ASTRONOMY 150 - EXAM #3 Name: _____

June 7, 1999 TA's Name & Section: _____

Answer all questions in the space provided. If you have any questions, raise your hand. 100 points possible.

1 (8 pts) Point out as least two factual errors in the quote below and explain why they are errors.

> "Mars is in essentially the same orbit [as the Earth]. Mars is somewhat the same distance from the Sun, which is very important. We have seen pictures where there are canals, we believe, and water. If there is water, that means there is oxygen. If oxygen, that means we can breath".
>
> — *Vice President Dan Quayle, serving as head of the National Space Council. Interview on CNN, week of October 8, 1989*

2 (5 pts) Very recent findings by the *Mars Global Surveyor* suggest that Mars once had a magnetic field like the Earth [Mars does not currently have a magnetic field]. In order to generate a magnetic field, what had to have been different about Mars in the past as compared to now?

3 (8 pts) Saturn's moon Enceladus is being tidally heated. Describe how tidal heating works and draw a diagram.

4 (3 pts) Enceladus is in resonance with another of Saturn's moons Dione. If Enceladus has an orbital period of 33 hours, how long does Dione take to go around Saturn?

_____ **hours**

5 (6 pts) Jupiter's very large mass means that it has a large influence in our Solar system. Describe two ways that Jupiter has influenced other worlds or regions in our Solar system.

6 (3 pts) In class we have frequently talked about the "snow-line" in our solar system. What is the "snow-line"?

7 (10 pts) The nearby Solar-type star HD 210277 has a 1.3 Jupiter-mass planet orbiting it at a distance of 1 AU. **If** this planet is a Jupiter-sized gas giant, explain why it is unlikely that it formed at its present location. [Assume this stellar-system is made of the same materials and in the same proportions as our Solar system.]

8 (6 pts) If a planet did form at 1 AU from a solar-type star, describe its most likely composition, density, and size.

9 (10 pts) Everything in our solar system formed from the same material. Material whose elemental composition we call "solar abundance". However, when we pick-up a typical rock on the surface of the Earth or the Moon its composition is very different from "solar abundance". Explain why this is.

10 (4 pts) Describe the appearance of a comet when it is 10 AUs from the Sun.

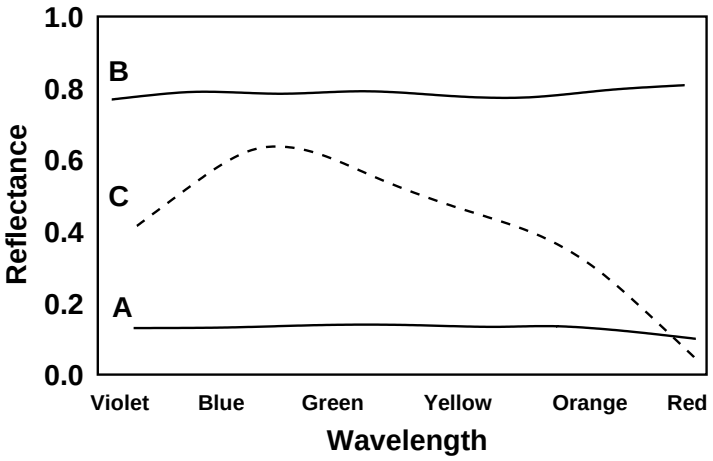
11 (6 pts) Describe the appearance of a comet when it is 1 AU from the Sun.

12 (6 pts) Uranus' moon Ariel has about the same crater density as the lunar mare (neither are saturated). We usually conclude that this means they have about the same age. Explain why this conclusion may be completely incorrect.

13 (6 pts) We learned that there are three broad categories of meteorites: Stony, Stony-Iron, and Iron. Describe from what parts of an asteroidal parent body they originated (a diagram might be helpful).

14 (2 pts) List the top 100 objects in the solar system

Based on observations from the surface of the Earth you have collected data (below) on three worlds in our solar system. Based on the data identify the three worlds. [You do not have to give a specific name (*i.e. Ceres*) just saying an asteroid would suffice].



World	Density (g/cm^3)	Diameter (Earth = 1)
A	5.4	0.4
B	1.2	0.1
C	1.3	4.0

15 (6 pts) Identification of World A: _____
Reason for your identification:

16 (6 pts) Identification of World B: _____
Reason for your identification:

17 (6 pts) Identification of World C: _____
Reason for your identification: