

# Forces

## Mark Scheme 4

Level	IGCSE
Subject	Physics
ExamBoard	CIE
Topic	General Physics
Sub-Topic	Forces
Paper Type	(Extended) Theory Paper
Booklet	Mark Scheme 4

**Time Allowed:** 40 minutes

**Score:** /42

**Percentage:** /100

- 1 (a) (i) 1. force marked towards centre B1  
 2. force marked towards centre B1
- (ii) 1. clearly horizontal at start to left or right M1  
 horizontal to the left curving down to reach ground to left of A B1  
 2. vertically down, not necessarily to reach ground B1

(b) Allow use of  $g = 9.81$  or  $9.8$  throughout

- (i) 0.5 N B1
- (ii) 4.1 N or 3.1 N e.c.f. from (i) C1  
 4.1 N e.c.f. from (i) A1

[8]

- 2 (a) (i) any mention of force or weight ignore mass C1  
 Force to left > force to right )  
 OR resultant force ) any 1 A1  
 OR unbalanced force )  
 OR weight > friction )
- (ii) to overcome/compensate for friction/resistance B1
- (b)  $2/2.5$  or  $4/5$  etc. or  $F/a$  or  $F = ma$  C1  
 $0.8 \text{ kg}$
- (c)  $0.7/0.8$  e.c.f. from (b) B1  
 $0.875 \text{ (m/s}^2\text{)}$  e.c.f. from (b) could be scored on table (no unit needed) B1
- (d) (i)  $v = at$  or  $0.5 \times 1.2$  C1  
 $0.6 \text{ m/s}$
- (ii) any velocity  $\times$  time or speed  $\times$  time C1  
 $0.36 \text{ m}$  c.a.o. (note:  $0.72 \text{ m}$  gets C1, A0) A1 [11]

- 3 (a) two masses chosen with ratio 2:1 or 3:1 or 3:2  
chosen masses in correct holes to balance M1  
A1
- (b) disc does not rotate/is balanced/in equilibrium/no movement B1  
NOT spin the disc NOT anything to do with calculating moments  
NOT when disturbed, returns to original position
- (c) moment of one mass correct (ignore units)  
accept mass  $\times$  distance calculated B1  
equal answers B1
- (d) correct addition of masses/weights, including 200g B1  
any mass correctly converted to N B1 [7]
- 4 (a) (i) straight arrow towards centre, by eye B1 [1]  
(ii) force larger B1 [1]
- (b) (i) straight arrow along tangent at P clockwise, by eye B1 [1]  
(ii) friction between tyres and track provide centripetal force B1  
friction too small (to provide required force) B1 [2]
- (c) (i) constant speed/velocity OR uniform motion OR no acceln. B1 [1]  
NOT constant motion
- (ii)  $(3 \times 25)/2 + (7 \times 25)$  OR area under graph C1  
212.5 cm any no s.f.  $\geq 2$  A1 [2]
- (iii)  $25/3$  or increase in speed/time C1  
8.33 cm/s any no s.f.  $\geq 2$  OR  $8\frac{1}{3}$  cm/s accept cm/s<sup>2</sup> A1 [2]

**[Total: 10]**

- 5 (a) moment of W down/anticlockwise, moment of steam opposite C1  
when moment of steam > moment of W, steam escapes  
OR when clockwise moment > anticlockwise moment, steam escapes A1 [2]
- (b) (i)  $12 = 0.2 F$  C1  
 $F = 60 \text{ N}$  c.a.o. allow 60–61 for ans if working for 60 N shown A1 [2]
- (ii) (P =)  $F/A$  or  $60/0.0003$  e.c.f. C1  
 $2 \times 10^5 \text{ Pa}$  or  $200\,000 \text{ Pa}$  e.c.f. (accept  $\text{N/m}^2$ ) OR  $20 \text{ N/cm}^2$  A1 [2]

**[Total: 6]**