## Solutions

Marking: **M1** a correct method, **A1** the correct answer, **B1** an independent mark.

Each answer shows the steps, then the **result**.

**2.1**

- $1200 \div 150$
- **8.0** m/s

**2.2**

- horizontal: the object is stationary
- steeper: a greater (constant) speed

**2.3**

- $(30 - 12) \div 9.0$
- **2.0** m/s$^2$

**2.4**

- area $= 15 \times 6.0$
- **90** m

**3.1**

- $v^2 = u^2 + 2as = 0 + 2 \times 10 \times 20$
- $v^2 = 400$
- $v =$ **20** m/s

**3.2**

- A: constant acceleration from rest
- B: constant velocity
- C: constant deceleration to rest

**3.3**

(a) $(8 - 0) \div 10 = 0.8$ m/s$^2$

(b) first part $\frac{1}{2} \times 10 \times 8 = 40$ m; middle $30 \times 8 = 240$ m; last part $\frac{1}{2} \times 4 \times 8 = 16$ m; total **296** m

(c) total time 44 s; $296 \div 44 =$ **6.7** m/s

(d) points to include:

- set up a ramp and measure its height with a metre rule (K)
- release the trolley from the same point each time, without pushing it (App)
- measure the speed at the bottom with a light gate and data logger, or time it over a measured distance with a stopwatch (K)
- speed = length of card ÷ time to pass the light gate (or distance ÷ time) (K)
- change the height in steps, e.g. 10, 20, 30, 40, 50 cm, using the same trolley and ramp surface (App)
- repeat each height three times and find the mean; plot speed against height (An)

Levels: **5–6** a full, logical answer with correct physics and correct terms; **3–4** several correct points, partly linked; **1–2** one or two relevant points.