

GCSE Physics

Worksheet: Our solar system

TIME 35 min	TOTAL 32 marks	CALCULATOR Allowed	DIFFICULTY Easy, Medium
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Topics: Our solar system

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.

01

Our solar system contains many different objects.

01.1

How many stars are there in our solar system?

Tick (✓) **one** box.

1	☐
8	☐
9	☐
Millions	☐

[1 mark]

01.2

How many planets orbit the Sun?

Number of planets =

[1 mark]

0 1 . 3

What name is given to the natural satellites that orbit planets?

.....

.....

.....

.....

[1 mark]

0 1 . 4

Our solar system is a small part of a galaxy.
Name this galaxy.

.....

.....

.....

.....

[1 mark]

0 1 . 5

Name **one** other type of object, apart from planets, that orbits the Sun.

.....

.....

[1 mark]

0 2

0 2 . 1

Which of these is **not** a normal member of our solar system?

Tick (✓) **one** box.

A dwarf planet

A moon

Another star like the Sun

A planet

☐

☐

☐

☐

[1 mark]

0 2 . 2

State what keeps the planets in orbit around the Sun.

[1 mark]

0 3

0 3 . 1

The Sun formed from a cloud of dust and gas called a nebula.

What pulled the dust and gas together?

Tick (✓) **one** box.

Electrostatic attraction

☐

Gravitational attraction

☐

Magnetic attraction

☐

Nuclear fusion

☐

[1 mark]

0 3 . 2

Which of these is a natural satellite?

Tick (✓) **one** box.

Mars

☐

The International Space Station

☐

The Moon

☐

The Sun

☐

[1 mark]

0 4

Table 1 gives the approximate average distance from the Sun and the orbital period for four planets.

Table 1

Planet	Average distance from the Sun in millions of km	Orbital period
Mercury	58	88 days
Earth	150	365 days
Jupiter	780	12 years
Neptune	4500	165 years

0 4 . 1

Describe the pattern shown by the data.

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[2 marks]

0 4 . 2

Suggest why a planet further from the Sun takes longer to complete one orbit.

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[2 marks]

0 5

A cloud of dust and gas (a nebula) begins to collapse under its own gravity to form a new star.

0 5 . 1

Explain how gravity causes the temperature inside the collapsing cloud to increase.

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[2 marks]

0 6

The Sun formed about 4.6 billion years ago.

0 6 . 1

Describe how the Sun was formed.

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[3 marks]

0 6 . 2

Name the process that releases energy in the core of the Sun.

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[1 mark]

0 6 . 3

The size of the Sun is stable because two effects are in equilibrium.
Name these **two** effects.

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[2 marks]

0 7

A star forms from a cloud of dust and gas. The statements A, B, C and D describe stages in the formation of a star.

- A Fusion reactions start in the core.
- B Dust and gas are pulled together by gravity.
- C The star becomes stable, with a constant size.
- D The collapsing cloud becomes denser and hotter, forming a protostar.

0 7 . 1

Write the letters A, B, C and D in the correct order.

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[2 marks]

0 7 . 2

What is the name for a cloud of dust and gas in space from which stars form?

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.....
[1 mark]

0 7 . 3

Explain why the Sun does not collapse under its own gravity.

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[2 marks]

0 8

The Solar System contains the Sun and a wide variety of orbiting bodies.

0 8 . 1

Describe the structure of the Solar System, including the main types of body it contains and what keeps them in their orbits, and explain how the Sun is believed to have formed.

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[6 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: Our solar system · 32 marks

Question 1 (5 marks)

01.1 [1 mark]

Correct: 1

01.2 [1 mark]

Answer: 8

- 8 / eight (1)
-

01.3 [1 mark]

Answer: Moons

- moons (1)
-

01.4 [1 mark]

Answer: The Milky Way

- the Milky Way (1)
-

01.5 [1 mark]

Answer: Dwarf planets (e.g. Pluto)

- dwarf planet (1)

Notes: Allow asteroids or comets.

Question 2 (2 marks)

02.1 [1 mark]

Correct: Another star like the Sun

02.2 [1 mark]

Answer: The Sun's gravitational force.

- the gravitational force (attraction) of the Sun (1)
-

Question 3 (2 marks)

03.1 [1 mark]

Correct: Gravitational attraction

03.2 [1 mark]

Correct: The Moon

Question 4 (4 marks)

04.1 [2 marks]

Answer: Planets further from the Sun take longer to orbit it — and the increase in period is much more than proportional to the increase in distance.

