What are asteroids, meteors, comets, and moons?
Science -
* pp 212-214 due Wed.
* Quest - Mon. over Lessons 3-4, 5

MT
pp 141-142 all
4 4's due Wed.
Lesson 5

What are asteroids, meteors, comets, and moons?

Write an X on the rock that might have started out as an asteroid. Tell why you made that choice.
I will know the difference between moons, asteroids, comets, meteoroids, meteors, and meteorites.

Words to Know

- asteroid
- dwarf planet
- comet
1. **Explain** Why is the gravitational force of Jupiter important to Earth?

**Possible answer:**
- Jupiter's gravity prevents most asteroids from hitting Earth.

Asteroid Ida has a smaller asteroid orbiting around it. The smaller asteroid is named Dactyl.
**Explain** Why do more asteroids not hit Earth? (Jupiter’s gravity holds most asteroids in an area beyond Mars in the asteroid belt.)

**Predict** What do you think would happen if an asteroid several hundred kilometers wide were to hit Earth’s moon? (Possible answers: It might cause a huge crater. Dust might spread in large quantities. The moon could be knocked out of orbit or possibly destroyed.)
**Explain** Why is a very bright meteor called a fireball? (Because it gets so hot that it glows as a streak of light)

**Order** In what order does a meteoroid go from being a meteoroid to a meteorite? (Meteoroid → meteor → meteorite)
2. **Calculate** The diameter of this crater may be 24 times larger than the diameter of the meteor that formed it. Measure the crater from point A to point B. Then, measure the circles and draw an X on the circle that best represents the probable size of the meteor.

The crater measures 170 mm across;

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170 \text{ mm} \div 24 = 7 \text{ mm}. 
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An Asteroid of Extinction  Some scientists think that the impact from a large asteroid or comet caused the extinction of about 50 percent of all living species, such as dinosaurs, around 65 million years ago. In 1990, scientists discovered a large crater off of the Yucatan Peninsula in Mexico that they think is the result of this large asteroid or comet. The crater is thought to be between about 180 kilometers (112 miles) and 300 kilometers (186 miles) wide, making it one of the largest impact craters on Earth.
Recall  What is a comet? (A comet is a frozen mass of different types of ice and dust orbiting the sun.)

Describe  How does the sun affect a comet when the comet comes close to the sun? (The comet heats up and loses dust and rocky matter.)

Illustrate  Draw the path of a comet around the sun in a cartoon-style image. Under the drawing, describe what is happening. (Students’ drawings should show the orbit of a comet around the sun. Their description should explain what is happening in their drawing.)
3. Cause and Effect: What causes a meteor shower?
Possible answer: Earth passes through the orbit of a comet. Loose pieces of the comet become meteors when they collide with Earth's atmosphere.

Comet Lulin
Elaborate

Tell students that a comet called Halley’s Comet was named for Edmund Halley (1656–1742), an English astronomer who was the first to predict with reasonable accuracy the return of the comet that now bears his name. Halley’s Comet can be seen about every 75 years. Ask students why Halley’s Comet is only seen every 75 years. (It is close to the Sun and to Earth only during part of its very large orbit.)
Recall What is unusual about Pluto’s orbit? (Pluto’s orbit is tilted.)

Decide What evidence helped scientists decide that Pluto is a dwarf planet? (Pluto is very small and has an odd orbit.)

Justify Why should Eris be named a planet before Pluto is named a planet? (Eris is slightly larger than Pluto.)
Chiron was the first moon of Pluto to be discovered. Since then, other moons have been found orbiting Pluto.

4. **Calculate** In how many more years will Pluto be closer to the sun than Neptune?

**Subtract the current year from 2227.**

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\begin{array}{c}
2227 \\
- 2013 \\
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214
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The orbit of Pluto is not aligned with the orbits of the other planets.
Pluto the Dwarf Planet In 2003, Palomar Observatory astronomers thought they detected an additional planet, larger than Pluto, in our solar system. This new discovery intensified the debate about the definition of a planet. In 2006, the International Astronomical Union (IAU) redefined the word *planet* as “a celestial body that orbits the sun, has a nearly round shape, and clears the neighborhood around its orbit.” The newly identified object did not qualify. Neither did Pluto—its odd, angled orbit sometimes overlaps Neptune’s and it has not cleared the region of its orbit. During this 2006 IAU meeting, the IAU also made a new “dwarf planet” category. Dwarf planets are not moon-like satellites. They are like planets except that they do not clear the neighborhood of their orbits. Pluto now belongs in that category, as does the newly discovered object, named Eris.
5. **Compare and Contrast** How are moons and asteroids alike? How are they different?

Both travel in an orbit. Asteroids have uneven shapes and can be very small. Moons are larger and often have a spherical shape.
6. **Explain** How can you tell the difference between a comet and a star?

* A star looks like it stays in place, while a comet looks like it is moving from night to night.*
7. **How are comets and asteroids alike and different?**

**Possible answer:** Comets and asteroids both orbit the sun. Comets have ice and dust. Asteroids are rocky.