Key questions

What causes the: day, month, year, seasons, and phases of the Moon? (Including knowing the lunar phases.)

What are the constellations?

What are circumpolar stars?

How does the sky move over 1 day? Why does it depend on your location on Earth?

How does the sky change over months?

What are Newton's laws?

- what is mass? force? speed? velocity? acceleration?

What is gravity?

- what are sources of gravity
- what attracts what?
- how does gravity depend on distance?

What are Kepler's laws?

- how do planets move around the Sun
- how does their speed change?
- how are period and semi-major axis related?

Sample Question

Asteroid Beyonce was discovered exactly 8 years ago, and has a semi-major axis of exactly 8 AU.

How many orbits around the Sun has asteroid Beyonce made since it was discovered?

A. exactly one
B. less than one
C. more than one

Key questions

- What is a meteor? Shooting star?
  - Why does it shine?
  - Where does it come from?
  - What is the typical size?
  - When is the best time to see them?
- What is a meteor shower?
  - What causes them?
- What is the difference between a meteor and a fireball?

Key questions

- What is a meteorite?
  - What are the three types?
  - What are the differences in number?
  - How do we determine the age?
    Structures of the atom.
  - How do we know that they're from outer space?
- How do the planets orbit the Sun?
- What is the Oort cloud?
- What is the Kuiper belt?
- What is a meteoroid?
- What is the difference between a comet and asteroid?

Key questions

- What is the asteroid belt?
  - How much mass? How dense?
- What are the properties of Near Earth Asteroids?
  - Where do they come from?
  - How long do they last in near Earth orbit?
- What is the stuff between the stars?
- What is the solar nebula theory?

Key questions

What are molecular clouds made from?

Where are stars born?

How are stars born?

Explain gravitational collapse?

What is the effect of spin on a collapsing cloud?

How does small interstellar space dust become planets?

What causes the differences between the planets?

Sample Question

Which of these has a composition most similar (elements in the most similar proportions) to that of the nebula that gave rise to the solar system?

A. (a) the Earth
B. (b) Jupiter
C. (c) a stony meteorite
D. (d) an iron meteorite
E. (e) the nucleus of a typical comet

Key questions

What is terminal velocity and how does it affect impactors? Large ones, small ones?

What is the temperature of small meteorites when they impact?

- **What does the surface look like?**
- **Why do they hurt so?**
- **What property plays main role in amount of energy that they have when they impact?**

Sample Question

Which of these will cause the most damage?

Hint: compare the kinetic energies.

A. an impactor of mass = M, which impacts with speed = V

B. an impactor of mass = 2M, which impacts with speed = V/2

C. both (A) and (B) have have the same kinetic energy

Key questions

How did the Moon form?

Explain the conditions of the Earth during the first billion years with respect to impactors.

What are typical speeds of objects entering our atmosphere?

What does gravity do to dropped objects? How do they react?

If you drop a hammer and a feather, what happens on the Earth or the Moon?

Key questions

What is a crater?

What are the differences between the two main types?

Why are craters mostly round?

Why so few craters on the Earth?

What happened 65 million years ago?

What is the KT boundary?

Proof of impactor?

What happened in Siberia ~100 years ago?

- How often do we expect such impacts?
- Why not more deaths from such events in the past?

Key questions

What happened to Jupiter in 1994?

What happened to the comet?

What happened at the impact sites?

Why does the impact of Jupiter serve as a wake-up call?

What are the consequences of a large impact?

So far, what has NASA done about 1km sized asteroids?

What is NASA going to do with ~100 meter asteroids?

Key questions

- What is the Torino Scale?
- What is Apophis?
  - How close will it get in 2029?
  - What is a keyhole? Why is earlier detection better for impact mitigation?
- What are some problems with blowing up a large impactor?
- Explain the options for delaying an impactor.

Sample Question

Of the potentially hazardous asteroids we have discovered orbiting the Sun, how many are certain to hit the Earth in the next 10 years?

A. zero
B. 1
C. 2
D. 5
E. more than 5