Name: _____ Date _____

Levers & Pulleys - Design Challenge #3

Ted and Jan were working on a search and rescue team that needed to lift an injured climber out of a 20m ravine. Ted was at the top the ravine; Jan was at the bottom of the ravine. The injured climber weighs 720N. They have two pulleys and a rope in their rescue kit.

Scenario A: Jan is going to attach the injured climber to the pulley system and Ted will lift him out of the ravine.

- How should they set up their pulleys so Ted can lift the climber using as little effort as possible? Draw a diagram and set-up the pulley system.

- How much effort will Ted have to use? _____
- How far will Ted have to pull the rope? _____
- What is the mechanical advantage? _____

Note: Mechanical Advantage = $\frac{\text{Load}}{\text{Effort}}$

Name: _____ Date _____

Scenario B: Jan is going to attach the injured climber to the pulley system, and she is going to lift the climber from her position at the bottom of the ravine.

- How should they set up their pulleys so Jan can lift the climber using as little effort as possible? Draw a diagram and set-up the pulley system.

- How much effort will Jan have to use? _____
- How far will Jan have to pull the rope? _____
- What is the mechanical advantage? _____

Evaluate: Determine which scenario (A or B) provides the greatest advantage to lift the climber out of the ravine. Write an argument about why you feel this provides the greatest advantage including the following:

- Comparison of the mechanical advantages
- Comparison of the directional advantages
- Comparison of how far the ropes will be pulled
- The reason why you chose that scenario

Note: Mechanical Advantage = $\frac{\text{Load}}{\text{Effort}}$

 This work is funded by the Washington State Office of Superintendent of Public Instruction Mathematics & Science Partnership under Title II, Part B Program Code: 62CFDA 84.366.