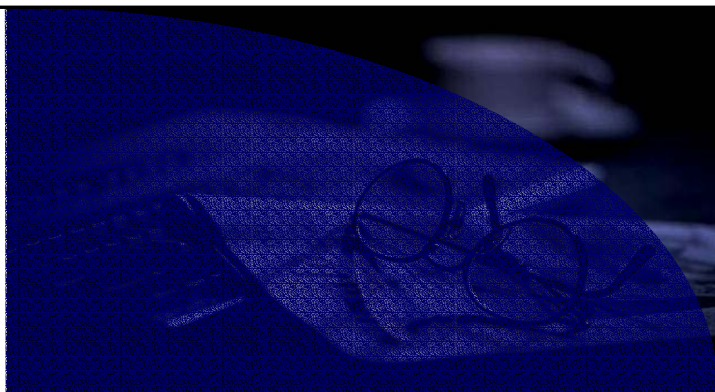


assessment for learning

year 9



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## 9J Gravity and space

### Assessment for learning...year 9 (level 3-6)

Answer all questions:

Total marks	24
Time allowed	25 mins.

#### Question 1:

In July 1994, fragments of the comet Shoemaker-Levy 9 were pulled into the planet Jupiter, causing a series of enormous collisions.

(a) The fragments of comet were pulled towards Jupiter by gravity. How did the gravitational force vary with the mass of the fragment?

.....  
.....

1 mark

(b) As each fragment approached Jupiter, the gravitational force on it changed. Describe the change.

.....  
.....

1 mark

(c) Tick the correct box to complete the statement.

Between the different fragments of the comet

there was an attractive force

there was a repulsive force

there was no force

1 mark

The comet was in fragments because, in July 1992, it had passed very close to Jupiter and had broken up.

(d) Tick the correct box to describe the gravitational force per kilogram on different sides of the comet as it passed close to Jupiter.

all parts of the comet were pulled towards Jupiter equally strongly

all parts of the comet were pulled towards Jupiter, but the side facing towards the planet was pulled more strongly

all parts of the comet were pulled towards Jupiter, but the side facing away from the planet was pulled more strongly

the side of the comet facing towards Jupiter was pulled towards the planet but the side facing away was repelled

1 mark

(e) Tick the correct box to show what gravitational force (if any) the comet exerted on Jupiter.

no force

an attractive force

a repulsive force

1 mark

Maximum 5 marks

**Question 2:**

Satellites can sometimes be seen in the night sky. They look like stars slowly moving across the sky.

(a) We can see stars because they are light sources. They give out their own light. Satellites do not give out their own light. Explain why satellites can be seen in the clear night sky.

.....  
.....  
.....

2 marks

(b) Sometimes a satellite suddenly stops being visible. However, you can usually see it again in another part of the sky later the same night. This can happen when there are no clouds in the sky and the satellite is overhead.

Why does the satellite suddenly stop being visible?

.....  
.....

1 mark

(c) Give one use of satellites in orbit around the Earth.

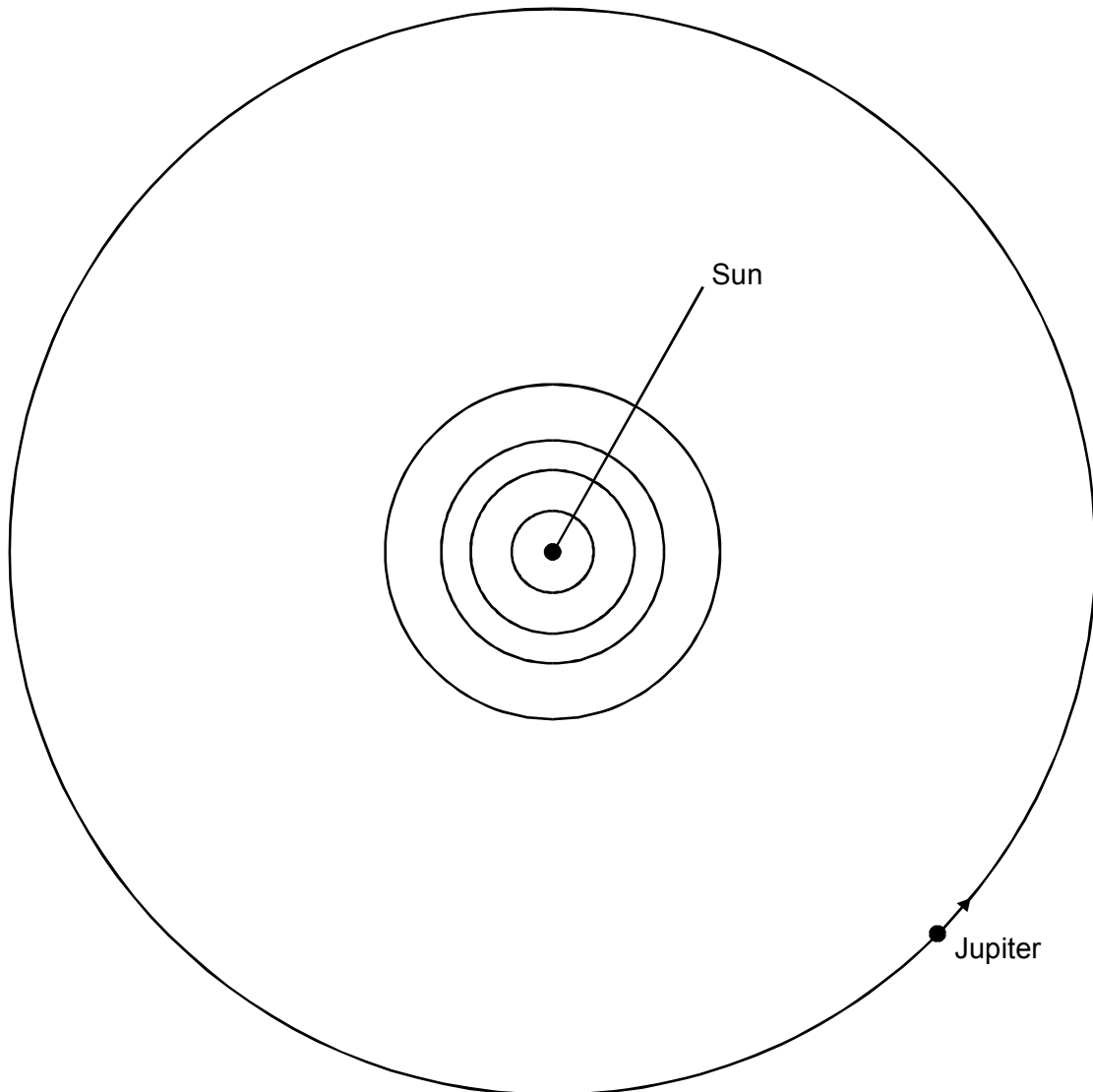
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1 mark

