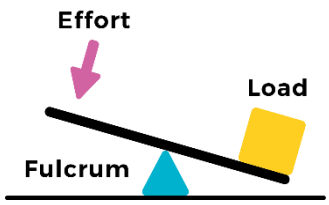
EXPERIMENT 1



1. The same loads are attached to two levers. In machine number 1 the fulcrum is located close to the load, in machine number 2 - it is close to the free end of the strip. Try to lift the loads in lever no.1 and lever no. 2 by pressing on the ends of the wooden strips in the indicated places. Before you test this, answer the following research question.

Research question

In which lever (1 or 2) will you need to use less effort (applied force) to lift the load?

Hypotheses

Underline the selected answer:

- Less effort must be used in lever no. 1.
- Less effort must be used in lever no. 2.
- The same effort must be used in both machines.

1. Do an experiment. In which lever you used less effort (applied force) to lift the load? Talk about it in your group. Describe your observations.

Results

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2. Now, do the same experiment, but take different measurements. Use the hooks that are under the strips. Put the tip of the dynamometer on the hook in lever no. 1, pull it vertically down and lift the load. Check the result on the scale in Newtons (N) and write it in the table. Measure the distance from the hook to the fulcrum in centimeters (cm). Write result in the table. Repeat measuring on lever no. 2.

Results

Machine number	The effort needed to lift the load	The distance from the hook to the fulcrum
1	……. N	……. Cm
2	……. N	……. Cm

Conclusions

How does this lever work? How does it make easier for a person to do work, for example lifting loads?

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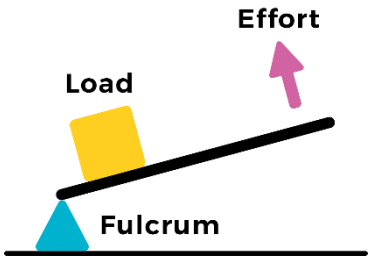

EXPERIMENT 2

1. The load is placed at the end of the lever. The experiment you will do will consist of lifting the load up using successive 5 hooks that are on a wooden strip. Hook 1 is located near the load, and hook 5 is at the free end of the strip. Before you test this, answer the following research question.

Research question

When will you need to use the smallest and when the biggest effort (applied force)? Write hook numbers.

Hypotheses

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2. Do an experiment. When did you use the smalles and when the biggest effort? Talk about it in your group. Describe observations.

Results

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3. Now you will do the same experiment, but you will take different measurements. Put the tip of the dynamometer on the hook no. 1, pull it vertically up and lift the load which is on the simple machine. Check the result on the scale in Newtons (N) and enter it in the table. Measure the distance from the hook to the center of the load, specify the result in centimeters (cm) and enter it in the table. Repeat measuring on each hook.

Results

Hook number	The effort needed to lift the load	The distance from the hook to the center of the load
1	……. N	……. Cm
2	……. N	……. Cm
3	……. N	……. Cm
4	……. N	……. Cm
5	……. N	……. Cm

Conclusions

How does this lever work? How does it make easier for a person to do work, for example lifting loads?

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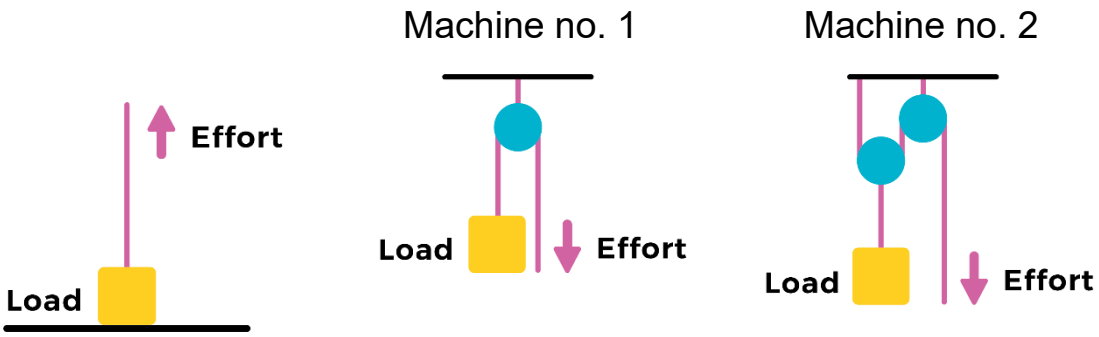
EXPERIMENT 3

1. Hold the free sling with the load and lift it up. Remember how much effort was needed to lift the load. Now look at two simple machines (no. 1 and no. 2). In a moment, you will try to lift a load using the pulley no. 1 and then pulley no. 2. Before you test this, answer the following research questions.



