

Equations of motion for constant acceleration

Physics grades 11-12 (A Level · IB · Class 11-12) · Test

Name: _____ Date: _____ Class: _____ Mark: ____ / 20

This test covers the equations of motion, free fall and velocity-time graphs. Use a calculator, show your working and give units with every final answer. Take $g = 9.81 \text{ m/s}^2$ and ignore air resistance. The test is worth 20 marks.

Level: Physics grades 11-12 (A Level · IB · Class 11-12) · **Curriculum:** A Level 3.4, IB A.1

Time: 40 minutes · 8 questions · Total: 20 marks · Calculator allowed

Question 1 Choosing equations (2 marks)

- State the suvat equation that does not contain the displacement s . (1 mark)
- State the suvat equation that does not contain the acceleration a . (1 mark)

Question 2 Cyclist (3 marks)

A cyclist moving at 2.0 m/s accelerates uniformly at 0.80 m/s^2 for 10 s .

- Calculate her final velocity. (1 mark)
- Calculate the distance she travels in the 10 s . (2 marks)

Question 3 Canyon drop (3 marks)

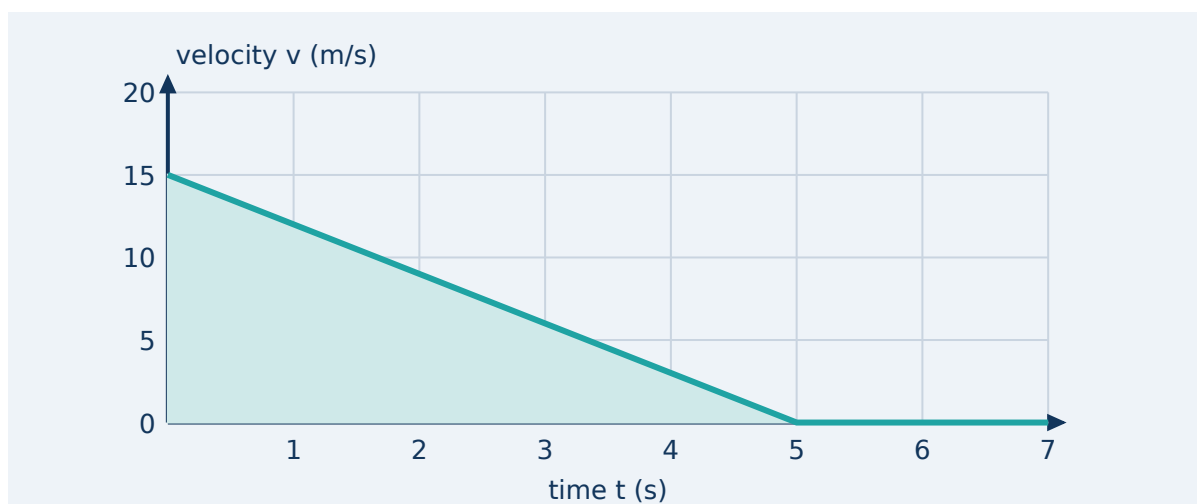
A stone is dropped into a canyon and hits the bottom 80 m below. Ignore air resistance.

- Calculate the time of fall. (2 marks)
- Calculate the speed on impact. (1 mark)

Question 4 Bus braking (3 marks)

Use the graph. A school bus slows down uniformly.

- Calculate the acceleration. (1 mark)
- Calculate the distance the bus travels while slowing down. (2 marks)



Velocity-time graph of the bus.

Question 5 Thrown ball (3 marks)

Mei throws a ball vertically upwards at 12 m/s.

- Calculate the maximum height above the release point. (2 marks)
- Calculate the time for the ball to return to the release point. (1 mark)

Question 6 Top of the flight (2 marks)

A ball is at the top of its flight. State its velocity and its acceleration at that instant and explain why the ball does not stay there. (2 marks)

Question 7 Limits of the equations (2 marks)

Explain why the suvat equations cannot be used for a parachutist during the whole of a jump. (2 marks)

Question 8 Van overtaking (2 marks)

A van speeds up from 5.0 m/s to 25 m/s over a distance of 100 m. Calculate its acceleration and the time taken. (2 marks)