Visiting the MOST

To make your visit to the Milton J. Rubenstein Museum of Science & Technology as meaningful as possible:

A  Explore and complete some of the online pre-visit activities with your students.

B  Design pre-visit, during and post-visit plans that includes activities and demonstrations that you select.

C  Discuss your plan with a MOST education staff member prior to your visit.

D  Plan your large group to be divided in a ratio of 8 to 10 students per chaperone.

E  Cue the chaperones about their roles. They should be engaged with the students and assisting them with their hunt for answers and monitoring the materials provided.

F  Relax and have fun!
Simple Machines

Name: ___________________________  Date: __________

**Directions:**

The answers to the following questions are found in the simple machine corner of the museum located near TechnoTown.

1. Which is easier to lift, the weight on rollers or the weight without rollers? Explain:

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_____________________________________________________________________________________________________
_____________________________________________________________________________________________________

2. How much rotation does a helical gear provide?

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_____________________________________________________________________________________________________
_____________________________________________________________________________________________________

3. Try this: Turn the crank on the gear system counter-clockwise. Count how many times the direction of rotation changes in this gear system. Can you align all the colored bars on the gears?

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_____________________________________________________________________________________________________
_____________________________________________________________________________________________________

4. Draw the three levers with the 30 lbs. on the end of each arm. Note in your drawings the location of the fulcrum. Use a measuring tape to determine the distance of the fulcrum.

   \[ a \quad b \quad c \]
5 Which lever system feels the easiest to move? Explain your thoughts.
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______________________________________________________________________________________________________
______________________________________________________________________________________________________

6 Which lever does the most work? Explain your thoughts.
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______________________________________________________________________________________________________
______________________________________________________________________________________________________

7 Calculate the effort force for each of the cases above, using the information that follows to assist with this problem.
______________________________________________________________________________________________________
______________________________________________________________________________________________________
______________________________________________________________________________________________________

a Case 1

b Case 2

c Case 3
A lever is a mechanism that can be used to exert a large force over a small distance at one end of the lever by exerting a small force over a greater distance at the other end of the lever.

In general the effort force can be expressed as

\[ F_e = F_l \frac{d_l}{d_e} \]

where

- \( F_e \) = effort force (N, lb)
- \( F_l \) = load force (N, lb) (note that weight is a force)
- \( d_l \) = distance from load force to fulcrum (m, ft)
- \( d_e \) = distance from effort force to fulcrum (m, ft)

8 Which pulley is the easiest to lift and why?

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______________________________________________________________________________________________________

______________________________________________________________________________________________________

9 What simple machine is adapted to make a screw?

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______________________________________________________________________________________________________

______________________________________________________________________________________________________

9 Go to TechnoTown. Find and identify three simple machines in the system. Tell the purpose of the machine.

<table>
<thead>
<tr>
<th>Simple machine name</th>
<th>Describe Location</th>
<th>Purpose of machine</th>
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Inquiry and process skills:
Gathering and organizing data, generalizing, inferring, making decisions manipulating materials, observing, predicting

Standard 1: Scientific Inquiry:
Key Idea 1: s1.1, s1.1a, s1.1b, s1.2, s1.3
Key Idea 2: s2.3a
Key idea 3: s3.1a, s3.4a, s3.4b

Skills and strategies for interdisciplinary problem solving:
working effectively, gathering and processing information, generating and analyzing ideas, presenting results

General Skills:
i, iii, iv, vi, ix, xii, xiii, xiv, xv, xvii