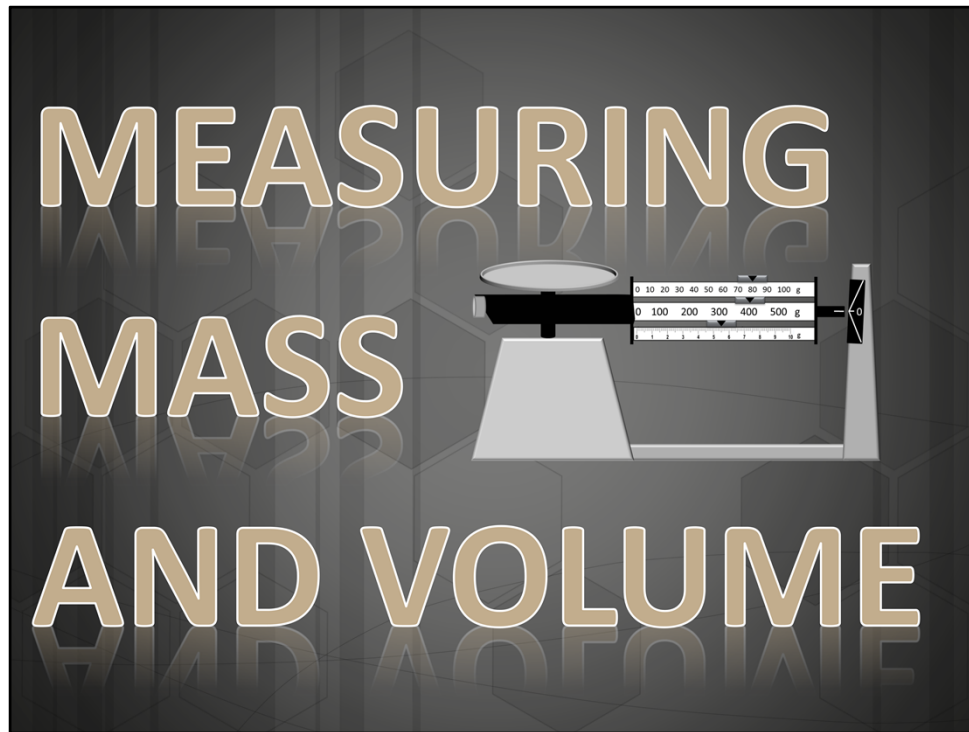
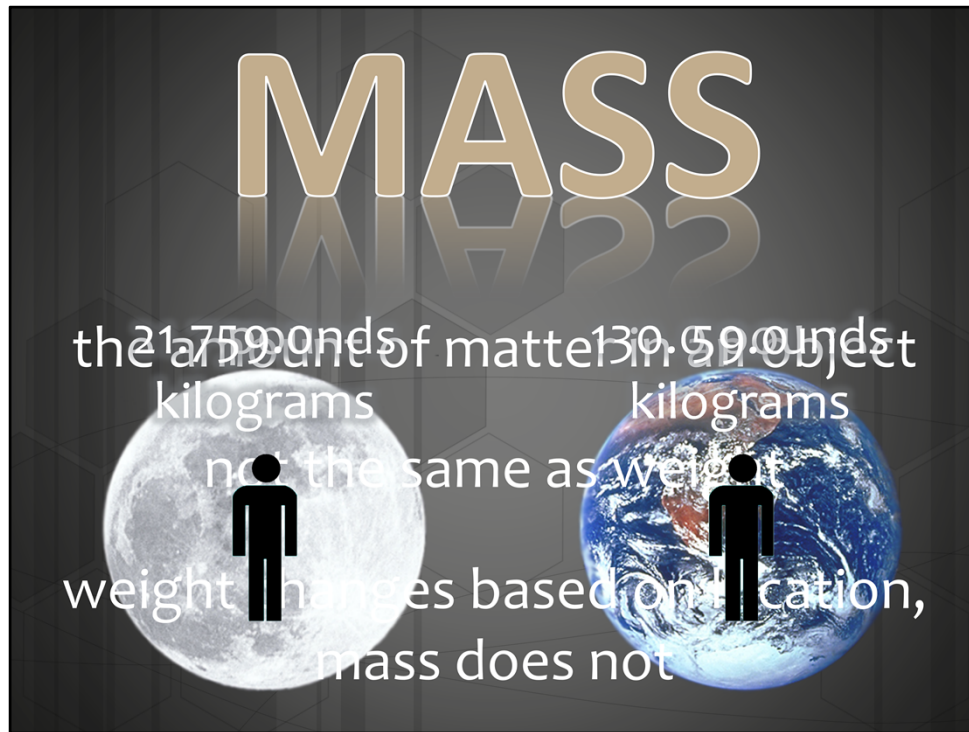


