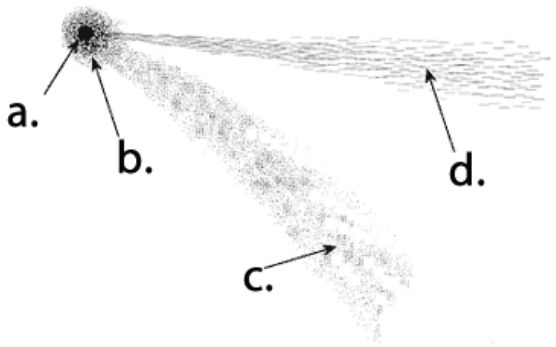
STUDY GUIDE FOR "COMETS"

1) Read the caption under the picture on page 293. What is the difference between comets and meteors:
Comets are made of _____
Meteors are made of _____

2) Do all comets travel at the same speed? _____ (page 293)

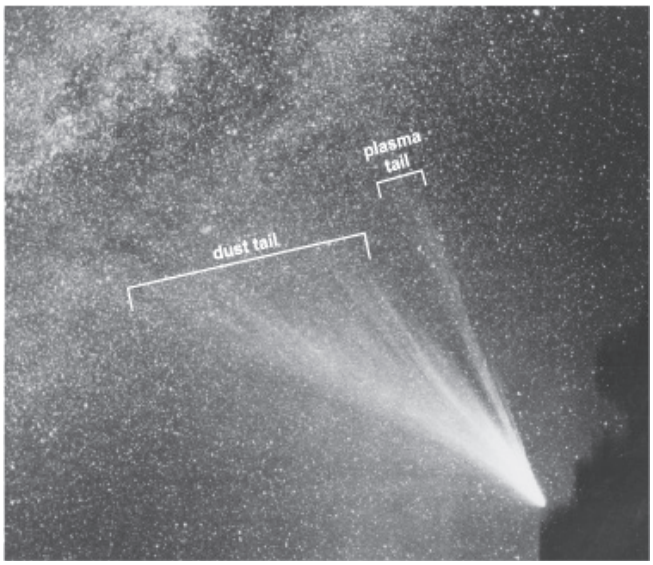
3) How big is an average comet? _____ (bottom of page 293)

4) In the diagram below, (a) is the _____, (b) is the _____,
(a) and (b) together are called the _____, (c) is the _____, and (d) is the _____.



(Read the description of comets at the top of page 294)

In the photo in you can clearly see (c) and (d).



5) How long is an AU (astronomical unit)? _____ miles. Hint-- this is also the distance from the Earth to the sun.

6) Comet tails are measure in AU. Tails have been as long as _____ AU.

7) How dense are comet tails? They are practically _____!

8) Is a comet tail more or less dense than the air we breathe? _____

NOTE:

When scientists say that there is water on the moon, they are sometimes referring just to OH^- ions (an oxygen with one hydrogen). This type of ion could also have been formed by protons from the sun hitting minerals that contain oxygen. Don't imagine lakes and rivers on the moon! The "water" is mostly locked up in minerals. They think that maybe, just maybe, there might be some ice, though, too. This has not yet been proven. One of the ways they detect the presence of water is to analyze reflected sunlight from the moon, and look at it through a spectrometer which can help to identify chemical elements. Don't imagine any photos of ice or lakes on the moon. Mostly the evidence is in the form of logical reasoning after gathering spectrometer data.

Did you know that there is water on Mercury? Read the captions for figure 158.

The next section deals with gravity (page 295):

9) Read the paragraph about astronaut James McDivitt. Read it again. (This shows that even astronauts can struggle with understanding the physics of outer space!) According to this paragraph, which travels at a faster velocity-- a satellite orbiting close to the earth or a satellite orbiting far away from the earth?
_____

10) If the earth was hollow and you were at the center, what would happen? You would _____

11) Which has a stronger gravitational effect on the earth, the sun or the moon? _____ Which one pulls on the oceans and causes tides? _____
The explanation for this is that the sun's pull is so (great/weak) (circle one) that all particles of the earth, including all water droplets in the ocean, feel the sun's pull (equally/unequally). The moon's pull is much (stronger/weaker) and can only pull the side of the earth that is (closer to/further away from) it.

12) How does the sun's gravity affect a comet?
a) it causes the comet to condense b) it can pull it apart c) it slows it down

13) What happened to Apollo 13's garbage after they dumped it into space? _____
_____

14) All objects have gravitational force. The area that is affected by their gravity is called their _____ of _____. Does this get smaller or larger as a body moves away from more massive bodies? _____

Turn the page to 296.

The first paragraph on this page is a bit hard to understand. Basically what it is saying is that two particles that are moving in the same direction and at the same speed (like cars traveling the same direction on a highway) would be likely to join together. Particles that are traveling in opposite or perpendicular paths would not be likely to join together. The particles would pick up speed as they rushed at each other, but this speed would, perhaps ironically, be the very thing that allowed them to escape from each other. (There was an episode of Star Trek where the ship was having trouble escaping from a solar system so they flew the ship at the sun, which created a "sling shot" effect, giving them enough momentum to jettison them away from the solar system.)

15) How large is earth's sphere of influence? _____ This means that a passing object withing this distance would be (more/less) influenced by earth's gravity than the sun's.

16) What is "aero-braking"? It when a spacecraft uses the _____ of the earth to slow down.

17) Does evaporation cool things down? _____ (Did you get that right on the test?)

18) So what would happen if a whole bunch of floating water droplets in space (all going approximately the same speed and direction) got within each other's sphere of influence? (You don't have to write this one down.) Then what would happen as this clump got bigger-- would it be more or less likely to capture more particles?
_____

19) Would a particle's sphere of influence get stronger or weaker as it traveled away from earth? _____

20) It is (easier/more difficult) to capture particles if a floating body has gases in or around it.