

## Final Examination

**At the end of the examination hand in all pages of the booklet.  
Materials permitted: Calculator and two 8½" x 11" sheets of paper**

### Table of Values:

Gravitational constant, G	6.67	$\times 10^{-11}$	$\text{m}^3 \text{kg}^{-1} \text{s}^{-2}$
Planck's constant, h	6.6	$\times 10^{-34}$	J s
Mass of the Sun, $M_{\text{U}}$	2	$\times 10^{30}$	kg
Astronomical Unit, A.U.	1.5	$\times 10^{11}$	m
Parsec, pc	206 000		A.U.
Stefan-Boltzmann constant, F	5.67	$\times 10^{-8}$	$\text{W m}^{-2} \text{K}^{-4}$
Speed of light, c	3	$\times 10^8$	$\text{m s}^{-1}$

### Section A: Multiple choice (25%)

10 questions worth 2 points each

**Circle the letter corresponding to the most appropriate answer to each**

- A1) The most abundant material in the universe is:  
a) hydrogen                      b) CO<sub>2</sub>                      c) H<sub>2</sub>O                      d) helium                      /2
- A2) The waves that geophysicists use to probe the interior of the Earth are:  
a) seismic                      b) gravitational                      c) infra-red                      d) laser                      /2
- A3) Which type of rock is not found on the Moon?  
a) Basalt                      b) Anorthosite                      c) Limestone                      d) Breccias                      /2
- A4) Caloris Basin is found on:  
a) Moon                      b) Mimas                      c) Mercury                      d) Mars                      /2
- A5) The magnetic field strength of Venus, relative the that of Earth is:  
a) 0                      b) huge                      c) 1                      d) 0.01                      /2
- A6) What is the major constituent of the atmosphere of Mars?  
a) CO<sub>2</sub>                      b) CH<sub>4</sub>                      c) H<sub>2</sub>                      d) H<sub>2</sub>O                      /2
- A7) The least dense planet in the Solar System:  
a) Uranus                      b) Mars                      c) Saturn                      d) Jupiter                      /2
- A8) The surface temperature of Titan is:  
a) 368 K                      b) 273 K                      c) 178 K                      d) 95 K                      /2
- A9) Which planet is blue-green, with dark storms?  
a) Saturn                      b) Earth                      c) Neptune                      d) Uranus                      /2
- A10) Which of the following has *not* been found on Europa?  
a) Mountains                      b) Craters                      c) Ice                      d) Cracks                      /2

**Section B (25%)**  
10 questions worth 2 points each  
**Answer each question in the space provided**

What *name* describes each of the following?

B1) The planets which are further from the Sun than the Earth is. \_\_\_\_\_ /2

B2) This adjective describes a planet that is orbiting another star. \_\_\_\_\_ /2

B3) Northern (or Southern) Lights. \_\_\_\_\_ /2

B4) An apparent “rocking” motion of the Moon. \_\_\_\_\_ /2

B5) Densest of the planets \_\_\_\_\_ /2

B6) The most prominent of the gaps in Saturn’s rings. \_\_\_\_\_ /2

B7) Spacecraft which orbited Jupiter \_\_\_\_\_ /2

B8) The region around a planet occupied by its magnetic field. \_\_\_\_\_ /2

B9) The most massive satellite in the Solar System. \_\_\_\_\_ /2

B10) Satellite of Uranus that appears to have been broken up  
and re-assembled. \_\_\_\_\_ /2

**Section C (25%)**

Points for each part are shown beside its answer space

**Answer each question in the space provided**

C1) Mercury's sidereal rotation period is 59 days and its diameter is 4878 km, what difference in wavelength would be observed between 21 cm radio waves reflected from the centre and side of the planet?

\_\_\_\_\_ /5

C2) The Oort cloud of comets is believed to orbit about 50 000 AU from the Sun.

a) How long do they take to orbit the Sun?

\_\_\_\_\_ /5

b) What is their orbital speed?

\_\_\_\_\_ /5

C3) The angular diameter of Jupiter varies little between one opposition and another. In contrast, the angular diameter of Mars varies considerably. Why?

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**Section D (25%)**

10 questions worth 2 points each

**Answer each question in the space provided**

In a *few sentences*, with a *diagram* if useful, explain what is meant by **each** of the following terms:

D1) Synodic Period \_\_\_\_\_

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D2) Kuiper Belt \_\_\_\_\_

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D3) Greenhouse Effect \_\_\_\_\_

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D4) Mare \_\_\_\_\_  
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D5) *MESSENGER* \_\_\_\_\_  
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D6) Retrograde \_\_\_\_\_  
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D7) Viking \_\_\_\_\_  
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