**Module 1: What is Earth Science?**  
**Topic 3 Content: Measuring Mass and Volume Presentation Notes**



Measuring Mass and Volume

**Module 1: What is Earth Science?**  
**Topic 3 Content: Measuring Mass and Volume Presentation Notes**



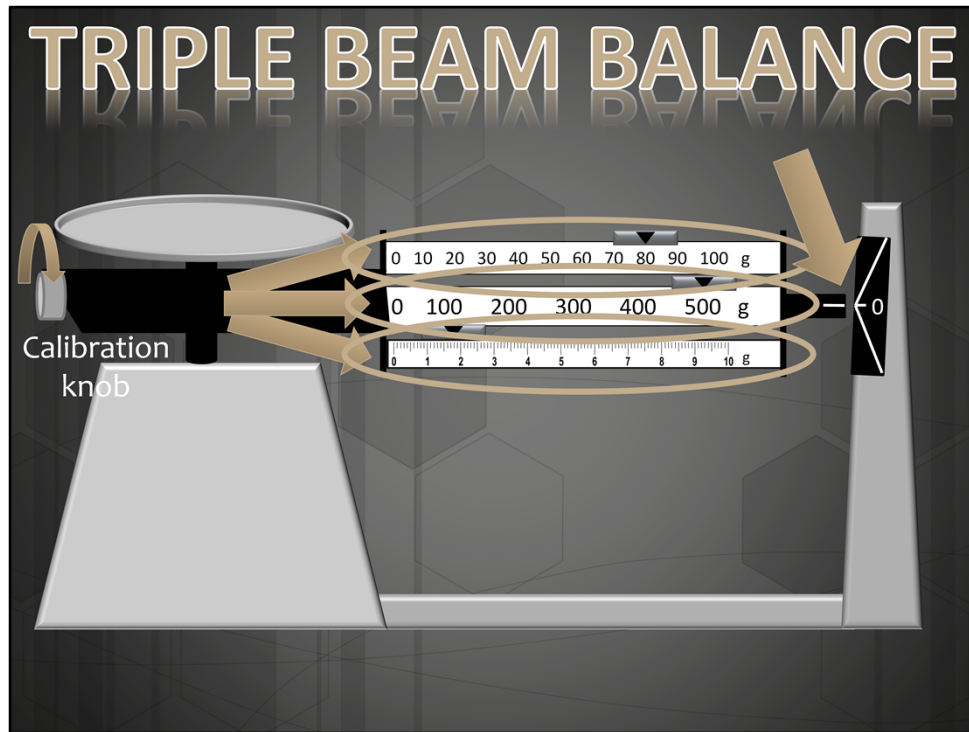
Mass is the amount of matter in an object. It is not the same as weight. Your weight is a measure of the pull of gravity between you and the body on which you are standing. Weight can change based on your location, but mass does not. The moon has a weaker gravitational force than Earth, so if you weigh 130 pounds on Earth, you will only weigh 21.7 pounds on the Moon. If your mass on Earth is 59 kilograms, your mass on the Moon is also 59 kilograms. The most common unit of measurement for mass is grams.

