# Lesson 10: Conditions for a Unique Triangle—Two Angles and a Given Side

## Classwork

#### **Exploratory Challenge**

1. A triangle  $\triangle XYZ$  has angles  $\angle X = 30^{\circ}$  and  $\angle Y = 50^{\circ}$  and included side XY = 6 cm. Draw triangle  $\triangle X'Y'Z'$  under the same condition as  $\triangle XYZ$ . Leave all construction marks as evidence of your work, and label all side and angle measurements.

Under what condition is  $\triangle X'Y'Z'$  drawn? Compare the triangle you drew to two of your peers' triangles. Are the triangles identical? Did the condition determine a unique triangle? Use your construction to explain why.

2. A triangle  $\triangle RST$  has angles  $\angle S = 90^{\circ}$  and  $\angle T = 45^{\circ}$  and included side ST = 7 cm. Draw triangle  $\triangle R'S'T'$  under the same condition. Leave all construction marks as evidence of your work, and label all side and angle measurements.

Under what condition is  $\triangle R'S'T'$  drawn? Compare the triangle you drew to two of your peers' triangles. Are the triangles identical? Did the condition determine a unique triangle? Use your construction to explain why.

3. A triangle  $\triangle JKL$  has angles  $\angle J = 60^{\circ}$  and  $\angle L = 25^{\circ}$  and side KL = 5 cm. Draw triangle  $\triangle J'K'L'$  under the same condition. Leave all construction marks as evidence of your work, and label all side and angle measurements. Under what condition is  $\triangle J'K'L'$  drawn? Compare the triangle you drew to two of your peers' triangles. Are the triangles identical? Did the condition determine a unique triangle? Use your construction to explain why. 4. A triangle  $\triangle ABC$  has angles  $\angle C = 35^{\circ}$  and  $\angle B = 105^{\circ}$  and side AC = 7 cm. Draw triangle  $\triangle A'B'C'$  under the same condition. Leave all construction marks as evidence of your work, and label all side and angle measurements. Under what condition is  $\triangle A'B'C'$  drawn? Compare the triangle you drew to two of your peers' triangles. Are the triangles identical? Did the condition determine a unique triangle? Use your construction to explain why.

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## **Problem Set**

- 1. In triangle  $\triangle FGH$ ,  $\angle F = 42^{\circ}$  and  $\angle H = 70^{\circ}$ . Side FH = 6 cm. Draw triangle  $\triangle F'G'H'$  under the same condition as  $\triangle FGH$ . Leave all construction marks as evidence of your work, and label all side and angle measurements. What can be concluded about  $\triangle FGH$  and  $\triangle F'G'H'$ ? Justify your response.
- 2. In triangle  $\triangle WXY$ ,  $\angle Y = 57^{\circ}$  and  $\angle W = 103^{\circ}$ . Side YX = 6.5 cm. Draw triangle  $\triangle W'X'Y'$  under the same condition as  $\triangle WXY$ . Leave all construction marks as evidence of your work, and label all side and angle measurements. What can be concluded about  $\triangle WXY$  and  $\triangle W'X'Y'$ ? Justify your response.
- 3. *A*, *Z*, and *E* are collinear, and  $\angle B = \angle D$ . What can be concluded about  $\triangle ABZ$  and  $\triangle EDZ$ ? Justify your answer.
- 4. Draw  $\triangle ABC$  so that  $\angle A$  has a measurement of 60°,  $\angle B$  has a measurement of 60°, and AB has a length of 8 cm. What are the lengths of the other sides?
- 5. Draw  $\triangle ABC$  so that  $\angle A$  has a measurement of 30°,  $\angle B$  has a measurement of 60°, and *BC* has a length of 5 cm. What is the length of the longest side?