GCSE and IGCSE Physics: Speed, Velocity and Acceleration Worksheet - Mark Scheme

Year 10-11 · GCSE (AQA 4.5.6) and Cambridge IGCSE 0625 topic 1 · Exam-style questions

Section A: Speed and distance-time graphs [14 marks]

1	Speed has magnitude only / is a scalar (1). Velocity has magnitude and direction / is a vector (1).	**2**
2	6 m/s; 480 m; 600 s (10 min); 4 m/s (2400 ÷ 600). Guidance: 1 mark for each correct answer. Allow units conversion errors only if method is shown.	**4**
3	Distance = 9000 m, time = 1800 s (1); 9000 ÷ 1800 (1) = 5 m/s (1).	**3**
4	Sloping line: constant speed (1). Horizontal: stationary (1). Steeper line: faster constant speed (1).	**3**
5	Speed equals the gradient of the line (1): change in distance divided by change in time (1).	**2**

Section B: Acceleration and velocity-time graphs [17 marks]

6	4 m/s^2; 24 m/s; 12 s; -3 m/s^2 (deceleration). Guidance: 1 mark each.	**4**
7(a)	24 ÷ 8 (1) = 3 m/s^2 (1)	**2**
7(b)	24 ÷ 6 (1) = 4 m/s^2 (1)	**2**
7(c)	½ × 8 × 24 (1) = 96 m (1)	**2**
7(d)	Constant speed: 24 × 10 = 240 m (1); braking: ½ × 6 × 24 = 72 m (1); total = 96 + 240 + 72 = 408 m (1)	**3**
7(e)	408 ÷ 24 (1) = 17 m/s (1)	**2**
8	Gradient = acceleration (1). Area = distance travelled (1).	**2**

Section C: Equations of motion [15 marks]

9	$v^2 - u^2 = 2as$ (1); 900 - 100 = 2 × a × 400 (1); a = 1 m/s^2 (1).	**3**
10	v = u + at = 0 + 10 × 3 (1) = 30 m/s (1).	**2**
11	$s = ½ g t^2$ = 0.5 × 10 × 9 (1) = 45 m (1).	**2**
12	0 - 225 = 2 × (-5) × s (1); s = 225 ÷ 10 (1) = 22.5 m (1).	**3**
13	Weight is constant and air resistance increases with speed (1). Resultant force decreases until air resistance equals weight (1). Then acceleration is zero so speed is constant (1).	**3**
14	Any two: higher speed; tiredness / drugs / alcohol (thinking distance); worn brakes / tyres; wet or icy road; heavier load.	**2**

Total: 46 marks. Accept any scientifically correct alternative wording.