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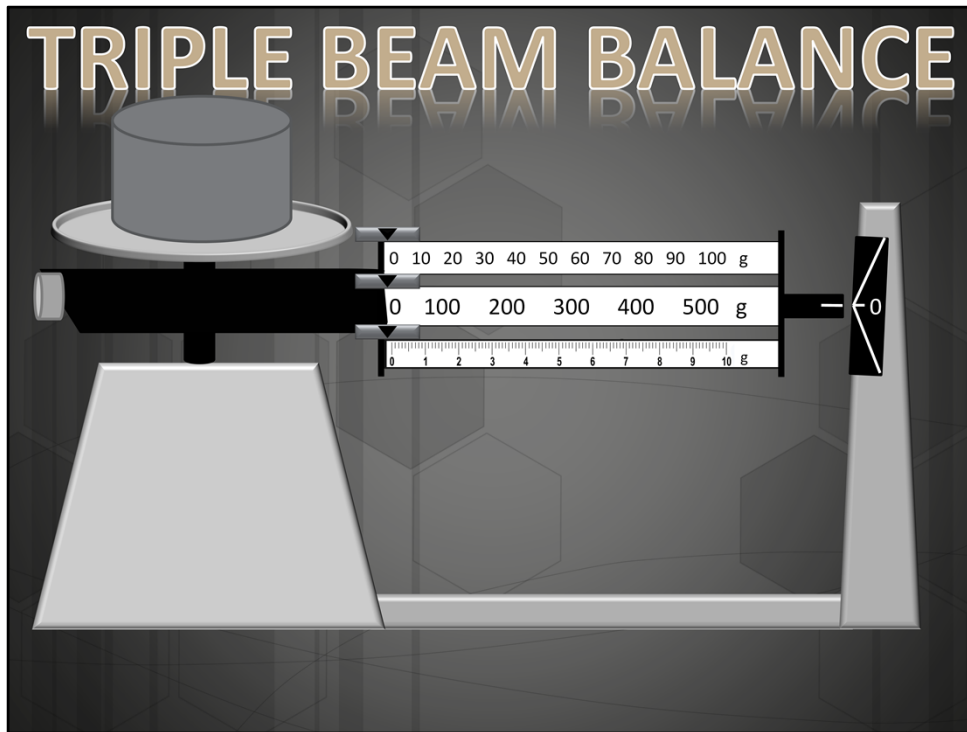
In laboratories, scientists measure mass in two ways. Science laboratories supporting newer technology might have access to digital scales. Digital scales are easy to operate and can give quick, precise measurements for mass. These scales also support the same accuracy as the triple beam balances at 0.1 grams.

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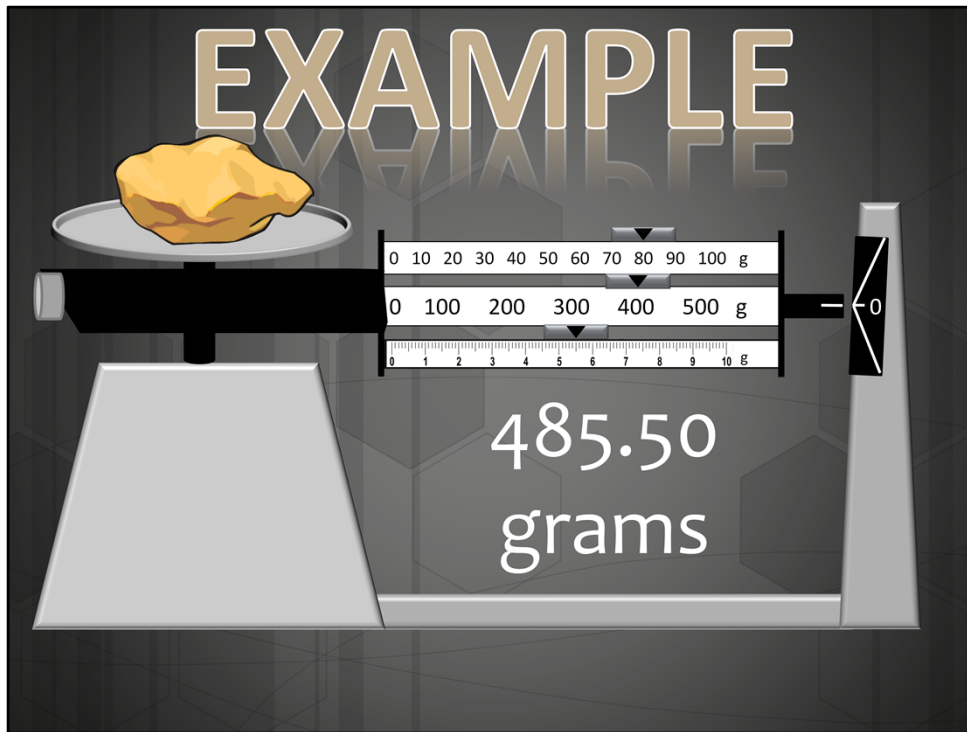
Scientists also measure mass using a triple beam balance, as shown here. A triple beam balance has three beams. Each beam has specific standard mass increments. The highest beam, the central beam, has 100 gram increments. The second beam increases by ten grams. The lowest beam increases by one gram with 0.1 gram increments in between. Before you begin measuring with a triple beam balance, you must make sure the balance is zeroed. This means that all the weights are moved to the left side of the beams and the pointer lines up straight. You will use the calibration knob to balance the scale. Turn the knob clockwise or counterclockwise until the pointer lines up. Then, you are ready to measure.

