

AMNH Rose Center for Earth and Space

1 Worlds Beyond Earth (Post-show questions)

What did you learn about the early solar system from space show? Describe something about the evolution of the solar system that you didn't know before.

2 Weight on astronomical objects

Strewn throughout the Rose Center (primarily on the bottom floor) are several different scales on which you can stand. These scales tell you how much you might weigh, were you to stand on the surface of different astronomical bodies (e.g. the Moon, Halley's Comet, a neutron star, etc.)

1. Stand on several different scales. Write down how much you weigh on each and the name of the corresponding astronomical body. (If the scales aren't working, you can use <https://www.exploratorium.edu/explore/solar-system/weight> to calculate your weight on different astronomical bodies.)

(a)

(b)

(c)

2. *Weight* is not a term often found in physics because it is a special case of a more universal quantity we use. What is the name of this more universal quantity? (Hint – it is one of these: *acceleration, work, power, energy, mass, force, velocity, momentum.*) How does it relate to weight specifically?
3. On which object did you weigh the most? On which object did you weigh the least?
4. Using your results from the previous questions, why would you have a different weight on each astronomical body? Why wouldn't you just weigh what you do on Earth? What is different about these bodies that is responsible for changing your weight on them? (Hint: two factors!)

3 Meteorites

There's a lot more to the Solar System than just planets! In the Hall of Meteorites at the Museum of Natural History, we can learn about the other solid bodies that orbit the Sun. Although smaller, they have played a role in the evolution of life on Earth, and they carry records that tell the history of the Solar System going all the way back to the formation of the planets (and even further!).

After taking time to explore all of the exhibits in the Hall of Meteorites, answer the questions below in your lab notebook. Some answers require you to combine information from more than one exhibit.

3.1 The Ahnighito Meteorite

1. What makes this meteorite so special that it's the centerpiece of the collection at AMNH?
2. What is the size of the Ahnighito meteorite relative to a typical human adult? Make a rough sketch of the meteorite's outline along with a person (any of your classmates will do) standing next to it.
3. What is the meteorite mostly made of? How heavy is the Ahnighito meteorite? If you assume that an average person weighs 150 lbs, how many people would it take to balance out the weight of this relatively compact meteorite? (Note: 1 ton = 2000 lbs)

4. What is the difference between a meteorite and a meteor?
5. Give an example of a good place on Earth to search for meteorites. What makes this type of location optimal?

3.2 Impacts

6. Why is the Moon's face covered in craters, while we only see a few on Earth?
7. How does the impact of a large body lead to a mass extinction event, as in the case of the dinosaurs? (Hint: see the Willamette Meteorite display on the lowest level of the Rose Center.)
8. When and where do scientists think Chicxulub (the dinosaur-killing impact) occurred? What is the evidence for it being responsible for this mass extinction?

9. Briefly explain the leading theory of how the Moon formed.

10. What do you think are the main reasons scientists want to study meteors/meteorites?

4 The Big Bang

At the end of the *Scales of the Universe* exhibit, you should find yourself at the entrance to the big sphere. You may have to wait a minute or two in line to get inside to see a short movie on the Big Bang. See this short film, then answer these questions.

1. How old is the Universe?

2. What happened as the Universe expanded?

3. How did small galaxies interact with each other as the Universe evolved?

5 Black Hole Movie

The AMNH has a small theater on the lowest floor under the sphere and in the corner near the images of the galaxies on the wall. It cycles through two or three films, each lasting 5-10 minutes. Go watch the black hole film. (You can watch the other ones too – they are interesting!) After watching it, answer these questions:

1. How do black holes form?
2. If black holes are, in fact, “black”, how do astrophysicists detect them?

6 Conclusions

What was your favorite part of visiting The Rose Center for Earth and Space and why? What is something new that you learned?