

PHYS 178 – Assignment 2

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 Earth-Moon distance is expanding at the rate of a few centimetres per year.

The Moon's gravitational field raises a tidal bulge on the Earth. The Earth's rotation drags the bulge ahead of the Earth-Moon line. This asymmetry means that the gravitational pull of the Earth on the Moon is off centre in a direction that tends to pull it along in its orbit; as a result the Moon slowly spirals away from the Earth.

2. Give two pieces of evidence that imply that the lunar seas are younger than the lunar highlands.

First, the seas are much less cratered than the highlands, implying that they have not been exposed to bombardment for as long. Second, radioactive dating of lunar samples obtained in the Apollo missions confirm that the highlands are older than 4 Gyr, whereas the age of the lunar seas are in the range 3.3–3.8 Gyr.

3. Briefly outline one of the scenarios for the formation of the Moon.

A brief description of one of the condensation, fission, capture or impact scenarios would have done here.

4. Describe how Mercury's "lobate scarps" are thought to have formed.

Mercury's large core shrank significantly as it cooled, causing the crust (which would not shrink as much) to wrinkle and crack.

5. Why is Mercury believed to have a large iron core?

Primarily its high density. Mercury's magnetic field indicates that some of the metallic core may still be liquid (but it does not necessarily imply that the core is large).