Earth & The Solar System

Question Paper

Course	CIE IGCSE Physics
Section	6. Space Physics
Topic	Earth & The Solar System
Difficulty	Hard

Time Allowed 80

Score /60

Percentage /100

Question 1a

The statements below describe some of the objects which are found in the Solar System.

For each description, state the name of the object.

(i) The fifth planet from the Sun.

[1]

(ii) A rocky object located between Mars and Jupiter.

[1]

(iii) A ball of ice and dust whose orbit takes it beyond the Solar System.

[1]

(iv) One of a number of small, rocky objects orbiting Jupiter.

[1]

[4 marks]

Question 1b

The Earth-Moon system creates effects which can be observed from Earth.

(i) Tick the statements which are **correct**.

- ☐ The Earth orbits the Sun once every 365 days
- ☐ The Moon takes five weeks to orbit the Earth
- ☐ The Moon's phases change on a regular cycle
- ☐ Day and night on Earth are caused by the Moon's orbit

[2]

(ii) Sketch and explain the appearance of the Moon two weeks after a New Moon.

You may use your diagram to support your explanation.

[4]

[6 marks]

Question 2a

Extended tier only

A comet enters the Solar System from beyond the orbit of Pluto.

(i) State the direction in which the comet travels.

[1]

(ii) State how the strength of the Sun's gravitational field changes as the distance from the Sun decreases.

[1]

(iii) State how the speed of the comet changes as it enters the Solar System.

[1]

[3 marks]

Question 2b

Extended tier only

Mercury is nearer to the Sun than Saturn.

(i) Compare the orbital speeds of Mercury and Saturn. Explain your answer.

[3]

(ii) Compare the length of the year on Saturn to a year on Mercury.

Explain any differences which you mention in your answer.

[3]

[6 marks]

Question 3a

A student states that the nearest star to Earth is Proxima Centauri.

Explain what is wrong with this statement.

[1 mark]

Question 3b

Light from Proxima Centauri takes 2 200 000 minutes to reach the Earth. Light from the Sun takes 8.3 minutes to reach the Earth.

The distance from the Sun to the Earth is defined as being 1 astronomical unit (AU).

For the distance to Proxima Centauri

(i) Calculate the distance in metres.

[3]

(ii) Use the ratio method to determine the distance in terms of astronomical units

[2]

[5 marks]

Question 3c

A light year is the **distance** that light travels in one year.

Astronomers usually give the distance from stars in terms of light years rather than using metres and kilometres.

Suggest a reason for this.

[2 marks]

Question 4a

Extended tier only

Explain why the orbital speeds of the gas giants are slower than those of the rocky planets.

[3 marks]

Question 4b

Extended tier only

The data table in Fig. 1 shows data on the four inner planets.

	Mean distance from Sun / millions km	Orbital period / days	Surface temp / °C	Density / kg/m^3	Diameter / 10^3 km	Mass / 10^{24} kg	Surface gravity / N/kg
Mercury	57.9	88	350	5427	4.8		3.7
Venus	108.2	225	460	5243	12.1		8.9
Earth	149.6	365	20	5514	12.8	5.97	9.8
Mars	227.9	687	23	3933	6.8		3.7

Fig. 1

Estimate whether the missing masses of Mercury, Venus and Mars, are larger, smaller or very similar to the mass of Earth, referring to the data to support your answer.

(i) Mercury

[3]

(ii) Venus

[3]

(iii) Mars

[3]

[9 marks]

Question 4c

Extended tier only

Select data from the table to support the use of Newton's Laws of Motion when calculating for orbital motion.

Explain your choice.

[7 marks]

Question 5a

Extended tier only

The orbital speeds of comets are not constant.

Describe and explain how the speed changes.

[5 marks]

Question 5b

Extended tier only

Fig. 1 shows Jupiter and the orbits of two of its moons, Ganymede and Europa.

The positions of the two moons are marked for various dates.

