

# Motion

## Mark Scheme 6

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

**Time Allowed:** 52 minutes

**Score:** /43

**Percentage:** /100

- 1 (a) straight line through origin and reaching (or would reach) 30m/s after 3s B1
- (b) average speed  $\times$  time or area under graph or  $s = ut + \frac{1}{2}at^2$  or  $\frac{1}{2}b \times h$  C1  
20 m c.a.o. A1
- (c) line, all below first line and horizontal at 14m/s ( $\pm\frac{1}{2}$  small square) B1  
NOTE: "knee" of line need not be curved
- (d) (i) any intelligent attempt B1  
e.g. effect of air resistance, B larger area than A, B smaller mass/weight than A
- (ii) (eventually) upward force on B = downward force or equivalent. B1  
no more acceleration or constant speed NOT terminal velocity B1
- (e) (i) 2.0 N or 2 N B1
- (ii) 0.2 kg or 200 g B1
- (f) 2 N or 2.0 N or candidate's (e)(i) B1
- [10]
- 2 (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)  $12 \times 2$  C1  
24N A1
- (c) resultant force = 38N OR his (b)(iii) + 14 C1  
 $38/12$  OR (his (b)(iii) + 14)/12 C1  
 $3.166 \text{ m/s}^2$  or  $3.17 \text{ m/s}^2$  or  $3.2 \text{ m/s}^2$  NOT 3.16 A1
- (ii)  $v = at$  or  $3.2 \times 2.5$  C1  
 $7.8 - 8.0 \text{ m/s}$  e. A1
- (d) idea of acceleration B1 [11]

- 3 (a) (i) 1.6s to 1.8s ALLOW 4.2 – 6s ALLOW 4.4 – 6s NOT 2s NOT 4.0 – 6s B1
- (ii) 6 – his (i), evaluated ALLOW 0 – 4.2s ALLOW 0 – 4.4s NOT 0 – 4s e.c.f. B1
- (iii) his (i)  $\times$  20 C1  
 32 – 36m or his (i)  $\times$  20 evaluated  
 allow B1 only for 40m with no working A1
- (iv) area under whole graph or  $\frac{1}{2}vt + \text{his(iii)}$  C1  
 70 – 95m A1
- (b) (i) weight of ball down and (air) resistance up )  
 OR friction opposes weight )  
 upward/resistance/friction force increases ) any 3 B1 $\times$ 3  
 with time/distance/speed/as ball falls )  
 net force reduces )  
 less force, so less acceleration )
- (ii) up force = down force OR no resultant force OR air res. = weight B1  
 no net force, no acceleration/constant speed B1

[Total: 11]

- 4 (a) point 8,12 identified B1  
 straight line joining 0,0 and 8,12 B1  
 straight line joining 8,12 and 20,12 B1 3
- (b) acceleration = change in v/change in t or 12/8 etc C1  
 = 1.5 m/s<sup>2</sup> A1 2
- (c) distance = area under graph between t = 20 and t = 25 C1  
 = 24 m to 28 m A1 2
- (d) F = ma or 4000  $\times$  1.2 C1  
 = 4800 N A1 2
- (e) more passengers got on (so mass increased)  
 driver pressed accelerator less (so force decreased)  
 more traffic or going uphill any two lines B2 2  
 [11]