

Speed

Mark Scheme 1

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

Time Allowed: 57 minutes

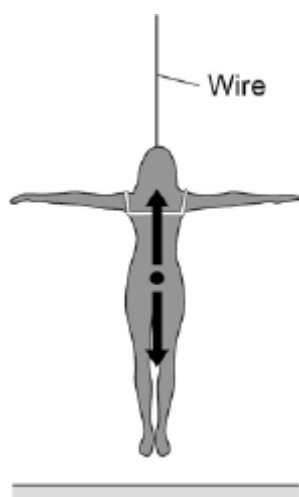
Score: /56

Percentage: /100

Grade Boundaries:

| | | |
|---------------|---|------------|
| M1.(a) | C | 1 |
| (b) | 2040 / 120 | 1 |
| | 17 (m / s) | 1 |
| | <i>allow 17 (m / s) with no working shown for 2 marks</i> | |
| (c) | the thinking distance and the braking distance combined <i>accept 36 m</i> | 1 |
| (d) | thinking distance increases | 1 |
| | braking distance stays the same | 1 |
| | | [6] |

M2.(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) $34 \text{ (N)} / 30 \text{ (N)}$

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

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

1

allow $0.38 \text{ (m / s}^2\text{)}$ with no working for 3 marks

[12]

M3.(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]

M4.(a) pitch

1

loudness

1

(b) (i) as length (of prongs) decreases frequency / pitch increases
accept converse
accept negative correlation
ignore inversely proportional

1

(ii) 8.3 (cm)
accept 8.3 ± 0.1 cm

1

- (iii) (8.3 cm is) between 7.8 (cm) and 8.7 (cm)
ecf from part (ii)

1

(so f must be) between 384 (Hz) and 480 (Hz)

1

$410 \text{ (Hz)} \leq f \leq 450 \text{ (Hz)}$

if only the estimated frequency given, accept for 1 mark an answer within the range

1

- (c) (i) electronic

1

- (ii) frequency is (very) high
*accept frequency above
20 000 (Hz) or audible range*

1

so tuning fork **or** length of prongs would be very small (1.2 mm)

1

- (d) 285.7 (Hz)

accept any correct rounding 286, 290, 300

allow 2 marks for 285

allow 2 marks for correct substitution $0.0035 = 1 / f$

allow 1 mark for $T = 0.0035 \text{ s}$

allow 1 mark for an answer of 2000

3

[13]

| | | | |
|---------------|---|---|------------|
| M5.(a) | (i) not moving | 1 | |
| | (ii) straight line from origin to (200,500) <i>ignore a horizontal line after (200,500)</i> | 1 | |
| | (b) 35 000 <i>allow 1 mark for correct substitution, ie $14\,000 \times 2.5$ provided no subsequent step</i> <i>an answer of 87 500 indicates acceleration (2.5) has been squared and so scores zero</i> | 2 | [4] |
| M6. | (a) (i) 12 | 1 | |
| | (ii) 0.2 <i>allow 1 mark for their (a)(i) $\div 60$ and correctly calculated</i> | 1 | |
| | m/s^2 <i>accept correct unit circled in list</i> <i>accept ms^{-2}</i> <i>do not accept mps^2</i> | 1 | |
| | (b) B | 1 | [4] |
| M7. | (a) distance travelled under the braking force <i>accept braking (distance)</i> | 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