

MR SULLY UNFOLDS PHYSICS ANSWERS

Orbital motion and satellites

AQA 4.8.1.3
Space · Paper 2
Physics only

Name _____ Class _____ Date _____

Gravity keeps planets orbiting stars, and moons and artificial satellites orbiting planets.

KEY IDEAS

- Gravity provides the force that keeps planets and satellites (natural and artificial) in circular orbits.
- In a circular orbit, the force of gravity changes the direction of motion but not the speed, so the velocity changes.
- **Higher:** for a stable orbit, the radius must change if the speed changes: smaller orbits need higher speeds.

Section A · Recall

Grade 4–5

1 What force keeps the Moon in orbit around the Earth? [1]

Gravity

2 Give one difference between a natural satellite and an artificial satellite. [2]

A natural satellite (moon) formed naturally;

an artificial satellite was built and launched by people.

3 Name the object that each of these orbits: a planet; a moon. [2]

Planet: a star (e.g. the Sun) · Moon: a planet

Section B · Explain

Grade 5–6

4 Explain why a satellite moving in a circle at constant speed is accelerating. (Higher) [3]

Velocity is a vector: it includes direction.

The satellite's direction is constantly changing,

so its velocity is changing, which means it is accelerating.

5 In which direction does the force of gravity act on an orbiting satellite? [1]

Towards the centre of the orbit (the centre of the planet).

Section C · Stretch

Grade 7+

6 A satellite is moved into a lower orbit. Explain what must happen to its speed. (Higher) [3]

Closer to the planet, the gravitational force is stronger.

For a stable orbit, the radius must change if the speed changes:

the satellite must move faster in the lower orbit.

Exam-style question

AQA style

7 The International Space Station (ISS) orbits much closer to the Earth than a communications satellite.

a Compare the speeds of the ISS and the communications satellite. Explain your answer. (Higher) [3]

The ISS moves faster.

Gravity is stronger closer to the Earth,

so a smaller orbit needs a higher speed to be stable.

b Describe the difference between the speed and the velocity of the ISS as it orbits. [2]

Its speed stays the same,

but its velocity keeps changing because its direction changes.

Total: _____ / 17

How confident am I?	Not yet	Nearly	Got it
I can explain how gravity keeps objects in orbit	☐	☐	☐
I can explain why orbiting objects are accelerating	☐	☐	☐
I can link orbit radius and speed (Higher)	☐	☐	☐