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

Classwork

Exploratory Challenge

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

Under what condition is $△X'Y'Z'$ 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.

1. A triangle $△RST$ has angles $∠S=90°$ and $∠T=45°$ and included side $ST=7 $cm. Draw 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 $△R'S'T'$ 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.

1. A triangle $△JKL$ has angles $∠J=60°$ and $∠L=25°$ and side $KL=5 $cm. Draw 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 $△J'K'L'$ 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.

1. A triangle $△ABC$ has angles $∠C=35°$ and $∠B=105°$ and side $AC=7 $cm. Draw 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 $△A'B'C'$ 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.

Problem Set

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