

Computer Marked Assignment

Make sure you know how to use the CMA form: detailed instructions are given in your student handbook (or supplement).

You are strongly advised to attempt every question in this assignment.

If you do not wish to answer a question, pencil across the 'don't know' cell ('?').

If you think that a question is unsound in any way, pencil across the 'unsound' cell ('U') in addition to pencilling across either an answer cell or the 'don't know' cell.

Note For each question, you **must** pencil across **either** the required number of answer cells **or** the 'don't know' cell.

Covering:

Block 2, Chapters 1-7

Cut-off date:

Friday 5 July 1996

PART A

This part covers mainly Chapters 1-5 of Book 2, and carries 60% of the marks for this assignment.

Q1 Images taken from a passing spacecraft reveal that an asteroid 24 km in diameter has a tiny companion satellite orbiting it at a distance of 13.7 km with a period of 1.6 hours. What is the mass of the asteroid? Choose from the key the answer nearest to yours.

KEY for Q1

- | | |
|------------------------|---------------------------|
| A 1.7×10^3 kg | E 6.1×10^{12} kg |
| B 3.6×10^4 kg | F 4.6×10^{16} kg |
| C 4.9×10^5 kg | G 7.7×10^{18} kg |
| D 5.7×10^9 kg | |

Pencil across *one* cell in row 1.

Q2 Which *two* of the following lines of evidence indicate most strongly that the Moon was formed as a result of a giant impact on the Earth?

KEY for Q2

- A The radius of the Moon's core is a smaller fraction of the Moon's diameter than the radius of the Earth's core is of the Earth's diameter.
- B The Earth and the Moon have similar abundances of radioactive, heat-producing isotopes.
- C The Earth and the Moon have mantles with similar SiO_2 and Al_2O_3 abundances.
- D The Earth and the Moon share similar oxygen isotope characteristics.
- E The Moon's mantle is enriched in titanium relative to the Earth's.
- F The Moon's core is smaller than the Earth's.
- G The Moon is depleted in volatile elements relative to the Earth.

Pencil across *two* cells in row 2.

Q3 How does the total heat production from radioactive isotopes in the Earth today compare with that immediately after it formed? (Refer to Table 3.2). Is it:

KEY for Q3

- A $\frac{1}{2}$ of the primordial total.
- B $\frac{1}{4}$ of the primordial total.
- C $\frac{1}{8}$ of the primordial total.
- D $\frac{1}{16}$ of the primordial total.
- E $\frac{1}{32}$ of the primordial total.
- F $\frac{1}{64}$ of the primordial total.
- G $\frac{1}{128}$ of the primordial total.
- H Not possible to answer this question with the available information.

Pencil across *one* cell in row 3.

Q4 The terrestrial impact crater at Chicxulub in Mexico, which is thought to have been associated with the death of the dinosaurs, is buried by younger deposits. It is inferred to have a diameter of about 180 km. If a comparable impact were to affect the Moon next Thursday, what sort of structure would we expect to see the following day?

KEY for Q4

- A A crater with terraces and a single central peak.
- B A crater with a complex central peak or fragmentary ring.
- C A crater with a complex central peak or fragmentary ring and well developed ejecta rays.
- D A crater with a complex central peak or fragmentary ring, well developed ejecta rays and impact melt.
- E A peak-ring basin with ejecta rays and impact melt.
- F A multi-ringed basin with ejecta rays and impact melt.
- G A multi-ringed basin with ejecta rays and impact melt, flooded by basalt lavas.

Pencil across *one* cell in row 4.