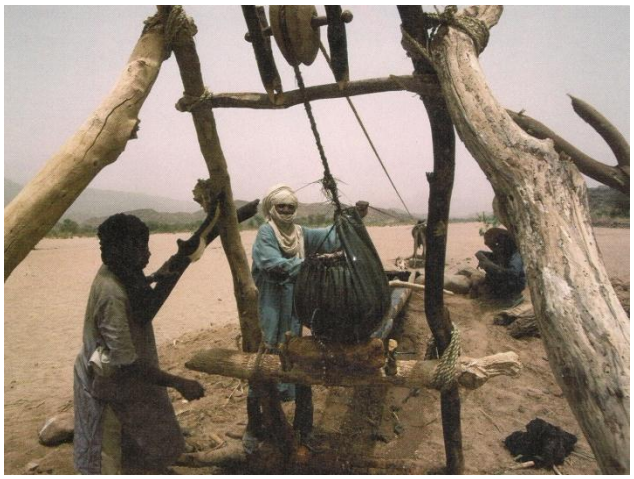
Name: _____ Date: _____

Exploring Pulleys



This photograph shows how a pulley system in Niger, Africa is used to get water from a well. A wooden structure was built to support a pulley. One end of a rope is passed over the pulley and attached to an animal-hide bucket. By attaching the other end of the rope to a donkey, the bucket can be raised and lowered. This piece of equipment doesn't work by itself. Someone or something has to pull the rope to start the motion of raising or lowering the bucket. All motion is caused by a force. A force is a push or a pull. The effort needed to pull on a rope or lift an object is an example of a force.

Equipment:

- String
- Scissors
- Empty Thread Spools
- Skewers
- Straws
- Tape
- Paper Clips
- Popsicle Sticks
- Spring Scale
- 100g Mass
- Ruler

Procedure:

1. Cut a piece of sting about 1 m long. Make a loop on both ends.
2. Use the spring scale to lift the 100 g mass straight up. Record the reading on the spring scale – this tells you the force you need to lift the mass.
3. With your group, brainstorm some ways you could use the materials provided to build a mechanical system that will lift the mass off the floor. Include a pulley (empty thread spool) in your design.
4. Select the best idea from your brainstorming. Write a brief description of the system, and explain how you think it will work.
5. Build your system and use it to lift the mass. Use the spring scale to measure the force needed to lift the mass. Notice the direction of the force.
6. Change your system or select another idea to test. Use the spring scale, measure and record the force needed to lift the mass.

Observations:

1. What force was required to lift the 100 g mass without your system?

   _____

2. What force was required to lift the 100g mass with your "best" system?

   _____

3. Draw a picture of the "best" system that you can build. In your drawing show the direction the rock moved and the direction of the force you applied.

Discussion:

1. Why do you think this system worked the best?

   _____

   _____

   _____

   _____

2. Did your system allow you to change the direction of the force? Explain.

   _____

   _____

   _____

3. How could changing the direction of a force be useful?

   _____

   _____

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