Making the Slopes Safer for Skiers

Instructions:

- View the video found on page 1 of this journal activity.
- Using the information provided in the video, answer the questions below.
- Show your work for all calculations

1. The Students’ Conjectures: (3 points: 1 point each)
   
   a. What conjecture is being made?
   
   b. What key details are given?
   
   c. What is your plan of action?

2. Looking at the Consecutive Interior Angles (9 points)
Look at the diagram of the scenario below. A steep downhill ski slope is intersected at an angle by a less steep ski slope. Safety fences need to be set up in the locations shown. The angles of the fences, angles 1 and 2, can be determined by finding the relationship between the angles $a$ and $b$.

a. Draw a geometric diagram of this scenario using two parallel lines and one transversal. (Remember that a transversal is a line which cuts across parallel lines.) Label the angles, parallel lines, and transversal as indicated in the diagram above. (2 points)

b. Starting with the fact that angles 1 and $a$ are a linear pair and that angles $b$ and 2 are also a linear pair, use a two column proof to prove that consecutive interior angles $a$ and $b$ are supplementary. (5 points)

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c. Explain what the result of your proof tells you about angles $a$ and $b$. Specifically, if you measured one angle, what would you know about the other? (2 points)

3. The Exterior Angles (6 points)

a. The fences will be aligned with the exterior angles $\angle 1$ and $\angle 2$. What are some other relationships you can see between $\angle 1$, $\angle 2$, $\angle a$, and $\angle b$? (2 points)
b. Which of the relationships you listed above will be the most helpful in figuring out the measurements of the safety fences? (2 points)

c. What is the measure of \( \angle 2 \)? (2 points)

4. Reflections (2 points: 1 point each)

a. Can you think of any other real-life scenarios where parallel lines and transversals exist?

b. What are the limitations of the ski slope scenario as a real-life example?