Maximum 4 marks

**Question 3:**

The diagram shows the Sun and the orbits of the five inner planets. The distances (but **not** the sizes of the Sun and Jupiter) are to scale.



(a) On the diagram, draw a dot to show the Earth's position when Earth and Jupiter are moving parallel to each other and in the same direction. Label the dot E.

1 mark

(b) As Jupiter moves in its orbit, it appears to move across the pattern of stars in the background. When Jupiter and the Earth are moving parallel to each other, Jupiter appears to move backwards across the pattern of stars. Explain why.

.....  
.....

1 mark

(c) The light from the Sun takes about 8.3 minutes to reach the Earth. Using the diagram above, estimate how long it takes for light to travel from Jupiter to the Earth when they are the shortest possible distance apart. Show your working.

.....  
.....  
.....

2 marks  
Maximum 4 marks

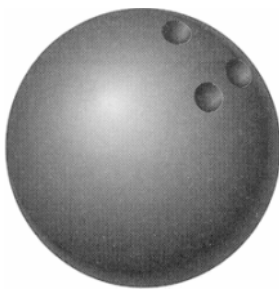
**Question 4:**

The picture shows a man called Aristotle. He lived in Greece over 2000 years ago.



Aristotle said that the heavier an object is, the faster it will fall to the ground.

(a) The drawings below show a bowling ball, a cricket ball and a ping-pong ball. Lila dropped them all at the same time from the same height.



bowling ball  
mass=5 000 g



cricket ball  
mass=160 g



ping-pong  
mass=2.5 g

If Aristotle was correct, which of the three balls would you expect to reach the ground first?  
Give the reason for your answer.

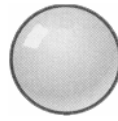
.....  
.....

1 mark

(b) Joe said that it would be a fairer test if Lila had only used a cricket ball and a hollow plastic ball as shown below.



cricket ball  
mass = 160 g



hollow plastic ball  
mass=56 g

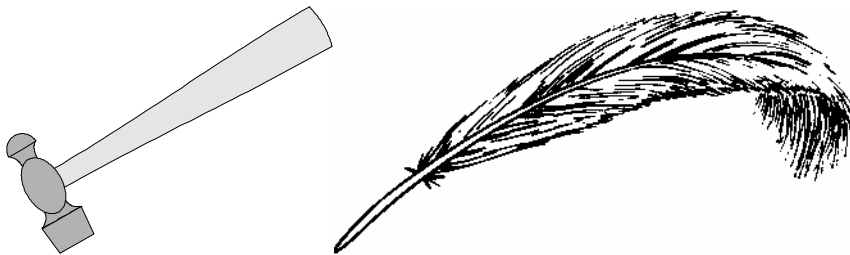
Why was Joe correct?

.....  
.....

1 mark

(c) About 400 years ago in Italy, a man called Galileo had a different idea. He said that all objects dropped from the same height would reach the ground at the same time.

(i) Lila dropped a hammer and a feather at the same time from the same height.



If Galileo was correct, which, if either, would reach the ground first?

.....