- the greater a planet's distance from the Sun, the longer its orbital period (1)
 - the period increases by much more than the distance does, so they are not directly proportional (e.g. Neptune is 30 times further from the Sun than the Earth, but its period is 165 times longer) (1)
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04.2 [2 marks]

Answer: A more distant planet has much further to travel around its orbit, and it moves more slowly there too, since the Sun's gravity is weaker further away.

- it must travel a much greater distance to complete one orbit (a bigger circle has a bigger circumference) (1)
 - and the Sun's gravitational pull on it is weaker at a greater distance, so it also orbits more slowly (1)
-

Question 5 (2 marks)

05.1 [2 marks]

Answer: As gravity pulls the particles inwards, gravitational potential energy is transferred to kinetic energy, increasing the internal energy and temperature of the cloud.

- gravity pulls the particles of dust and gas closer together, so they fall inwards and speed up (1)
 - energy is transferred from the gravitational potential energy store to the kinetic energy store of the particles, which increases the internal energy (and temperature) of the cloud (1)
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Question 6 (6 marks)

06.1 [3 marks]

Answer: A cloud of dust and gas was pulled together by gravity until it was hot and dense enough for fusion to start.

- from a cloud of dust and gas (a nebula) (1)
- the dust and gas were pulled together by gravity / gravitational attraction (1)
- it became hot and dense enough for (nuclear) fusion to start (1)

06.2 [1 mark]

Answer: Nuclear fusion

- (nuclear) fusion (1)

06.3 [2 marks]

Answer: Inward gravitational collapse and outward expansion due to fusion energy.

- gravity / gravitational attraction pulling inwards (gravitational collapse) (1)
- outward pressure / expansion caused by the energy released by fusion (1)

Question 7 (5 marks)

07.1 [2 marks]

Answer: B, D, A, C

- B first and C last (1)
- fully correct order: B D A C (1)

07.2 [1 mark]

Answer: A nebula

- nebula (1)

07.3 [2 marks]

Answer: The outward effect of fusion energy balances the inward pull of gravity.

- gravity pulls the material of the Sun inwards (1)
- the energy released by fusion causes an outward pressure / expansion that balances gravity (1)

Question 8 (6 marks)

08.1 [6 marks]

Answer: Level-of-response answer: one star, the Sun, at the centre, orbited by eight planets and the dwarf planets, with natural satellites (moons) orbiting planets; all are held in their orbits by gravity. The Solar System is a small part of the Milky Way galaxy. The Sun formed from a cloud of dust and gas (a nebula) pulled together by gravitational attraction; as it collapsed it became hotter and denser (a protostar) until nuclear fusion of hydrogen nuclei began.

Levels of response

- **Level 3 (5–6)** A detailed, coherent answer. Relevant points are accurate, linked in a logical sequence and use correct scientific terms.
- **Level 2 (3–4)** Several relevant points with some linking, but the answer has gaps, errors or lacks detail.
- **Level 1 (1–2)** Simple statements making one or two relevant points, with little or no linking.
- **No marks (0)** Nothing relevant or worthy of credit.

Indicative content

- the Solar System has one star, the Sun, at its centre, together with the objects that orbit it
- eight planets and the dwarf planets (e.g. Pluto) orbit the Sun, and natural satellites (moons) orbit some of the planets (allow artificial satellites, asteroids, comets)
- all of these bodies are kept in their orbits by gravity: the gravitational attraction of the Sun (or, for moons, of their planet) provides the force needed for orbital motion
- our Solar System is a small part of the Milky Way galaxy
- the Sun formed from a cloud of dust and gas (a nebula) pulled together by gravitational attraction
- as the cloud collapsed it became denser and hotter (a protostar), until the temperature and density were high enough for nuclear fusion of hydrogen nuclei to begin, forming the Sun

Notes: Level 1 (1–2 marks): names some bodies in the Solar System, or states that gravity holds them in orbit. Level 2 (3–4 marks): describes the Solar System's structure and bodies, or gives a partial account of the Sun's formation, but not both fully. Level 3 (5–6 marks): a complete description of the Solar System's structure and what keeps its bodies in orbit, together with a correct, ordered account of the Sun's formation from a nebula pulled together by gravity until fusion begins.
