

Straight-line motion with graphs and equations

AP Physics 1 (algebra-based) · Test

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

This test lasts 45 minutes and covers one-dimensional kinematics: definitions, graphs, constant-acceleration equations and free fall. Use $g = 9.81 \text{ m/s}^2$. Show every formula and substitution, give units, and state your sign convention when direction matters. The paper is worth 20 marks.

Level: AP Physics 1 (algebra-based) · **Curriculum:** AP P1 Unit 1

Time: 45 minutes · 8 questions · Total: 20 marks · Calculator allowed

Question 1 Scalars and vectors (2 marks)

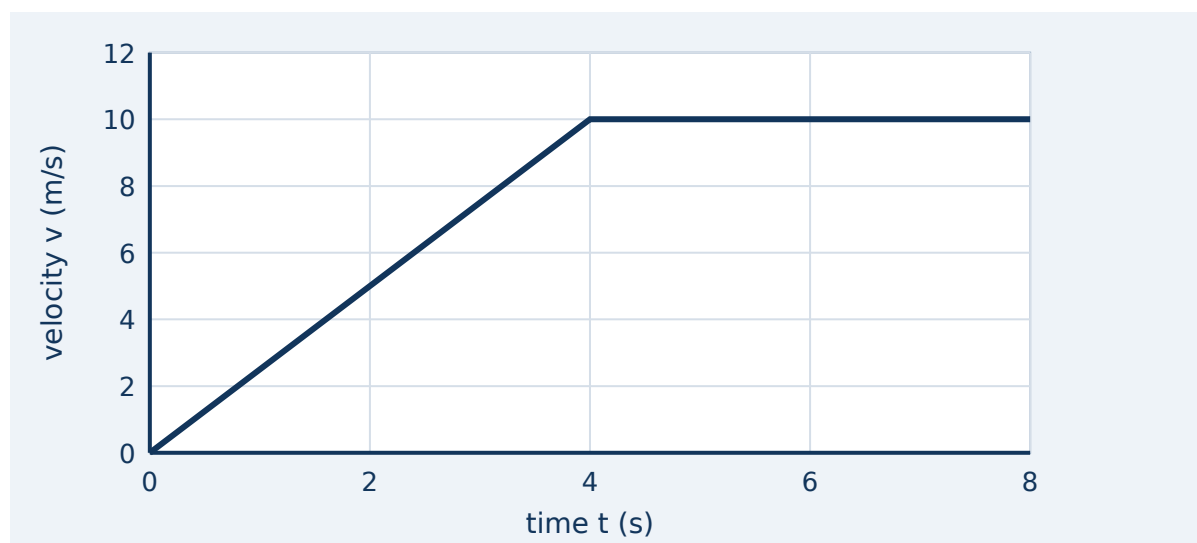
Name one scalar and one vector from this list: speed, velocity, acceleration, distance. Explain the difference between them in one sentence.

Question 2 Round trip (2 marks)

Mei jogs 300 m east along a path and then 120 m back west. The jog takes 150 s. Calculate (a) her displacement and average velocity, (b) her average speed.

Question 3 Reading a graph (2 marks)

The graph shows the velocity of a bus.



Velocity of a bus against time.

- a. Calculate the acceleration in the first 4 s. (1 mark)
- b. Calculate the displacement from 0 to 8 s. (1 mark)

Question 4 Using an equation (3 marks)

A car speeds up from 12 m/s to 27 m/s while covering 90 m. Calculate (a) the acceleration (2 marks) and (b) the time taken (1 mark).

Question 5 Stone into a canyon (3 marks)

A stone dropped from rest into a canyon hits the bottom after 3.0 s. Ignore air resistance and use $g = 9.81 \text{ m/s}^2$. Calculate (a) the depth of the canyon (2 marks) and (b) the speed of the stone on impact (1 mark).

Question 6 Interpreting a curve (2 marks)

A position-time graph is a parabola that opens upward and starts at the origin with zero slope. Describe the motion and state the shape of the velocity-time graph.

Question 7 Experimental design (3 marks)

Describe how you would use a ball and a stopwatch to measure g . State what you measure, which graph you plot and how g is obtained.

Question 8 Footbridge (3 marks)

Aarav throws a pebble downward at 6.0 m/s from a footbridge. It hits the water after 1.8 s. Take $g = 9.81 \text{ m/s}^2$. Calculate (a) the height of the bridge (2 marks) and (b) the speed on impact (1 mark).