Conceptual Task: Tricky Triangles

Exploration Questions Sample Responses

a. What information is known about the triangle? Who knows what information? Use the table below to organize the information.

Completed table:

Sides/Angles	Amy knows…	Nigel knows…	Julian knows…
Amy → Julian $\left(\overline{AJ}\right)$	X	X	
Julian → Nigel $\left(\overline{JN}\right)$	X		
Nigel → Amy $\left(\overline{NA}\right)$			
$\angle A$			X
$\angle J$			
$\angle N$		X	

b. What information is unknown about the triangle?

None of the three knows the measure of angle *J* or the length of side Nigel-Amy.

c. Do any of the three students have enough information to calculate an unknown side or angle of the triangle? Explain your answer.

No, each student has at most two pieces of information about the triangle. At least three pieces of information (SSS, SAS, AAS) are needed to solve for unknown measurements.

d. If each student is allowed to ask one other student for a single piece of information to help solve the triangle, whom should Amy ask for information? What should Amy ask this person? Why?

Amy could ask Julian for angle *A* or Nigel for angle *N*. If she gets the measure of angle *A* from Julian, she can use the law of sines to solve for angle *N*. If she gets the measure of angle *N* from Nigel, she can find the measure of $\overline{NA}$ using the law of cosines. It would be more beneficial to ask Nigel for the measure of angle *N*. After she uses the law of cosines to solve for $\overline{NA}$, Amy will be able to solve for the remaining unknowns with the law of sines.

e. Whom should Nigel ask for a piece of information? What should Nigel ask this person? Why?

Nigel could ask Amy for the length of $\overline{JN}$ or Julian for the measure of angle *A*. If Nigel gets the measure of angle *A* from Julian, he can solve for $\overline{JN}$ using the law of sines. Nigel will have enough information to solve for $\overline{NA}$ using the law of cosines after that. If he asks Amy for the length of $\overline{JN}$, he could use the law of cosines to solve for $\overline{NA}$.

f. All three students are given the distance from Amy to Nigel. Who is likely to use the law of cosines to solve for an unknown measurement after receiving this information? What can they solve for?

Amy or Nigel could use the law of cosines. However, Amy is forced to use the law of cosines because she would know three side lengths and no angles. She could solve for angle *N* using the law of cosines and the new information.

g. Who is likely to use the law of sines after the distance between Amy and Nigel is disclosed? What can they solve for?

Amy would not be able to use the law of sines given the new information. She knows three side lengths but no angles. Nigel could use the law of sines to solve for angle *J*.

h. Is anyone still unable to calculate any unknowns after being given this information?

Julian still has insufficient information to use either the law of sines or the law of cosines to solve for any unknown values of the triangle.