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To measure using the triple beam balance, add a mass to the pan and let the balance settle. You will need to adjust the beams. At this point, you may want to start with the highest beam. Once the pointer is centered, you can record the sum of all three beams. The sum of all three beams is the mass of the object you are trying to measure.


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Now that you have learned how to measure mass, it is time for some practice. Are you ready to strike it rich? What is the mass of the golden nugget already on the triple beam balance? You will want to measure the mass of this object to the nearest tenth of a gram. Remember, to find the gold's mass, you take the sum of all three beams. What is the mass of the golden nugget? The mass of the golden nugget is 485.5 grams.

# Module 1: What is Earth Science?

## Topic 3 Content: Measuring Mass and Volume Presentation Notes



**Measuring Mass Practice**  
Quiz - 4 questions  
Last Modified: Dec 15, 2014 at 09:20 AM

**PROPERTIES**



On passing, 'Finish' button: [Goes to Next Slide](#)

On failing, 'Finish' button: [Goes to Next Slide](#)

Allow user to leave quiz: [After user has completed quiz](#)

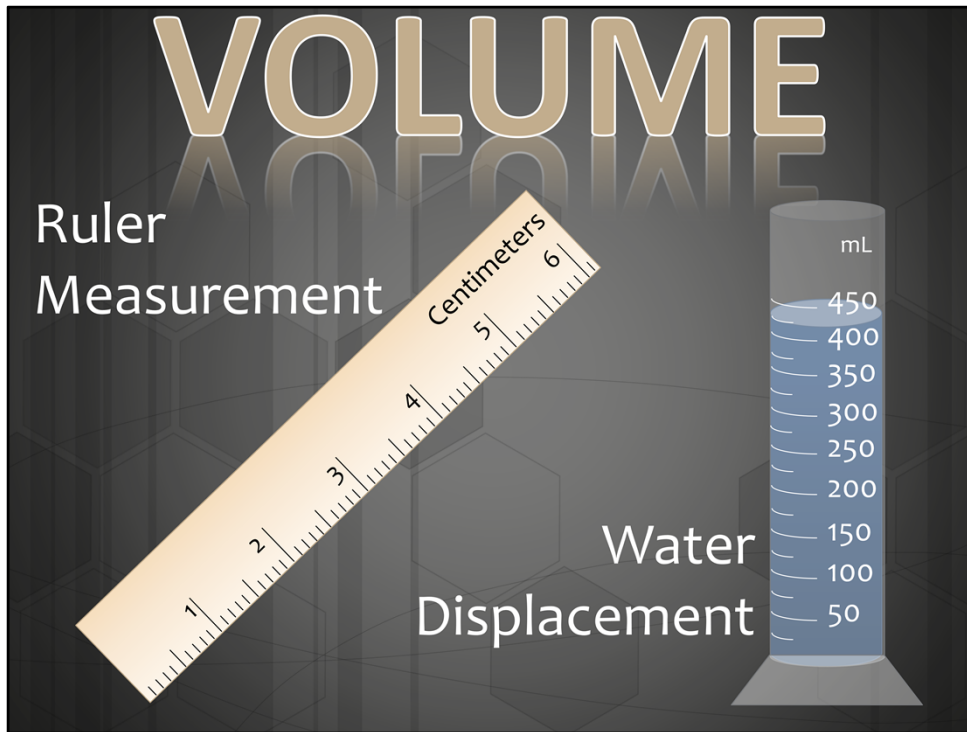
User may view slides after quiz: [At any time](#)

Show in menu as: [Multiple items](#)

 Edit in Quizmaker  Edit Properties

Now that you have explored how to measure mass using a triple beam balance, complete this activity to check your knowledge. After correctly reading the balance, enter the appropriate mass into the blank provided and click **SUBMIT**. Click **NEXT** to get started.