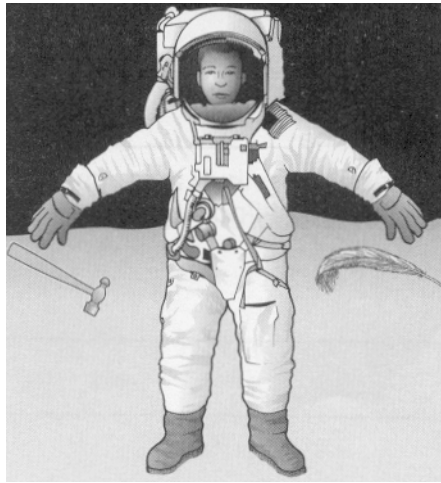
1 mark

(ii) Gravity acts on both the hammer and the feather as they fall. Give the name of **one** other force which acts on them as they fall.

.....

1 mark

(iii) An astronaut on the moon dropped a hammer and a feather at the same time from the same height.



How would the results of the astronaut's experiment on the Moon be different from Lila's experiment on the Earth?

.....

Explain your answer.

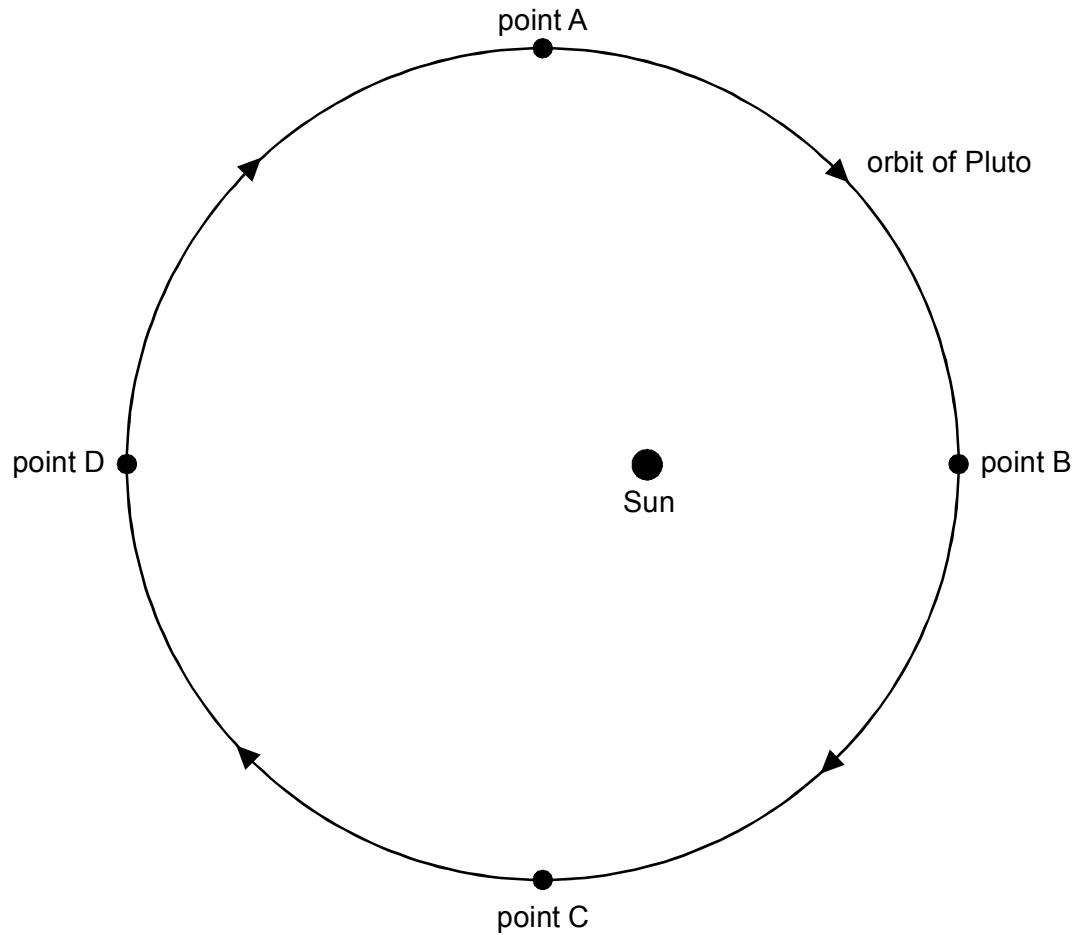
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2 marks  
Maximum 6 marks

**Question 5:**

In our Solar System, Pluto is usually the furthest planet from the Sun. The shape of its orbit is not quite a circle. The diagram shows the shape of Pluto's orbit and the position of the Sun.



(a) Describe how the gravitational force of the Sun, acting on Pluto, alters as Pluto moves round its orbit through points A, B, C and D. Give reasons for your answers.

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.....

.....

.....

3 marks

(b) At which point, A, B, C or D, will Pluto have:

(i) the most potential energy ? Explain your answer.

..... because .....

.....

1 mark

(ii) the most kinetic energy ? Explain your answer.

..... because .....

.....

1 mark

Maximum 5 marks