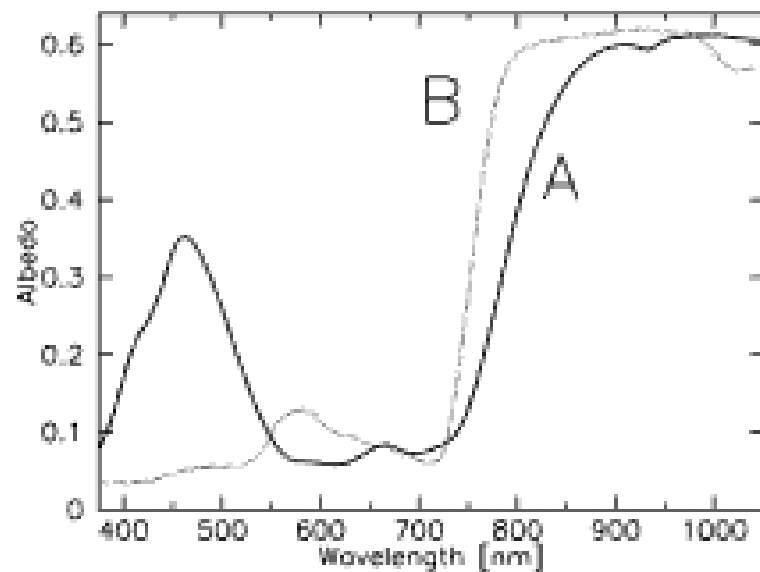


Answer all questions in the space provided. If you have any questions, raise your hand. 100 points possible. NO CALCULATORS OR ANY ELECTRONIC DEVICES.



The plot on the left shows the reflectance spectra of two samples, Sample A (solid line), and Sample B (dotted line). Both are commonly found here in the Pacific Northwest. Remember that you can see wavelengths in a range of 380 to 700 nm. Wavelengths longer than 750 nm are in the infrared.

1 (3 pts) What best describes the **visible** appearance of sample A?

- (a) Bright Blue
- (b) Dark Blue
- (c) Bright Green
- (d) Dark Green
- (e) Bright Red
- (f) Dark Red

2 (3 pts) What best describes the **visible** appearance of sample B?

- (a) Bright Blue
- (b) Dark Blue
- (c) Bright Green
- (d) Dark Green
- (e) Bright Red
- (f) Dark Red

3 (3 pts) At what wavelength would a filter be best able to distinguish the two samples?

- (a) 450 nm
- (b) 650 nm
- (c) 850 nm
- (d) 1000 nm

4 (3 pts) Which one of the sample is most likely to be a pine tree?

