

## PHYS 178 – Assignment 3

### Sketchy Answers

This assignment contributes 2% to your final grade. Please write brief answers directly on the sheet in the spaces provided (and on the back if necessary). The assignment should be turned into the PHYS 178 assignment box on level 2 of E7B, just outside the doorway to E7A.

1. Explain why the atmospheric pressure at the surface of Venus is almost 100 times that on Earth.

*The mass of (ie the amount of material in) Venus' atmosphere is almost 100 times that the Earth's. Venus' mass and radius are similar to the Earth's and so the acceleration due to gravity is similar. So the net force due to gravity on – i.e. the weight of – the atmosphere is about 100 times greater; it is this that creates the crushing pressure at the surface.*

2. Contrast the tectonic activity on Venus with that on Earth.

*Internally, Venus is thought to be as active as the Earth with convection of the mantle creating upwelling and downwelling regions that stretch or compress the overlying crust. This creates fractures and folds as on Earth. On Earth this also drives plate tectonics. On Venus there are no plates and subduction zones because the crust appears to be too strong and plastic to break apart.*

3. Briefly describe one piece of evidence for the existence of subsurface water on Mars.

*Fluid-like ejecta around some impact craters; jumbled or chaotic terrain at the heads of channels where water appears to have burst out of the ground; collapse of walls of large “canyons” possibly undermined by water; channels emerging from underground springs; Phoenix found subsurface ice; polar caps contain water overlaid with solid carbon dioxide; . . .*

4. Briefly describe a second piece of evidence for the existence of subsurface water on Mars.

*See above.*

5. Why is the atmosphere of Mars so tenuous compared to those of Venus and the Earth?

*The gravity is low, so atoms at the top of the atmosphere can more easily escape to space. These are created by the destruction of molecules by solar radiation and the solar wind. Over a few billion years this has eaten the atmosphere away.*