The radius of Europa's orbit is 671 000 km. The radius of Ganymede's orbit is 1 070 000 km

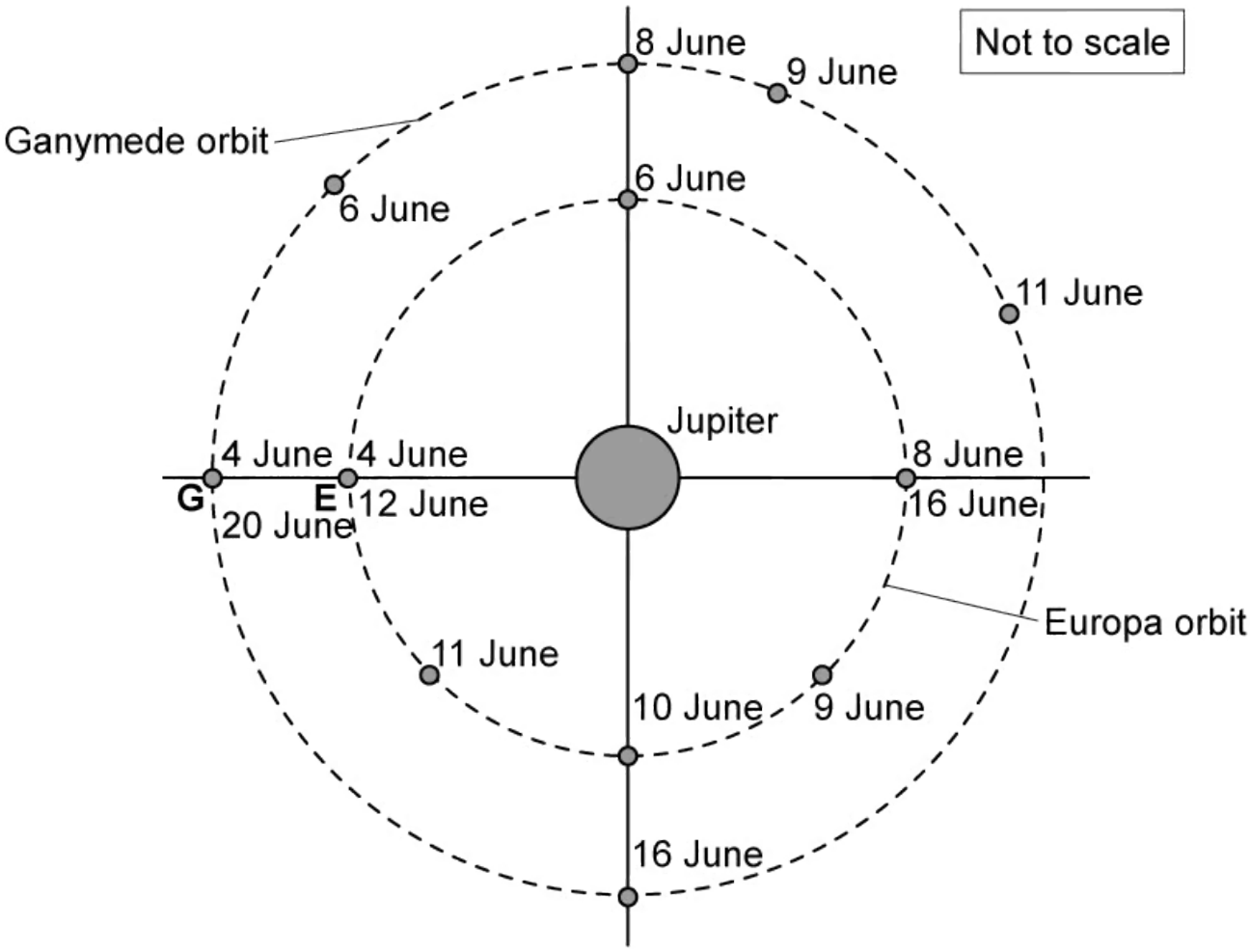

Fig.1.

Determine the time for Ganymede to complete one orbit of Jupiter.

[1 mark]

Question 5c

Extended tier only

Calculate the distance from Europa to Ganymede on 8 June.

[3 marks]

Question 5d

Extended tier only

Describe and explain how the distance between Europa and Ganymede changes during three orbits of Europa.

[5 marks]