Beam Balance

Build the Beam Balance and Loads
(Building Instruction 15A and 15B to page 9, step 9)
- Make sure the arm moves up and down freely and the Beam Balance is in a state of equilibrium

Describe any difficulties with your balance or describe what works well.
Contemplate

Why is it in a state of equilibrium?
Place the load and efforts as shown and use
the formulas for levers to find the mechanical
advantage and to explain what happens.

First, observe the mechanical advantage of
Beam Balance A.
Record the mechanical advantage on the
worksheet.

Then use the formula for calculating the
amount of effort needed to lift a given load to
explain why the Beam Balance is in a state of
equilibrium.
Record your findings on the worksheet.

Next, follow the same procedure for Beam
Balance B and C.

NO STAMPS

(This page will help you with p.3 😊)

Hint:
You can find all of
the formulas you need to
perform this Investigation
in the Principle Models
section for Lever.

Hint:
Use this formula to help
explain why each model
is balanced:
Effort x length of effort
arm = Load x length of
load arm.

Did you know?
The loads weigh 2 g
each.
How much does it weigh?
Your challenge is to use the balance to work out the weight of assembly A.

Put assembly A one arm and balance it with preassembled weights on the other arm. Use these positions to calculate the weight of assembly A.

Use the calibrated weighing machine to check your accuracy.

Build your own set of weights from LEGO® parts and test their accuracy.

<table>
<thead>
<tr>
<th></th>
<th>Calculated weight of load</th>
<th>Measured weight of load</th>
<th>Percentage of accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td><img src="image.png" alt="Image" /></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Names:**

**Hint:**
Find out how accurate your calculation was by finding the difference between the actual and calculated weight. Then divide the difference with the actual weight and multiply it by 100.

**Explain your findings:**

__________________________________________________________
Why is it in a state of equilibrium?

Place the load and efforts as shown and use the formulas for levers to find the mechanical advantage and to explain what happens.

First, observe the mechanical advantage of Beam Balance A.

Then use the formula for calculating the amount of effort needed to lift a given load to explain why the Beam Balance is in a state of equilibrium.

Next, follow the same procedure for Beam Balance B and C.

Use this formula to help explain why each model is balanced: \( \text{Effort} \times \text{length of effort arm} = \text{Load} \times \text{length of load arm} \).

<table>
<thead>
<tr>
<th></th>
<th>Mechanical advantage</th>
<th>Weight of load</th>
<th>Load distance from fulcrum</th>
<th>Weight of effort</th>
<th>Effort distance from fulcrum</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>(page 10, step 10)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>(page 11, step 11)</td>
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<tr>
<td>C</td>
<td>(page 12, step 12)</td>
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