IGCSE PHYSICS • EXERCISE SHEET

6.1 The Earth and the Solar System

Name: _____ Class: _____ Date: _____ **Total: 9 marks**

Objective

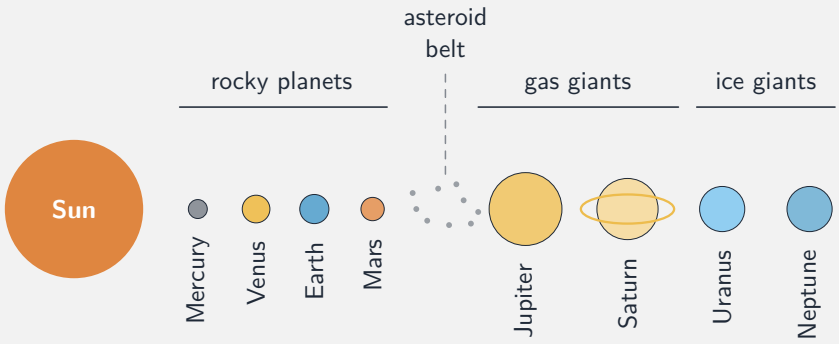
Build the skills to answer exam questions on **the Earth and the Solar System** 地球与太阳系—day/night/seasons, **orbital speed** $v = \dfrac{2\pi r}{T}$, the planets, and **orbits and gravity** 轨道与引力.

You must be able to:

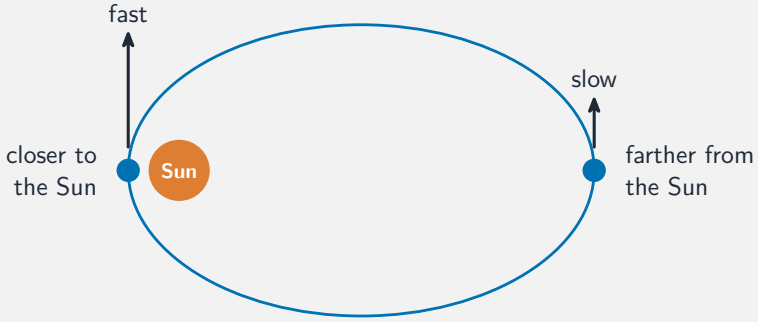
- explain day, year, seasons and Moon phases
- use $v = \dfrac{2\pi r}{T}$ for an orbit
- describe the Solar System and elliptical orbits

1 Worked examples

Orbits and orbital speed



Four small rocky planets, then the asteroid belt, then four large gaseous planets



An object speeds up when closer to the Sun (PE→KE) and slows down when farther away

Space station, $r = 7.0 \times 10^6$ **m,** $T = 5800$ **s:** $v = \dfrac{2\pi r}{T} = \dfrac{2\pi(7.0 \times 10^6)}{5800} \approx 7600$ m/s.

2 Practice

2.1 State what causes day and night. [1]

2.2 Name the force that keeps a planet in orbit around the Sun. [1]

3 Exam-style questions

3.1 Compared with the inner planets, the outer planets orbit the Sun: [1]

- **A** faster
- **B** more slowly
- **C** at the same speed
- **D** in the opposite direction

3.2 A moon orbits a planet at a radius of 4.0×10^8 m with a period of 2.0×10^6 s.

(a) Find its orbital speed. [3]

(b) State what happens to the gravitational field strength of the planet as you move further from it. [1]

3.3 A comet moves in a very stretched elliptical orbit. Explain why it moves fastest when closest to the Sun. [2]

4 Go further

You are now ready for the real exam questions on this subtopic. Open the **6.1 The Earth and the Solar System** past-paper sheet in the Library, or try these in **Practice mode**:

- 0625/21 N25 —Q38 (orbits / satellites)
- 0625/21 N25 —Q39 (comets / Solar System)

Solutions

2.1 the Earth spinning (rotating) on its axis.

2.2 gravity / the Sun's gravitational attraction.

3.1 B. The Sun's gravity is weaker further out, so outer planets move more slowly.

3.2 (a) $v = \dfrac{2\pi r}{T} = \dfrac{2\pi(4.0 \times 10^8)}{2.0 \times 10^6}$; $= 1.3 \times 10^3$ m/s.
(b) it decreases (gets weaker).

3.3 as the comet comes closer, its gravitational potential energy falls; by conservation of energy this becomes kinetic energy, so it speeds up.