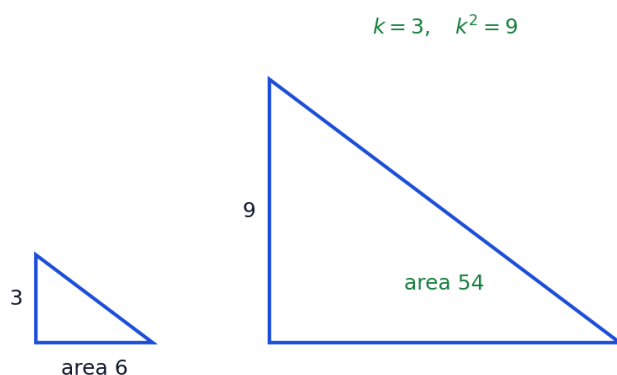
Solution. Yes, by hypotenuse-leg. Pythagoras also forces the remaining legs to match.

Solutions

3.2 Similarity and Proportion

3.2.1. Similar triangles have corresponding sides 3 and 9. If the smaller area is 6, find the larger area.

Solution. The length factor is $9/3 = 3$. The area factor is 9, so the larger area is 54.



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The length factor is 3, so the larger area is 6 times 9 = 54.

3.2.2. Triangles have angles $40^\circ, 60^\circ, 80^\circ$ and $60^\circ, 80^\circ, 40^\circ$. Are they similar?

Solution. Yes, by AA. Correspondence must match equal angles, regardless of the order given.

3.2.3. A map uses 1 cm for 4 km. What real distance corresponds to 7.5 cm?

Solution. Multiply by the scale: $7.5 \cdot 4 = 30$ km.

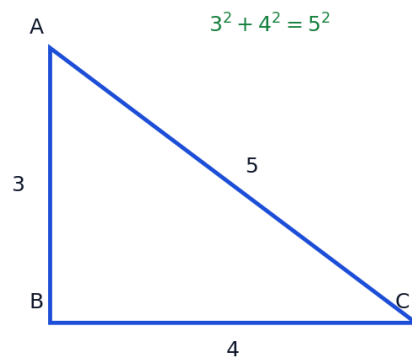
Solutions

3.3 Right Triangle Relationships

3.3.1. In a 3-4-5 right triangle, find sine, cosine, and tangent of the angle opposite the side of length 3.

Solution. $\sin \theta = 3/5$, $\cos \theta = 4/5$, and $\tan \theta = 3/4$.

A 3-4-5 right triangle



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For angle C, opposite = 3, adjacent = 4, and hypotenuse = 5.

3.3.2. A ladder 13 ft long rests against a wall with its base 5 ft from the wall. How high does it reach?

Solution. The height is $\sqrt{13^2 - 5^2} = \sqrt{144} = 12$ ft.

3.3.3. An isosceles right triangle has legs 7. Find its hypotenuse exactly.

Solution. $c = \sqrt{7^2 + 7^2} = 7\sqrt{2}$.