

Forces

Mark Scheme 6

Level	IGCSE
Subject	Physics
ExamBoard	CIE
Topic	General Physics
Sub-Topic	Forces
Paper Type	(Extended) Theory Paper
Booklet	Mark Scheme 6

Time Allowed: 50 minutes

Score: /41

Percentage: /100

- 1 (a) mass = $(1.5 \times 10 \times 12)/(30 \times 10)$ OR = $(1.5 \times 12)/30$ C1
 OR any correct moment equation with force or mass but not mixture A1 [2]
 = 0.6(0) kg
- (b) 21 N ecf from (a) B1 [1]
- (c) (i) stays in position B1
- (ii) any two from:
- clockwise moment = anticlockwise moment B1
 - centre of mass at pivot B1
 - no (resultant) moment/turning force acting on sculpture
 - balanced/in equilibrium
 - relative distances from pivot unchanged [3]
- [Total: 6]**
- 2 (a) (i) s = area under graph, stated or clearly used C1
 = $(\frac{1}{2} \times 18 \times 10) + (120 \times 18) + (\frac{1}{2} \times 18 \times 20)$ Award if at least one term correct C1
 = 90 + 2160 + 180 C1
 = 2430 m / 2.43 km at least 2 significant figures. *Unit penalty applies A1
- (ii) v = u + at in any form OR (a=) gradient OR 18/10 C1
 = 1.8 m/s²*Unit penalty applies A1
- (b) (F=) ma OR $1.1 \times 10^5 \times 1.8$ ecf from (a)(ii) C1
 = 1.98×10^5 N at least 2 significant figures. *Unit penalty applies A1
- (c) driving force = friction/air resistance/drag B1 [9]
- *Apply unit penalty once only

- 3 (a) 54 N *Unit penalty applies B1
- (b) (i) (the point where) proportionality between force/weight and extension/Hooke's Law stops B1
- (ii) 35 – 20 or 15 (cm) or 25 – 20 or 5 (cm) C1
 (F =) kx or $54/15 \times 5$ or $54/15$ or $5/15$ from 2(a) C1
 18 N *Unit penalty applies ecf from 2(a) A1
 54 – 18 or 36 or 5.4 – 1.8 ecf from 2(b)(ii)1. C1
 3.6 kg *Unit penalty applies ecf from 2(b)(ii)1. A1
- (iii) $(\rho =)m/V$ or $3.6/0.0045$ ecf from 2(b)(ii)2. C1
 800 kg/m^3 *Unit penalty applies ecf from 2(b)(ii)2. A1
- (c) air molecules further apart or oil molecules closer together B1 [10]
- *Apply unit penalty once onl
- 4 (a) idea of accelerating force/force down slope = friction force B1
 OR no resultant force/forces balanced
 (accept energy argument if Physics correct)
- (b) (i) idea of accelerating force/force down slope > friction force B1
 OR forces unbalanced
 (accept energy argument if Physics correct)
- (ii) $F = ma$ NOT $f \propto a$ B1
- (iii) 12×2 C1
 24N A1
- (c) resultant force = 38N OR his (b)(iii) + 14 C1
 $38/12$ OR (his (b)(iii) + 14)/12 C1
 3.166 m/s^2 or 3.17 m/s^2 or 3.2 m/s^2 NOT 3.16 A1
- (ii) $v = at$ or 3.2×2.5 C1
 $7.8 - 8.0\text{ m/s}$ e. A1
- (d) idea of acceleration B1 [11]

5	(a)	one slightly nearer the centre than the other	C1	
		20 kg is the nearer one to the pivot	A1	
	(b)	Clockwise moments = anticlockwise moments (about point/pivot)	A1	
		(accept opposite directions and equal)		
	(c)	$18 \times 2.5 = 20 \times B$	C1	
		distance = 2.25(m)	A1	2
				[5]
