

GCSE Physics

Worksheet: Orbital motion and satellites

TIME 20 min	TOTAL 20 marks	CALCULATOR Allowed	DIFFICULTY Easy, Medium
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Topics: Orbital motion and satellites

NAME	CLASS	DATE
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- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Answer all questions in the spaces provided.
- In all calculations, show clearly how you work out your answer.
- The marks for questions are shown in brackets.

0 1

0 1 . 1 Give **one** use of a geostationary satellite.

[1 mark]

0 2

The Moon orbits the Earth. The Earth orbits the Sun.

0 2 . 1 Which force keeps the Moon in its orbit around the Earth?

Tick (✓) **one** box.

Friction

☐

Gravity

☐

Magnetism

☐

Tension

☐

[1 mark]

0 2 . 2

The Moon is a natural satellite.

Give **one** example of an artificial satellite.

[1 mark]

0 2 . 3

What shape is the orbit of the Moon, approximately?

[1 mark]

0 2 . 4

Give **one** use of artificial satellites.

[1 mark]

0 3

0 3 . 1

A geostationary satellite stays above the same point on the Earth's equator.
How long does it take to complete one orbit?

Tick (✓) **one** box.

1 hour

☐

24 hours

☐

1 month

☐

1 year

☐

[1 mark]

0 3 . 2

Which force keeps a satellite moving in a circular orbit around the Earth?

.....

.....

.....

[1 mark]

0 4

Table 1 gives the approximate orbital radius and orbital period of four artificial satellites, A, B, C and D, around the Earth.

Table 1

Satellite	Orbital radius in km	Orbital period
A	6700	91 minutes
B	26 600	12 hours
C	42 200	24 hours
D	8000	119 minutes

0 4 . 1

Identify which satellite is most likely to be geostationary. Give a reason for your answer.

.....

.....

.....

.....

[2 marks]

0 4 . 2

Use Table 1 to describe the relationship between orbital radius and orbital period shown by the data.

.....

.....

[1 mark]

0 5

A polar-orbiting satellite passes over both the North and South poles on each orbit, at a much lower altitude than a geostationary satellite. As the Earth rotates beneath it, the satellite passes over a different strip of the Earth's surface on each orbit.

0 5 . 1

Suggest why a polar orbit, rather than a geostationary orbit, is used for a satellite that maps the entire surface of the Earth in detail.

.....

.....

.....

.....

[2 marks]

0 6

A satellite moves in a circular orbit around the Earth. The radius of its orbit is 7.0×10^6 m. It takes 5830 s to complete one orbit.

distance travelled in one orbit = $2 \times \pi \times \text{radius}$

0 6 . 1

Calculate the orbital speed of the satellite.

.....

.....

.....

.....

.....

Speed = m/s

[3 marks]

0 7

Planets, moons and artificial satellites all move in orbits.

0 7 . 1

Give **one** similarity between the Moon and an artificial satellite that orbits the Earth.

[1 mark]

0 7 . 2

Give **one** difference between a planet and a moon.

[1 mark]

0 7 . 3

Give **one** difference between a moon and an artificial satellite.

[1 mark]

0 7 . 4

Explain why the Earth moves in a circular orbit around the Sun instead of travelling in a straight line through space.

[2 marks]

END OF QUESTIONS

Original practice questions written to match the specification. Not produced by, affiliated with or endorsed by AQA.

Mark scheme

GCSE Physics · Worksheet: Orbital motion and satellites · 20 marks

Question 1 (1 mark)

01.1 [1 mark]

Answer: Satellite television broadcasting (or similar).

- satellite television broadcasting / weather monitoring of one region / some communications (1)
-

Question 2 (4 marks)

02.1 [1 mark]

Correct: Gravity

02.2 [1 mark]

Answer: A weather satellite (or any other named artificial satellite).

- the International Space Station / a communications, weather, navigation (GPS) or observation satellite / a space telescope (1)
-

02.3 [1 mark]

Answer: Circular

- circular (1)
-

02.4 [1 mark]

Answer: Communications (or weather forecasting, navigation, observing the Earth).

- communications (e.g. satellite television, telephone) / weather forecasting / navigation (GPS) / observing the Earth / astronomy (1)
-

Question 3 (2 marks)

03.1 [1 mark]

Correct: 24 hours

03.2 [1 mark]

Answer: Gravity.

- gravity / the gravitational force (from the body being orbited) (1)
-

Question 4 (3 marks)

04.1 [2 marks]

Answer: Satellite C: its 24-hour period matches the Earth's rotation.

- satellite C (1)
- its orbital period is 24 hours, the same as the time the Earth takes to rotate once, so it stays above the same point on the Earth (1)

04.2 [1 mark]

Answer: A greater orbital radius goes with a longer orbital period.

- the greater the orbital radius, the longer the orbital period (1)

Question 5 (2 marks)

05.1 [2 marks]

Answer: As the Earth turns beneath it, a polar orbit eventually covers the whole surface (unlike a geostationary satellite, fixed over one region), and its lower altitude gives more detailed images.

- because the Earth rotates beneath it, a polar-orbiting satellite eventually passes over every part of the Earth's surface, whereas a geostationary satellite always stays above the same single point/region (1)
- a polar orbit is also much lower, allowing more detailed (higher-resolution) images than a very distant geostationary satellite could take (1)

Question 6 (3 marks)

06.1 [3 marks]

Answer: 7540 m/s

- distance = $2 \times \pi \times 7.0 \times 10^6 = 4.40 \times 10^7$ (m) (1)
- speed = distance $\div$ time = $4.40 \times 10^7 \div 5830$ (1)
- 7540 (m/s) (1)

Question 7 (5 marks)

07.1 [1 mark]

Answer: Both orbit the Earth, held by its gravity.

- both orbit the Earth / both are kept in orbit by the Earth's gravity (1)
-

07.2 [1 mark]

Answer: Planets orbit the Sun; moons orbit planets.

- a planet orbits the Sun (a star), but a moon orbits a planet (1)
-

07.3 [1 mark]

Answer: A moon is natural; an artificial satellite is made by people.

- a moon is natural, but an artificial satellite was made and launched by people (1)
-

07.4 [2 marks]

Answer: The Sun's gravity continually pulls the Earth towards the centre of its orbit, changing its direction of motion.

- the Sun's gravity pulls the Earth towards the Sun (towards the centre of the orbit) (1)
 - this force continually changes the direction in which the Earth is moving (1)
-