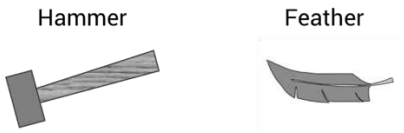
0 1

On the Apollo 15 mission in 1971, Commander David Scott famously dropped a hammer and feather from the same height of 1.6 m above the lunar surface. Both objects were dropped at the same time, and went on to hit the ground at exactly the same time.




0 1 . 1

Estimate the velocity at which both objects would have struck the lunar surface. The acceleration due to gravity at the surface of the Moon is approximately 1.6 $m/s^2$.

Velocity = _____ m/s

**[3 marks]**

0 1 . 2

Intrigued by this experiment, a student tries to repeat it at home. When they drop both objects from the same height however, they find that the feather takes over three seconds longer to reach the ground than the hammer.

Explain their findings, making full reference to the forces involved.

_____

_____

_____

**[3 marks]**

0 2

A stone is thrown into a deep lake from the side of a rowing boat.

0 2 . 1

At least three forces act on the stone as it falls through the water. By drawing labelled arrows onto the above diagram, write down the names of two of these forces and indicate the direction(s) in which they act.

**[2 marks]**


© my-gcsescience.com

0 2 . 2

Which of the following statements best describes the motion of the stone before it reaches the bottom of the lake?

It descends with constant velocity ☐

It accelerates downwards ☐

It accelerates downwards then descends with constant velocity ☐

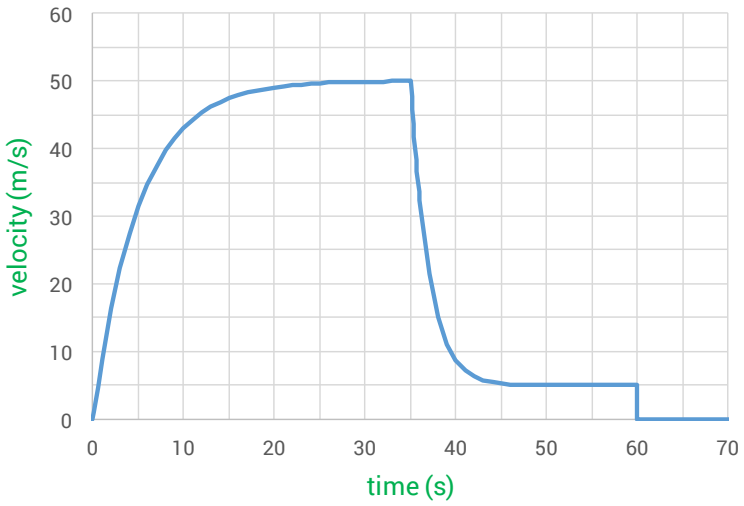
It accelerates downwards ☐

It decelerates downwards then descends with constant velocity ☐

**[1 mark]**

0 3

The below velocity-time graph describes the motion of a skydiver from the moment they jump out of their plane.




0 3 . 1

On the above graph:

- mark with the letter **X** the point at which they open their parachute;
- mark with the letter **Y** the point at which they reach their second (lower) terminal velocity;
- mark with the letter **Z** the point at which their acceleration is equal to 9.8 $m/s^2$.

**[3 marks]**


© my-gcsescience.com

0 3 . 2 Describe and explain the motion of the skydiver for the first 35 seconds of their jump.

**[6 marks]**

0 3 . 3 Describe and explain the motion of the skydiver from t = 35 seconds until the point at which they strike the ground.

**[6 marks]**


© my-gcsescience.com