Chapter 8 past paper questions - answers

1. (a) (i) car A: travels at constant speed **(1)**

(ii) car B: accelerates for first 5 secs (or up to 18 m s^{-1}) **(1)**
then travels at constant speed **(1)** 3

(b) (i) car A: distance = 5.0 × 16 **(1)**
= 80 m **(1)**

(ii) car B: (distance = area under graph)
distance = [5.0 × ½ (18 + 14)] **(1)**
= 80 m **(1)** 4

[7]

2. (i) $a = \frac{44}{4.0} = 11\ \text{ms}^{-2}$ **(1)**

$F = ma = 1.1 \times 10^5$ N **(1)**

(ii) $\Delta v = 236\ \text{m s}^{-1}$

$a = \frac{236}{8.0} = 29.5\ \text{ms}^{-2}$ **(1)**

(iii) $s_{\text{one}} = v_{\text{av}} \times t = \left(\frac{44+0}{2}\right) \times 4.0 = 88\text{m}$ **(1)**

$s_{\text{two}} = v_{\text{av}} \times t = \left(\frac{280+44}{2}\right) \times 8.0$ **(1)** = 1296(m) **(1)**

total distance = 1384 m **(1)**

[6]

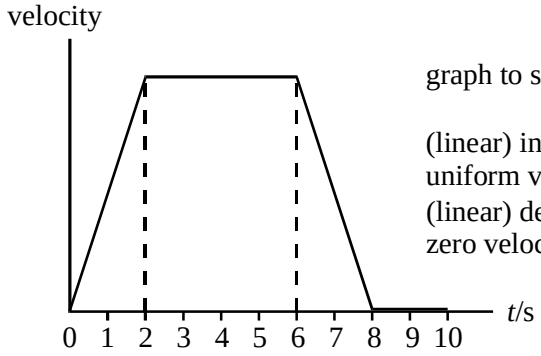
3. (a) (i) rate of change of velocity
[or a = $\frac{\Delta v}{t}$] **(1)**

(ii) (acceleration) has (magnitude and) direction **(1)** 2

(b) (i) (acceleration) is the gradient (or slope) of the graph **(1)**

(ii) (displacement) is the area (under the graph) 2

(c)



graph to show:

(linear) increase to t = 2.0 ± 0.2 s ✓
uniform velocity between 2.0 s and 6.0 s ✓
(linear) decrease from 6.0 ± 0.2 s to 8.0 s ✓
zero velocity after t = 8.0 s ✓

4

[8]

4. (a) velocity vector tangential to path and drawn from the ball, arrow in correct direction **(1)** 2

acceleration vector vertically downwards, arrow drawn and in line with ball **(1)**

(b) (i) $s = \frac{1}{2} gt^2$ gives $t = \sqrt{\frac{2y}{g}} = \sqrt{\frac{2 \times 24}{9.8(1)}}$ **(1)** = 2.2(1) s **(1)**

(ii) v (= s/t) = 27/2.2(1) **(1)** = 12(.2 m s^{-1}) or 12(.3) **(1)** (ecf from (b)(i))

(answer only gets both marks) 4

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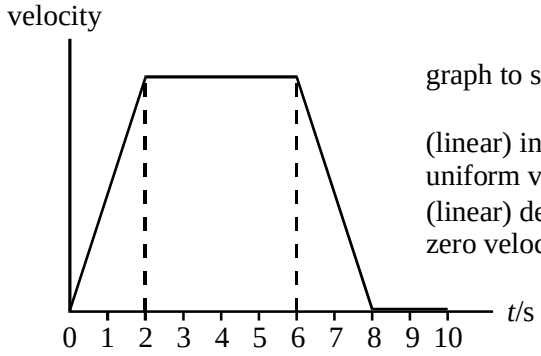

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