

6. Space physics

Starter Quiz

IGCSE Physics

Name: _____ Score: _____

1. What causes day and night?

- ☐ the Moon orbiting the Earth
- ☐ the Sun switching off
- ☐ the Earth orbiting the Sun
- ☐ the Earth spinning on its axis

2. How do the inner and outer planets differ?

- ☐ the inner four are small and rocky; the outer four are large and gaseous
- ☐ they are all the same
- ☐ the inner four are gaseous; the outer four are rocky
- ☐ the inner planets have no Sun

3. What powers the Sun?

- ☐ nuclear fusion of hydrogen into helium
- ☐ friction
- ☐ nuclear fission of uranium
- ☐ burning hydrogen like a fire

4. Light from a distant galaxy is redshifted. This means the galaxy is:

- ☐ standing still
- ☐ getting hotter
- ☐ moving toward us
- ☐ moving away from us, so its light is stretched to a longer wavelength

5. What causes the seasons?

- ☐ the Sun changing brightness
- ☐ the Earth getting closer to and further from the Sun
- ☐ the Moon blocking the Sun
- ☐ the tilt of the Earth's axis as it orbits the Sun

6. The Sun is about 1.5×10^{11} m away. How long does its light take to reach Earth, in seconds? (light speed 3.0×10^8 m/s)

_____ s

7. The cosmic microwave background radiation (CMBR) is found coming from every direction in space.

☐ True ☐ False

8. The phases of the Moon happen because we see different amounts of its lit side as it orbits.

☐ True ☐ False

9. The Hubble constant is about $H_0 = 2.0 \times 10^{-18}$ per second. Estimate the age of the Universe ($1/H_0$), in seconds.

_____ s

10. A satellite orbits at radius $r = 7.0 \times 10^6$ m with a period $T = 5800$ s. What is its orbital speed, in m/s?

_____ m/s

1. the Earth spinning on its axis

The Earth rotates once in about 24 hours, so each place faces the Sun (day) then faces away (night).

2. the inner four are small and rocky; the outer four are large and gaseous

The four inner planets are small and rocky; the four outer planets are large and gaseous (gas giants and ice giants).

3. nuclear fusion of hydrogen into helium

In a stable star, hydrogen nuclei fuse into helium in the core, releasing huge amounts of energy.

4. moving away from us, so its light is stretched to a longer wavelength

A receding source stretches the light to a longer wavelength – toward the red end of the spectrum.

5. the tilt of the Earth’s axis as it orbits the Sun

The tilted axis means each hemisphere leans toward the Sun for half the year (summer) and away for the other half (winter).

6. 500 s

$$\text{time} = \frac{d}{v} = \frac{1.5 \times 10^{11}}{3.0 \times 10^8} = 500 \text{ s (about 8 minutes).}$$

7. True

The CMBR fills all of space, coming from every direction – it is early radiation stretched into microwaves as the Universe expanded.

8. True

As the Moon orbits Earth, the fraction of its sunlit side that we can see changes, giving new, half and full moon.

9. 5e+17 s

$$\text{Age} \approx \frac{1}{H_0} = \frac{1}{2.0 \times 10^{-18}} = 5.0 \times 10^{17} \text{ s (roughly 16 billion years).}$$

10. 7600 m/s

$$v = \frac{2\pi r}{T} = \frac{2\pi \times 7.0 \times 10^6}{5800} \approx 7600 \text{ m/s.}$$