Research questions

How much force is needed to lift the load in the machines no.1 and 2?
Will it be easier or harder to lift the load using simple machines?

Hypotheses

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2. Do an experiment. Talk about it in your group. Describe observations.

Results

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3. Now you will do the same experiment, but you will take different measurements. Measure the effort needed to lift the load on the free sling and the efforts needed to lift the load in the machines (1 and 2). Hook the dynamometer into the knot and pull it vertically downwards. Read the results on the scale in Newtons (N). Enter the results below.

Results

The effort needed to lift the load:
free rope ..... N
machine 1 ..... N
machine 2 ..... N

Conclusions

How does the pulleys work? How does it make easier for a person to do work, for example lifting loads?

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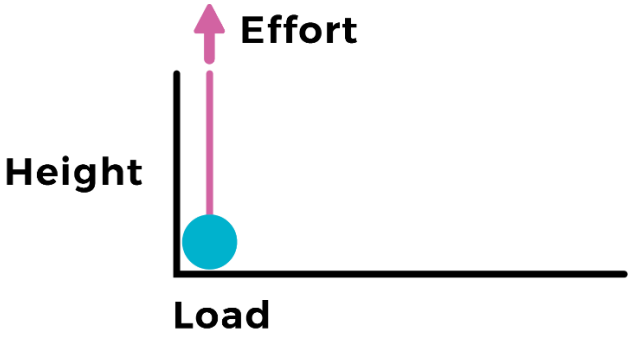
Co-funded by the European Union

EXPERIMENT 4

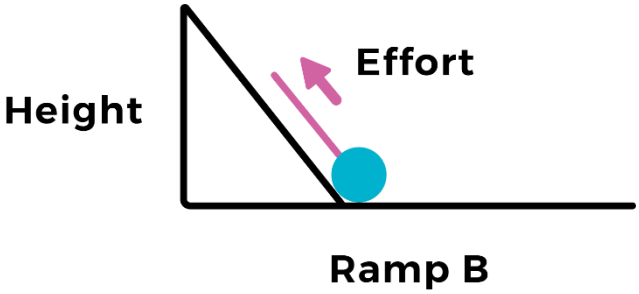
1. First, weigh the coconut using a dynamometer and check the result on the scale in grams (g). Enter the result below.

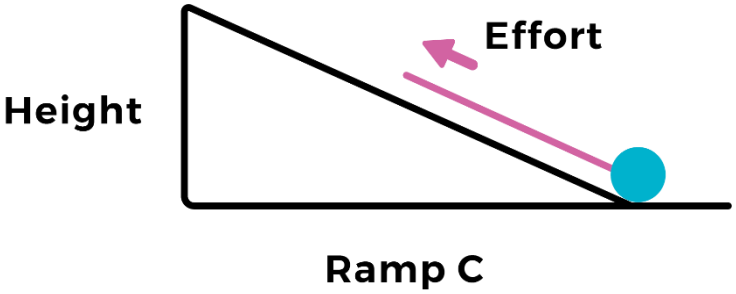
   weight of coconut …… g

2. Now try to lift the coconut to height A. Measure the effort required to do this using a dynamometer. Measure while the coconut is moving upwards. Check the result on the scale in Newtons (N) and enter it in the table.



3. In a moment you will arrange the elements of the inclined planes as shown in the pictures. You will use the ramps B and then C to pull the coconut up to height A. Before you do this experiment, answer the following research question.





Research question

When you will use the biggest and when the smallest effort to pull the coconut up?

Hypotheses

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4. Now, arrange the elements of the inclined planes as shown in the pictures. Use the ramps B and then C to pull the coconut up to height A. Pull the coconut very slowly. When did you use the smalles and when the biggest effort? Talk about it in your group. Describe observations.

Results

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5. Do an experiment again. Measure the efforts needed to pull the coconut up using ramps B and C. Pull the coconut very slowly. In this time, Use a dynamometer. Make sure that the dynamometer is set parallel to the ramp on which the coconut is moving. Check the effort on the dynamometer while the coconut is moving. Use the scale in Newtons (N). Then measure the lengths of ramp B and C. Give the results in centimeters (cm). Enter all results in the table.

Results

The length of the path that the coconut has travelled	The effort needed to pull the coconut up
A ……. cm	……. N
B ……. cm	……. N
C ……. cm	……. N

Conclusions

How does this simple machine work? How does it make easier for a person to do work, for example lifting loads?

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