3.24 The Solar System, Orbital Motion and Satellites: Test Pack

Total Marks

AQA 8463 · Calculator allowed · about 20 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 The Solar System contains many different types of object, all orbiting the Sun (directly or indirectly).

(a) State what type of object the Sun is. **(1)**

(b) Name the objects that orbit the Sun directly, such as Earth and Jupiter. **(1)**

(c) Name the objects that orbit planets, such as the Moon orbiting the Earth. **(1)**

(d) Name two other types of smaller object found in the Solar System, in addition to planets and their moons. **(1)**

(Total for Question 1 is 4 marks)

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2 Orbital speed, orbital radius and time period are linked by a single equation.

(a) Write down the equation linking orbital speed, orbital radius and time period. **(1)**

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(b) State the SI unit of orbital speed. **(1)**

(Total for Question 2 is 2 marks)

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3 Elements are created within the life cycle of a star.

(a) State the process, and the location within a star, by which elements up to iron are formed. **(2)**

(b) State when elements heavier than iron are formed. **(1)**

(Total for Question 3 is 3 marks)

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4 The Moon orbits the Earth, and the Earth orbits the Sun.

(a) State what provides the centripetal force that keeps the Moon in orbit around the Earth. **(1)**

(b) The Earth takes 1 year to orbit the Sun, and the Moon takes about 1 month to orbit the Earth. Using ideas about orbital radius, suggest why the Moon completes many more orbits of the Earth in a year than the Earth completes orbits of the Sun. **(2)**

(Total for Question 4 is 3 marks)

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5 A student incorrectly says that a star like the Sun produces energy by burning hydrogen gas, in the same way a fire burns fuel.

(a) State the correct process by which the Sun produces energy. **(1)**

(b) Explain why this process is different from ordinary burning (combustion). **(2)**

(Total for Question 5 is 3 marks)

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Mark scheme · 3.24 The Solar System, Orbital Motion and Satellites: Test Pack

Question 1

(a) a star **B1**

(a) Answer: A star.

(b) planets **B1**

(b) Answer: Planets.

(c) (natural) satellites/moons **B1**

(c) Answer: Natural satellites (moons).

(d) any two of: dwarf planets; asteroids; comets **B1**

(d) Answer: Any two of: dwarf planets, asteroids, comets.

Question 2

(a) orbital speed = (2 x π x orbital radius) / time period **B1**

(a) Answer: orbital speed = (2 x π x orbital radius) / time period

(b) metres per second, m/s **B1**

(b) Answer: Metres per second (m/s).

Question 3

(a) nuclear fusion **B1**

(a) in the core of the star **B1**

(a) Answer: Nuclear fusion, in the core of the star.

(b) during a supernova explosion **B1**

(b) Answer: During a supernova explosion.

Question 4

(a) the gravitational force between the Earth and the Moon **B1**

(a) Answer: Gravitational force between the Earth and the Moon.

(b) the Moon's orbital radius around the Earth is much smaller than the Earth's orbital radius around the Sun **B1**

(b) a smaller orbital radius corresponds to a much shorter time period, so the Moon completes far more orbits in the same amount of time, oe **B1**

(b) Answer: The Moon's orbit has a much smaller radius, giving a much shorter time period, so it completes far more orbits per year.

Question 5

(a) nuclear fusion (of hydrogen nuclei to form helium) **B1**

(a) Answer: Nuclear fusion.

(b) nuclear fusion involves the nuclei of atoms joining together, releasing energy from within the nucleus, not a chemical reaction with oxygen **B1**

(b) ordinary burning/combustion is a chemical reaction between a fuel and oxygen, releasing much less energy per kilogram of fuel than nuclear fusion, oe **B1**

(b) Answer: Fusion joins atomic nuclei together, releasing far more energy than the chemical reaction of burning with oxygen.

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