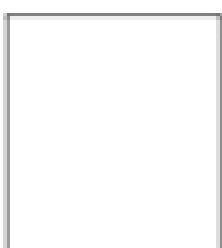
- (a) Sample A
- (b) Sample B

5 (3 pts) The other sample is most likely

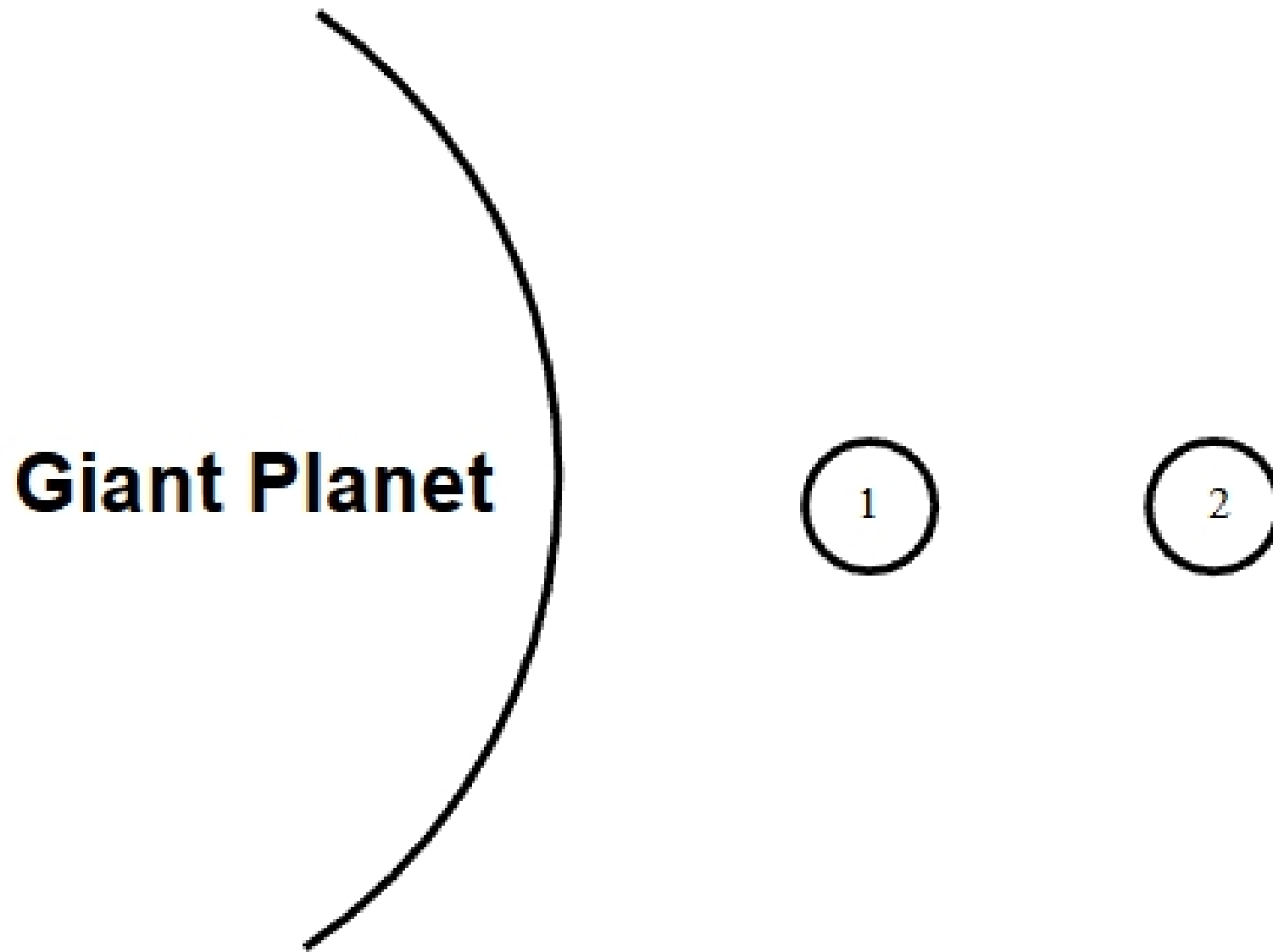
- (a) Concrete
- (b) Basalt
- (c) Blue tarp
- (d) Wet soil

6 (3 pts) In the infrared, these sample would appear

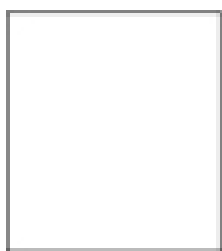
- (a) very bright
- (b) very dark
- (c) very red
- (d) very blue



7 (8 pts) In the diagram below, show the forces that are acting on each object (moon 1 and moon 2). Draw an arrow whose **direction** shows the direction of the force and whose **length** shows the amount of the force. Ignore the effects of the moons on the giant planet. (You should have 4 arrows)



8 (8 pts) Would you expect a world with a surface made of water ice to have a similar secondary atmosphere as a world with a surface made of rock? Why or Why not?



9 (8 pts) Explain what it means for an asteroid to be in a 2:1 resonance with Jupiter, and why there are not many asteroids in this resonance.

10 (8 pts) Describe how the composition and relative amounts of *solid* material available to build planets, differ inside the “snow-line” as compared to outside the “snow-line”.

