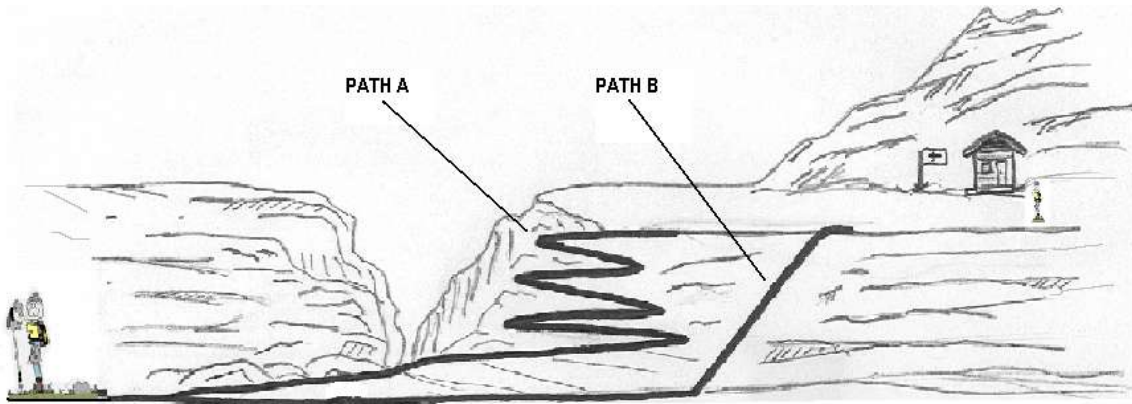


## 6<sup>th</sup> Simple Machines & Energy Summative Assessment

1. A hiker is at the bottom of a canyon and needs to get to the station at the top of the canyon, which is located one mile above the canyon floor. There are two paths (**Path A** and **Path B**) that lead to the top of the canyon. Both paths require the same amount of energy to reach the top of the rim.

The hiker prefers to use **Path A**, saying it is “easier” than using **Path B**. How is this possible? Explain using the concepts of effort force, effort distance, and energy.



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2. A teacher is standing on one end of a beam, and a 3<sup>rd</sup> grade student is standing on the other end. The student has been challenged to lift the teacher. She can place the fulcrum anywhere under the beam to create a lever system to accomplish this task.

Draw where the fulcrum should be placed under the beam to provide the student with the **greatest** mechanical advantage. Explain why your placement of the fulcrum makes the task easier.



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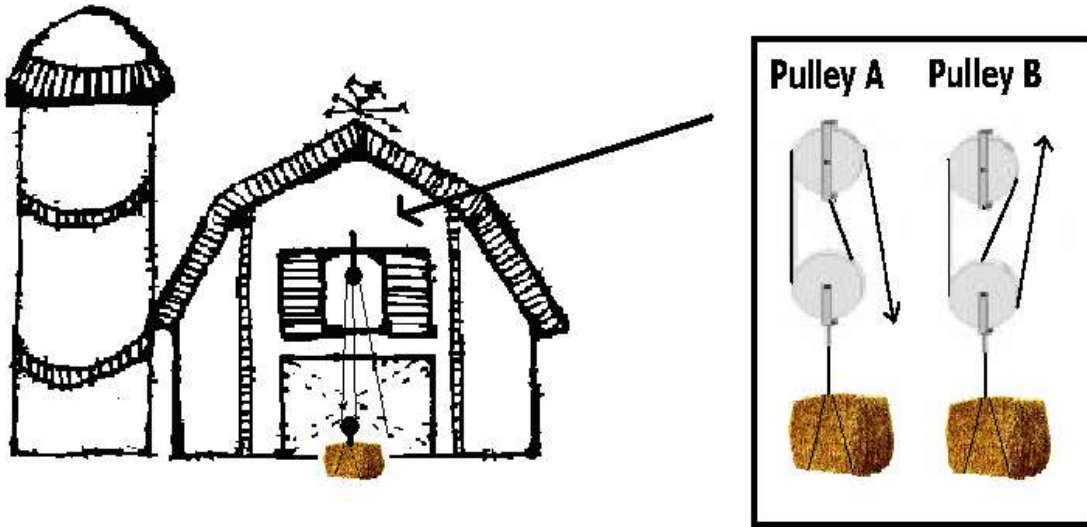
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Joe and Bob need to move bales of straw up into the loft of the barn for their father. The bales of straw are quite heavy, so they decide to use a system of pulleys similar to what they used in science class. The brothers have two different ideas for possible pulley systems that they could use (Pulley A and Pulley B) to complete this task.

3. Describe the advantages of using each pulley system to assist the brothers in their decision-making process for this task.



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Susan conducted a pulley investigation that required her to lift a box of books from the floor to the tabletop using five different pulley systems. The results of her investigation were recorded in the following data table.

**DATA TABLE FOR A PULLEY EXPERIMENT**

	<b>Pulley System #1</b>	<b>Pulley System #2</b>	<b>Pulley System #3</b>	<b>Pulley System #4</b>	<b>Pulley System #5</b>
<b>Effort Force</b>	20 N	10 N	5 N	2 N	1 N
<b>Effort Distance</b>	1 m	2 m	4 m	10 m	20 m
<b>Energy Input</b>					

4. Susan reviewed the data table and stated that more energy was required to lift the load using pulley system #1 than with any of the other pulley systems. Is Susan correct? Explain your answer using the ideas of effort force, effort distance, and energy.

*(Completing the data table may aid in answering this question)*

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A sixth grader returns home from a long day at school to find that her father has left the new dog food bag out on the picnic table. She has to move the 150-pound bag of dog food from the picnic table, across the yard, and up the steps to the back porch, without opening the bag, so that it will be safe from the other neighborhood dogs.

5. Choose at least two simple machines to show how the student could accomplish this task. Use the picture below to help illustrate your solution and then describe in words how your idea will work.

