Triple Beam Balance

Answer Key

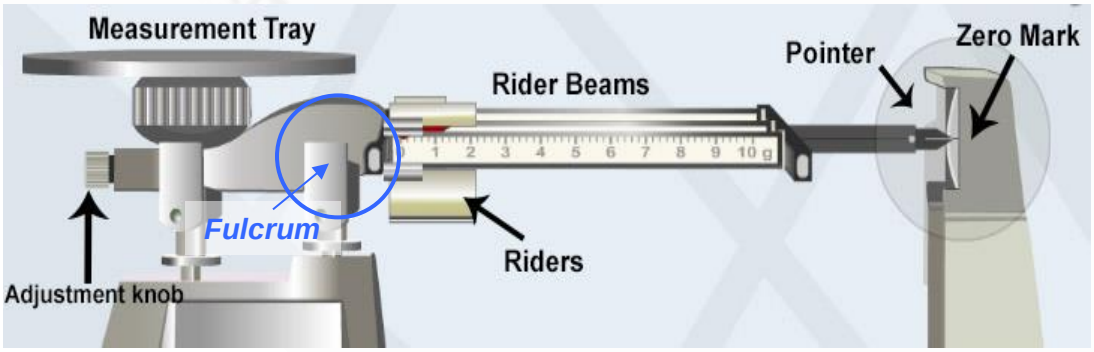
Vocabulary: fulcrum, lever, mass, rider, triple beam balance

Prior Knowledge Questions (Do these BEFORE using the Gizmo.)
[Note: The purpose of these questions is to activate prior knowledge and get students thinking. Students are not expected to know the answers to the Prior Knowledge Questions.]

1. A **lever** is a long beam that is set on a pointed **fulcrum**. A heavy rock is placed on a lever, as shown. Draw an arrow where you should push down to lift the rock most easily.
   Answers will vary. The correct answer is shown below.

2. Suppose you wanted to balance the rock with a smaller rock. Where would you put the smaller rock? Draw a smaller rock on the diagram above so that it balances the big rock.
   Note: The rock and arrow can both be placed at the same spot, at the end of the lever.

Gizmo Warm-up
A **triple beam balance** is a type of lever that is used to measure **mass**, or the amount of matter in an object. An object with an unknown mass is placed on the measurement tray. On the other side of a fulcrum, a set of sliding weights, called **riders**, slide on beams to balance the object.



Practice using the balance in the *Triple Beam Balance* Gizmo.

1. Where is the fulcrum of this lever? Circle and label its location on the diagram above.

2. How do you balance the object on the measurement tray?

   To balance the object, slide the riders to the right (away from the fulcrum).

Activity: **Measuring mass**	Get the Gizmo ready: • Set all the **Riders** to 0.	

Question: How is a triple beam balance used to find mass?

1. Observe: The riders have masses of 10 grams (top), 100 grams (middle), and 1 gram (bottom). Drag the **100-gram rider** to **300**. At this position it balances a 300-gram mass.

   What happens to the **pointer**? *The pointer sinks down to the bottom.*

2. Compare: Place each object on the measurement tray, one at a time. Which objects have a mass greater than 300 grams? *The cone and the cube.*

   How do you know? *The tray sinks (and the pointer rises) when they are placed on the tray.*

3. Measure: Move the **100-gram rider** back to **0**. Place the **light bulb** on the tray.

   - Move the **100-gram rider to the right**, one notch at a time, until the pointer sinks. Now move the 100 gram rider back to the left one notch. (The pointer should lift up.)
   - Move the **10-gram rider** to the right, one notch at a time, until the pointer sinks below the **zero mark**. Now move the rider back to the left one notch.
   - Slowly move the **1-gram rider** until the pointer lines up with the **zero mark**.

4. Calculate: The mass of the light bulb is the sum of the values on each rider. To get a magnified view of the **1-gram rider**, place the cursor over that rider. Each tick mark represents 0.1 g. Write your answer to the nearest 0.1 gram.

   100-g rider: *200 g* 10-g rider: *40 g* 1-g rider: *5.60 g*

   Mass of the light bulb: *245.60 g*

   Note: Because the position of the 1-g slider can be estimated to the nearest 0.01 g, the mass measurement is typically recorded to the nearest hundredth. For example, we would write 201.32 g or 146.70 g if the slider is exactly on a 0.1-g tick mark.

5. Practice: Use the Gizmo to find the mass of the other objects. Write their masses below.

   Paper clips: *5.40 g* Cone: *542.00 g* Cube: *429.30 g*