

Newton's Second Law

Mark Scheme

Level	GCSE (9-1)
Subject	Combined Science: Trilogy - Physics
Exam Board	AQA
Topic	6.5 Forces
Sub-Topic	Newton's Second Law
Difficulty Level	Bronze Level
Booklet	Mark Scheme

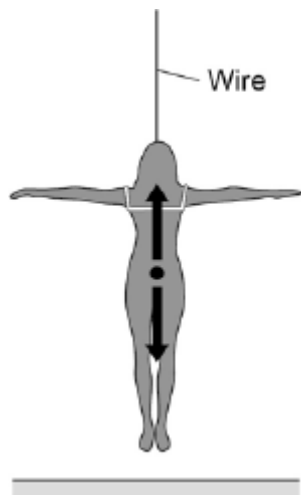
Time Allowed: 47 minutes

Score: /46

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 × acceleration

accept $F = ma$

1

accept equation correctly rearranged for a

(g) 25 = 65 × 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) (i) not moving

1

(ii) straight line from origin to (200,500)

ignore a horizontal line after (200,500)

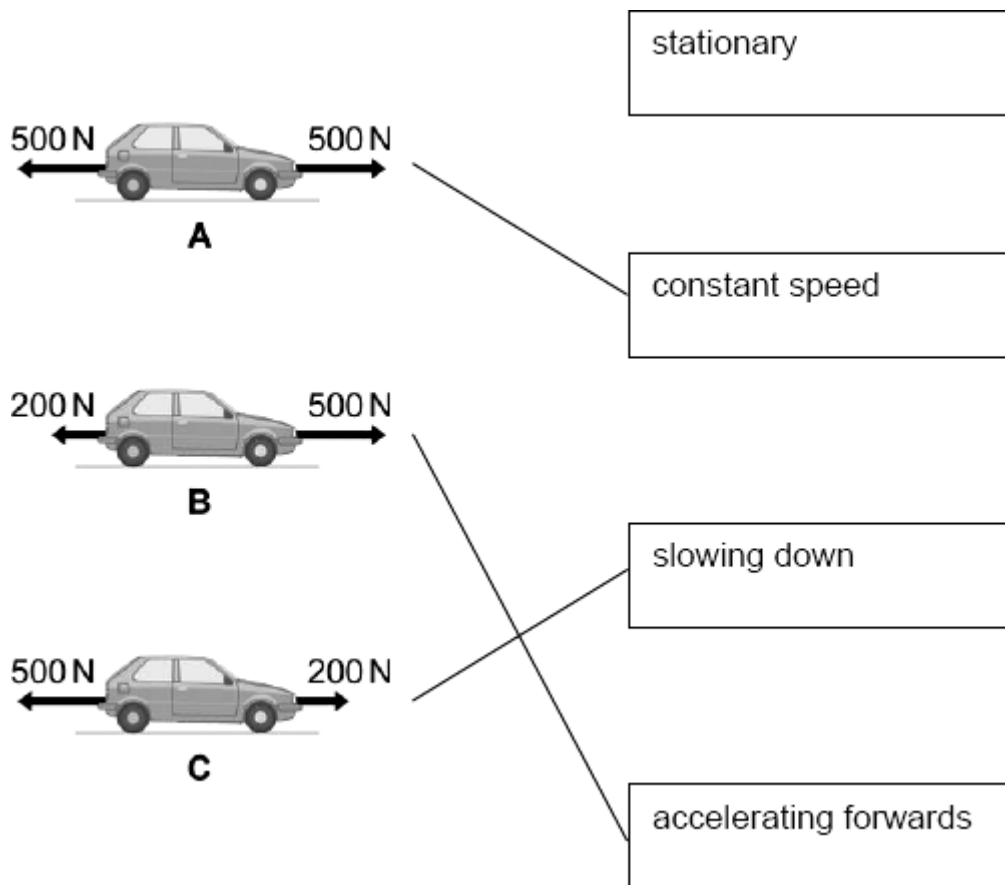
1

(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

- M3.(a)** 3 lines drawn
all correct
allow 1 mark for each correct line
if two or more lines are drawn from any diagram then all these lines are incorrect



- (b) (i) horizontal arrow to the right
judge by eye
accept an arrow drawn outside the box if it is labelled correctly

- (ii) horizontal arrow to the left
judge by eye

accept an arrow drawn outside the box if it is labelled correctly

1

(iii) equal to

1

(iv) to measure the forces exerted on the dummy during the impact

1

[7]

M4. (a) (i) 0.6

allow 1 mark for correct substitution

2

newtons

accept N

*do **not** accept n*

accept Newtons

1

(ii) the same as

1

(b) (i) changed velocity

accept increased/ decreased for change

accept speed for velocity

accept change direction

accept getting faster/ slower

accept start/ stop moving

accept correct equation in terms of change in speed or

change in velocity

1

(ii) down(wards)

accept towards the ground

accept ↓

do **not** accept south

1

[6]

M5.

(a) (i) friction

accept any way of indicating the correct answer

1

(ii) gravity

accept any way of indicating the correct answer

1

(b) (i) accelerates **or** speed / velocity increases

accept faster and faster (1 mark)

*do **not** accept faster pace / falls faster*

or suggestions of a greater but constant speed

1

downwards / falls

accept towards the Earth / ground

this may score in part (b)(ii) if it does not score here and

there is no contradiction between the two parts

1

(ii) constant speed / velocity **or** terminal velocity / speed or zero acceleration

stays in the same place negates credit

1

[5]

M6. (a) B

more aerodynamic **or** most streamlined shape **or**
smaller (surface) area

*accept less air/wind resistance **or** less drag **or** less friction
clothing traps less air **or** rolled up into ball **or** arms, legs
drawn in*

accept converse

2

(b) (i) gravity

1

(ii) air resistance

1

(iii) go up

1

(iv) stays the same

1

(c) bigger the area, the bigger force Y

accept the converse

or bigger the area more drag

accept when the parachute opens then force Y bigger

or bigger the area more air resistance

need the relation of area to force

1

[7]

M7. (a) (i) same size

1

(ii) **K**

1

(b) velocity

1

(c) C

1

greatest mass **or** because it's heavier

accept biggest load

*accept heaviest **or** more weight*

*do **not** accept fuller*

*do **not** accept more items*

*do **not** accept it's loaded*

*do **not** accept loaded most*

ignore references to time as neutral

1

[5]