**Module 1: What is Earth Science?**  
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Volume can be determined two different ways: through water displacement or through ruler measurement. The nature of the object determines the method that is used.



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**RULER  
MEASUREMENT**

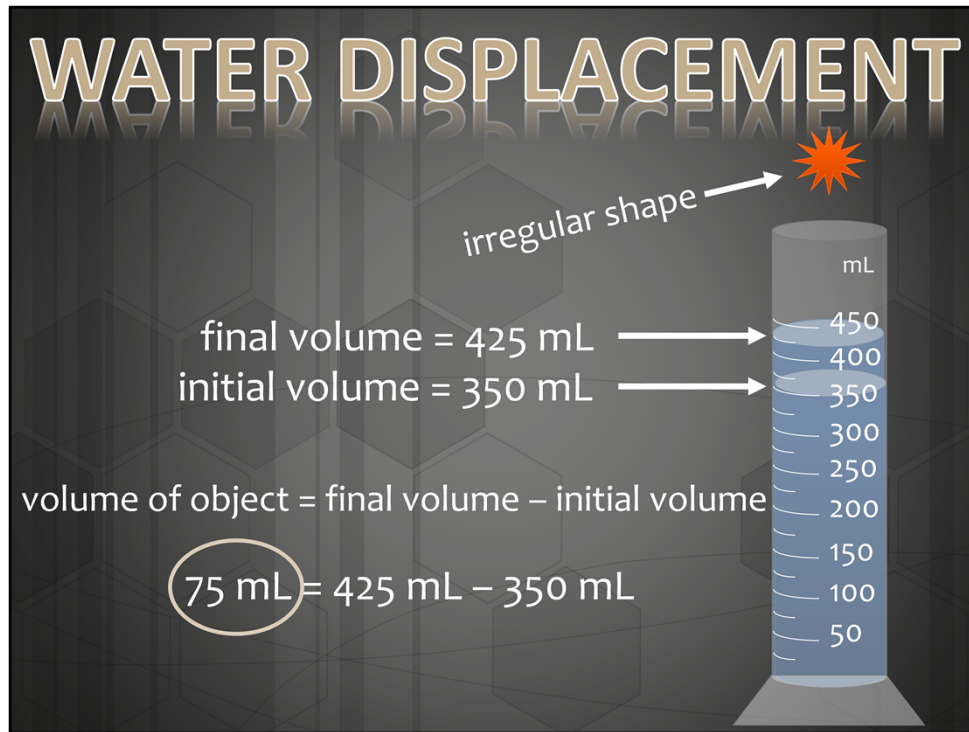
Centimeters

Width	Height	Length
1.3 cm	2.2 cm	1.8 cm

width x height x length = volume  
 $1.3 \times 2.2 \times 1.8 = 5.15 \text{ cm}^3$

If the object is a regular shape like a cuboid or prism, you can calculate volume using a ruler to measure the width, height, and length of an object. View this example using a rectangular cuboid-shaped block. You will need three different measurements to calculate the volume. First, you measure the width of the cube. It appears to be 1.3 centimeters. Next, you measure the height of the cube, and it appears to be 2.2 centimeters. Finally, you measure the length of the cube and you find that it is 1.8 centimeters. Once you have obtained all three measurements, you will need to multiply them in order to find the volume of the object. Here you see that the volume of this object is 5.15 cm<sup>3</sup>.

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When an object cannot be measured using a ruler, you will need to use the water displacement method to determine the volume of the object. In other words, this is the method to use when an object has an irregular shape. Think about your surroundings; are there items whose volume you think would be difficult to measure?

To determine the volume of an object using water displacement, follow these steps:

- First, use a graduated cylinder that is large enough to hold the object. The graduated cylinder shown here is marked up to 450 milliliters.
- Next, fill the cylinder with enough water to ensure that the object will be completely covered with water when submerged. Record the initial volume of the water. The initial volume of the water in this graduated cylinder is 350 milliliters.
- Then, place the object in the cylinder. Record the final volume. The final volume of the water in this graduated cylinder is 425 milliliters.
- Finally, subtract the initial volume of the water in the cylinder from the final volume of the water in the cylinder. The difference in the two volumes is the volume of the object. In this instance, 350 milliliters is subtracted from 425 milliliters, leaving a volume of 75 milliliters.