

The Distance-Time Relationship

Mark Scheme 1

Level	GCSE (9-1)
Subject	Combined Science: Trilogy - Physics
Exam Board	AQA
Topic	6.5 Forces
Sub-Topic	The Distance-Time Relationship
Difficulty Level	Bronze Level
Booklet	Mark Scheme 1

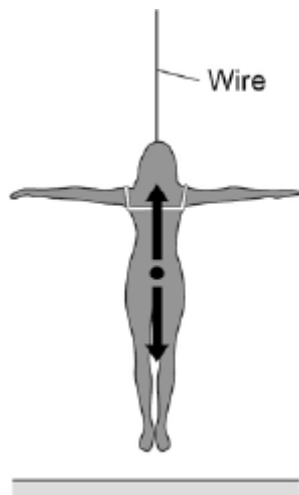
Time Allowed: 58 minutes

Score: /57

Percentage: /100

Grade Boundaries:

M1.(a)



arrow pointing vertically upwards

1

arrow pointing vertically downwards

1

(b) Gravitational force

*if more than **two** boxes ticked apply list principle*

1

Tension force

1

(c) 0 (N)

1

(d) weight = 70×9.8 (= 686)

1

weight = 690 (N)

1

allow 690 (N) with no working shown for 2 marks

allow 686 (N) with no working shown for 1 mark

(e) 34 (N) / 30 (N)

allow ecf from 05.4 correctly calculated

1

(f) resultant force = mass \times acceleration

accept $F = ma$

1

accept equation correctly rearranged for a

(g) $25 = 65 \times a$

1

$$a = 25 / 65$$

1

$$a = 0.38(4615...) \text{ (m / s}^2\text{)}$$

1

allow 0.38 (m / s²) with no working for 3 marks

[12]

M2.(a) terminal

1

(b) 5.4 (kg)

correct substitution of $54 = m \times 10$ gains 1 mark

2

(c) (i) $0 < a < 10$

1

some upward force
accept some drag / air resistance

1

reduced resultant force

1

(ii) 0

1

upward force = weight (gravity)

1

resultant force zero

1

[9]

M3.(a) (i) not moving

1

(ii) straight line from origin to (200,500)
ignore a horizontal line after (200,500)

1

(b) 35 000

allow 1 mark for correct substitution, ie $14\,000 \times 2.5$ provided
no subsequent step
an answer of 87 500 indicates acceleration (2.5) has been
squared and so scores zero

2

[4]

M4. (a) (i) 12

1

(ii) 0.2

allow 1 mark for their (a)(i) $\div 60$ and correctly calculated

1

m/s²

accept correct unit circled in list

accept ms⁻²

*do **not** accept mps²*

1

(b) **B**

1

[4]

M5. (a) distance travelled under the braking force
accept braking (distance)

1

(b) (directly) proportional

accept a correct description using figures

or

increase in the same ratio

eg if speed doubles then

thinking distance doubles

accept for 1 mark positive correlation

accept for 1 mark as speed

increases so does thinking distance

accept as one increases the other increases

accept as thinking distance increases speed increases

2

- (c) (i) control variable 1
- (ii) experiment done, student listens to music / ipod (etc) 1
- experiment (repeated), student not listening to music
for both marks to be awarded there must be a comparison 1
- (d) increase it
accept an answer which implies reactions are slower
do **not** accept answers in terms of thinking distance only 1
- (e) Y 1

[8]

- M6.** (a) shallowest slope/ gradient
accept smallest distance in biggest time
accept longest time to travel the same distance
accept the line is not as steep
accept it is a less steep line
do **not** accept the line is not steep 1
- (b) **A – B**
If 2 or 3 boxes are ticked no mark 1
- (c) (i) 200 m 1

	(ii)	20 s	<i>allow 1 mark for correctly identifying 60 s or 40 s from the graph</i>	2	
	(d)	(i)	<u>straight</u> line starting at origin <i>accept within one small square of the origin</i>	1	
			passing through $t = 200$ and $d = 500$	1	
	(ii)	166	<i>accept any value between 162 and 168 accept where their line intersects given graph line correctly read ± 3 s</i>	1	[8]
M7.	(a)	MN	<i>accept 5.8, 8 seconds must include unit</i>	1	
	(b)	LM	<i>accept 0.8, 5.8 seconds must include unit</i>	1	
	(c)	(i)	0.8	1	
		(ii)	drinking alcohol	1	
	(d)		<u>straight</u> (by eye) line starting at 0.8 seconds	1	

line drawn steeper than LM starting before L

*ignore lines going beyond 2 seconds but line must exceed
2.5 metres per second before terminating*

1

[6]

M8. (a) 60

1

(b) $5\frac{1}{2}$ hours

must include unit

1

(c) 30

1

(d) 30 minutes or

$\frac{1}{2}$ hour

must include unit

1

(e) D and E

accept finish for E

accept correct numbers from axes with units

1

least steep part of the graph

accept covers smallest distance in a set time

*accept only moves 5 km in $1\frac{1}{2}$ hours (accept anything
between 5 and 6)*

ignore horse is tired

1

[6]

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