

Year 12 Chaps 7 & 8

1. (a) (i) vector has direction **and** a scalar does not (1)
- (ii) scalar examples; any two e.g. speed, mass, energy, time, power
vector examples; any two e.g. displacement, velocity,
acceleration, force or weight [5]
2. (a) the point (in a body) (1)
where the weight (or gravity) of the object appears to act
[or resultant torque zero] (1) 2
- (b) (i) $P \times 0.90 = 160 \times 0.50$ (1)
 $P = 89 \text{ N}$ (88.9 N)
- (ii) $Q = (160 - 89) = 71 \text{ N}$ (1)
(allow C.E. for value of P from (i)) 3
- (c) (minimum) force $\times 0.10 = 160 \times 0.40$ (1)
force = 640 N (1) 2
- (d) force is less (1)
because distance to pivot is larger (1)
smaller force gives large enough moment (1) 3
- [10]
3. (i) $F = 650 \cos 57^\circ$ [1] = 350 N [1] (lose 1 mark if unit incorrect or missing)
(ii) $N = 650 \sin 57^\circ$ [1] = 550 N [1]
if "sine" used in (i) and "cos" in (ii) allow [2] marks
allow calculation from drawing scale diagram
if (i) and (ii) not awarded marks, then award
one mark for correct vector diagram [4]

9

4. (a) (i) rate of change of velocity

[or $a = \frac{\Delta v}{t}$] (1)

- (ii) (acceleration) has (magnitude and) direction (1)

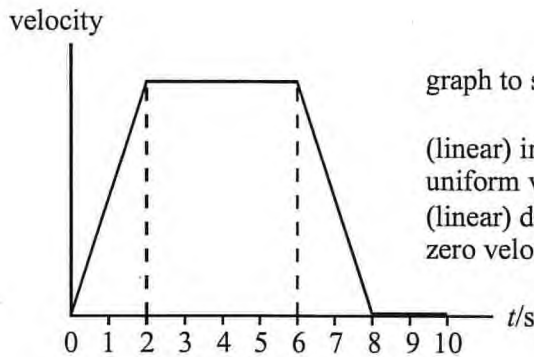
2

- (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 $t = 2.0 \pm 0.2$ s ✓

uniform velocity between 2.0 s and 6.0 s ✓ $\rightarrow 6 = 2$

(linear) decrease from 6.0 ± 0.2 s to 8.0 s ✓

zero velocity after $t = 8.0$ s ✓

4

[8]

5. (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 $t = \sqrt{\frac{2y}{g}} = \sqrt{\frac{2 \times 24}{9.8(1)}} (1) = 2.2(1) \text{ s} (1)$

2

(ii) $v (= s/t) = 27/2.2(1) (1) = 12(.2 \text{ m s}^{-1})$ or $12(.3) (1)$

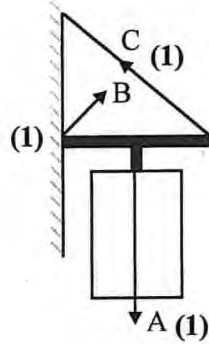
2

(ecf from (b)(i))

(answer only gets both marks) [6]

TOTU324

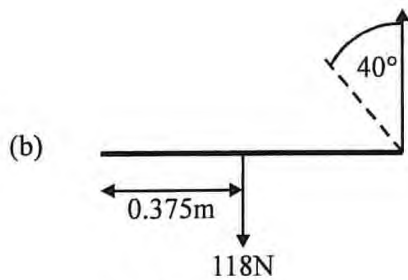
b (a) (i)



n.b. B must make an appreciable angle with wall and bar

- (ii) A weight of sign and bar (accept gravity) (1)
B reaction of wall (1)
C tension in wire (1)

max 5



use of mg (1)
clockwise moments 118×0.375 (1)
= anticlockwise moments $(T \cos 40^\circ)$ (1) $\times 0.750$ (1)
 $T = 77 \text{ N}$ (1)

max 4

[9]