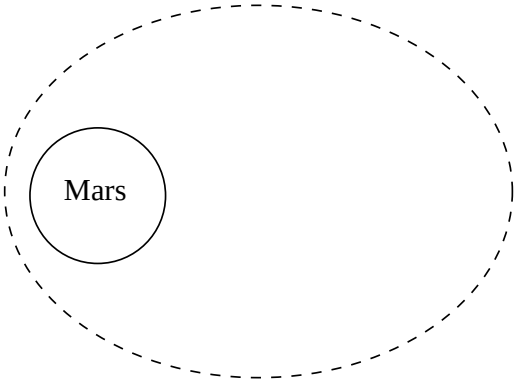
ASTRONOMY 150 - EXAM #1 Name: _____

January 30, 1998 TA's Name & Section (2 pts): _____

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

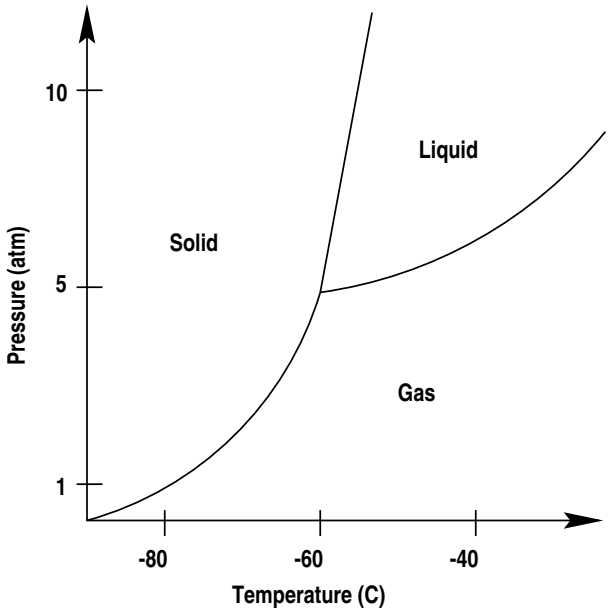


1 (4 pts) To the left is a diagram of the orbit of the Mars Surveyor spacecraft around Mars. Mark on this diagram the place in the orbit where the spacecraft is moving the fastest.

2 (10 pts) I said that the surface of Mercury is about 3.8 billion years old. How do we know this if we do not have any rocks from the surface that we can use to determine the age?

3 (6 pts) The gravity of the Moon is about 1/6 that of the Earth. For example, an astronaut weighing 180 pounds on the Earth would weigh about 30 pounds on the Moon. If you were to double the distance between the Earth and the Moon, how much would our 180 pound astronaut weigh on the Moon? [Be sure to explain your answer]

4 (10 pts) All of the worlds we have studied so far have impact craters. Pick one world (Mercury, Venus, or Mars) and describe two ways the impact craters on that world differ from impact craters on the Moon.



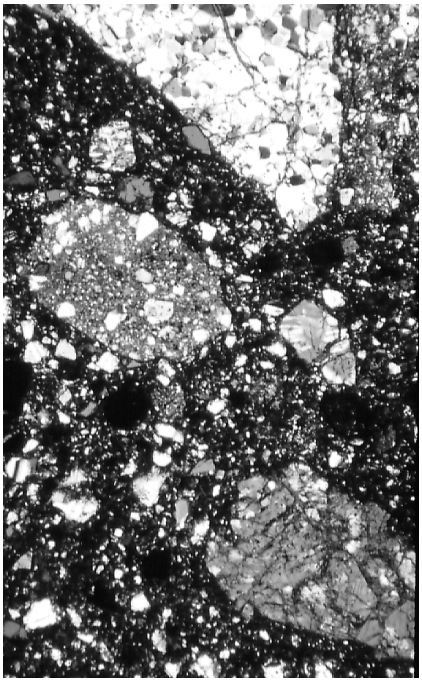
This is the phase diagram for carbon dioxide (CO_2). Use it to answer the following three questions.

5 (4 pts) If the temperature in this room were 20 C what phase would CO_2 be? (check one)

◯ Solid
◯ Liquid
◯ Gas

6 (6 pts) Why can't CO_2 exist as a liquid in this room?

7 (5 pts) If I were to increase the air pressure in this room to 7 times its normal value and then decrease the room temperature slowly from 20 C to -80 C describe what would happen to the CO_2 in the air.



This is an image of a thin–section of a Lunar sample we saw in class. Use it to answer the next four questions

8 (4 pts) What type of sample is this? (check one)

◯ Mare Basalt
◯ Impact Breccia
◯ Lunar Regolith
◯ Plutonic Rock
◯ Orange Soil

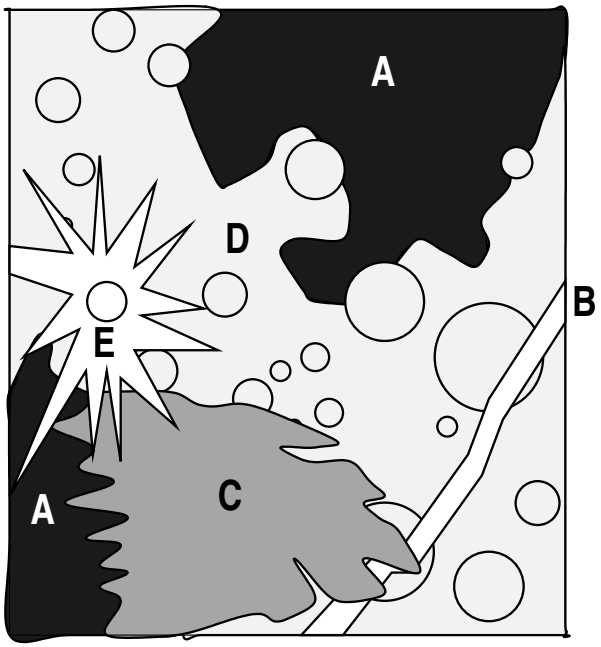
9 (5 pts) What are the characteristics of the thin–section that you used to answer the above question?

10 (5 pts) Describe how the rock this sample came from was formed.

11 (5 pts) Where on the surface of the Moon would you **most** expect to find this sample?

12 (6 pts) Explain why the Earth has such a large difference between its compressed density (5.5 g/cm^3) and its uncompressed density (4.5 g/cm^3) while Mars does not (3.9 g/cm^3 vs. 3.8 g/cm^3).

13 (10 pts) Pick two theories for the origin of the Moon other than the Giant Impact Theory. For each, describe one property of the Earth-Moon system that is well explained by the theory.



14 (5 pts) This is a geological map of the Apollo 17 landing site. Indicate the **relative** ages of the various landforms from oldest (1, formed first) to youngest (5, formed last).

A - Highland Mountains _____

B - Straight Rille _____

C - Landslide _____

D - Mare Surface _____

E - Crater and Ejecta _____

15 (5 pts) Explain how the lunar regolith was formed.

16 (8 pts) Where would you expect the lunar regolith to be thicker: the highlands or the maria? Explain your reasoning.