

Differential Heating (Left out Last Week- Oops!)

- ▶ Different substances absorb and retain heat at different rates
- ▶ Results from your lab- Which substance heated up quicker?
 - Sand or Water?
- ▶ Land (soil, rock, sand) heats fast and cools fast
- ▶ Water heats slowly and cools slowly

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Barycenter

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Who is Moving?

- ▶ Which celestial body is moving in location in our solar system?

Whiteboards!

- A) The Earth
- B) The Sun

BOTH!
Answer: A & B

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Background Information

- ▶ The Sun is not stationary
- ▶ Two Main Motions:
 - **1. Galactic Year:** (225 - 250 million Earth years)
Time for the Solar System to orbit once around the center of the Milky Way
 - The solar system is traveling at 514,000 mph

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So Why Don't We Feel Motion?

- ▶ You don't feel the Earth spin because you, the atmosphere, skyscrapers, and everything else are spinning along with the Earth at the same constant speed.
- ▶ If the earth suddenly started to speed up we'd fall over backwards, and we'd have to lean into the direction of the motion to stand. If the earth were speed up enough that it spun once every hour and twenty minutes, we would fly off its surface. The next time you're in a car or a plane traveling at a constant speed, close your eyes and try to feel that you're moving. You won't be able to tell.

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2nd Main Motion of the Sun

- ▶ 2. Sun orbits solar system's barycenter

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How Does The Sun Orbit?

- ▶ Let's investigate the importance of the barycenter
- 1. With half of your play-doh form a sphere
- 2. Stick the paper clip into your sphere
- 3. Use the small piece of string to suspend the sphere in the air
- ▶ Center of mass, the point of balance, of a sphere is easy to find

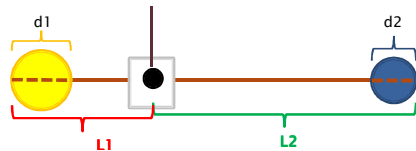
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Unequal distribution of weight?

1. Squish your sphere into an uneven shape
 2. Now where is the center of mass?
- ▶ Closer to the majority of the weight

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Data Collection



Diameter of Sphere 1 (d1) in cm	Length to Balance (L1) in cm	Diameter of Sphere 2 (d2) in cm	Length to Balance (L2) in cm

1. Form different sizes of spheres and find the point of balance.
2. Measure the diameter of each sphere and the distance to the point of balance.
3. Record your results in your notebook
4. If time, repeat for a second time with different size spheres

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Diameter of Sphere 1 (d1) in cm	Length to Balance (L1) in cm	Diameter of Sphere 2 (d2) in cm	Length to Balance (L2) in cm

Diameter Value $\div 2 = \text{Radius}$

$$\frac{4}{3}\pi(\text{radius})^3 = \text{Volume}$$

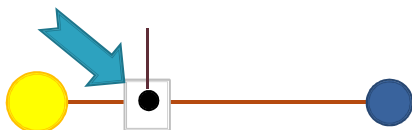
$$\text{Volume} \times \frac{2 \text{ grams}}{\text{cm}^3} = \text{Mass of Sphere}$$

Mass of Sphere 1 in g	Length to Balance (L1) in cm	Mass of Sphere 2 in g	Length to Balance (L2) in cm

$$\text{Mass Sphere 1 (L1)} = \text{Mass Sphere 2 (L2)}$$

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Barycenter = Center of Mass between two objects



Twist Your Model! This represents a planet orbiting the sun.

<http://scienceprojectideasforkids.com/2010/barycenter-of-the-earth-moon-system/>

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Think About It

- ▶ Which planets do you think affect the location of our solar system's barycenter the most?
 - Show me on your whiteboards!

Larger Planets – Jupiter and Saturn

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Sun and the Solar System's Barycenter

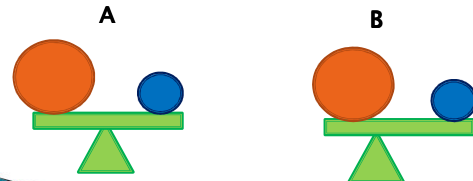
- ▶ <https://www.youtube.com/watch?v=1iSR3Yw6FXo>
 - Start at 1:27 to 2:13
- ▶ The Sun moves as planets tug on it
- ▶ This causes the Sun to orbit the solar system barycenter



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Revisiting the Warm-Up

1. Which picture of a balanced seesaw is right? Justify your choice.



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Today's Main Idea

The **barycenter** is the point in space around which two objects orbit and can vary slightly in its location.

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Explore Question

2. **Explore today's main idea with this question:** Draw a sketch to show the barycenter for the Earth and Moon.

Vocabulary for Next Time

- ▶ Perigee
- ▶ Apogee
- ▶ Eclipse

Helpful Page Numbers:
766, Glossary, Dictionary

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