

Motion

Mark Scheme 1

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|------------|-------------------------|
| Level | IGCSE |
| Subject | Physics |
| ExamBoard | CIE |
| Topic | General Physics |
| Sub-Topic | Motion |
| Paper Type | (Extended) Theory Paper |
| Booklet | Mark Scheme 1 |

Time Allowed: 59 minutes

Score: /49

Percentage: /100

| Question | Answer | Mark |
|----------|---|--|
| 1(a) | From time zero, line of constant positive gradient, not necessarily from origin Horizontal line from end of sloping line Line of steeper positive gradient from end of horizontal line | B1 B1 B1 |
| 1(b) | (distance =) area under graph stated $0.5 \times 7.5 \times 3.3 (= 12.375)$ $+ 12.5 \times 3.3 (= 41.25)$ $+ 0.5 \times 5 \times 3.3 (= 8.25)$ OR $\frac{1}{2} (a + b)h$ $= 0.5 \times (25 + 12.5) \times 3.3$ OR $(25 \times 3.3) - (0.5 \times 12.5 \times 3.3)$ 62m | C1 C2 (C1) (C1) (C2) A1 |
| | | Total: 7 |

- 2 (a) speed \times time in any form, symbols, numbers or words [1]
OR any area under graph used or stated [1]
13 (m/s) OR 24 (s) seen or used in correct context [1]
312 m (2 or 3 sig. figs.)
- (b) rate of change of speed OR gradient of graph OR 18/12 [1]
18 (m/s) OR 12 (s) seen or used in correct context [1]
1.5 m/s² [1]
- (c) same gradient / slope OR equal speed changes in equal times OR
allow graph symmetrical [1]
- 3 (a) (i) acceleration OR increasing speed C1
constant acceleration OR constant rate of increase in speed A1
- (ii) decreasing acceleration OR decreasing rate of increase in speed B1
NOT deceleration
- (b) mention of air resistance AND weight (of object) / force due to gravity B1
acceleration at start (of fall) is acceleration of gravity / 10 m/s² / a maximum / g B1
OR acceleration decreases (as it falls)
air resistance increases as speed increases/as it accelerates B1
acceleration zero/terminal velocity/constant speed/maximum speed when
air resistance = weight B1

[Total: 7]

- 4 (a) (i) horizontal line at 10 m/s B
(ii) straight line from origin to (5.0, 25) B1
- (b) (i) 50 m B1
(ii) area of triangle OR $\frac{1}{2} \times 25 \times 5.0$
62.5 m OR 63 m A1
(iii) when areas under graphs are equal C1
4.0 s A1

[Total: 7]

- 5 (a) point marked P (on line or time axis) at $t \geq 2.0$ s B1
- (b) attempt at gradient OR $(a =) \Delta v/t$ OR $(v - u)/t$ OR $240 (-0)/2.0$ C1
OR division of correct points on graph A1
120 m/s²
- (ii) suggestion of area (under graph) in words or formula or numbers C1
OR $0.5 (120 + 240) \times 1.0$ OR $[(120 \times 1.0) + (0.5 \times 120 \times 1.0)]$ C1
180 m A1
- (c) mass of sled changes/decreases OR fuel used up B1

[Total: 6]

- 6 (a) (i) (it/comet) travels in a straight line B1
(ii) area (under graph) OR $s = vt$ in any form OR vt C1
220 000 m OR 220 km A1
- (b) negative acceleration OR deceleration OR (it/the comet) is slowing down B1
acceleration/deceleration (only accept **it** if acc/decel already mentioned)
not constant allow either increasing or decreasing B1
- (c) attempt at gradient OR ($a =$) $\Delta v / \Delta t$ OR (0–)12 000/2.0 OR other correct values for $\Delta v / \Delta t$ C1
(–)6000 m/s^2 tolerance 5000 – 7000 m/s^2 A1
- (d) (it/comet) hits surface (of planet) B1
OR stops o.w.t.t.e.

[Total: 8]

- 7 (a) speed is constant/uniform/unchanging OR terminal velocity/speed B1
no net/resultant force OR air resistance cancels/equals weight
- (b) P between 0.25 s and 1.90 s (inclusive) B1
- (c) (i) ($a =$) $\Delta v / t$ OR 2.5/0.25 OR other point on correct section of line B1
9.6 to 10 m/s^2 (inclusive) B1
- (ii) area under graph OR attempt at counting squares OR between 16.2 and 17.5 m C1
(inclusive)
between 16.5 and 17.1 m (inclusive) A1

[Total: 7]