

# MARK SCHEME

# GCSE

## PHYSICS

## AQA - COMBINED SCIENCE

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P5 - TEST 2

FORCES

Beginner

## Mark schemes

<b>1.</b>	<b>B and D</b> (either order)	1	
	<b>B and D</b> (either order) <i>accept A and C</i>	1	
	<b>A or C</b>	1	
			<b>[3]</b>
<b>2.</b>	(a) Has direction and magnitude	1	
	(b) 5.5	1	
	(c) $6.4 \div 9.8 = 0.65$ (kg)	1	
	(d) the Earth's gravitational field strength is 2.5 times greater <i>allow the gravitational field strength on Earth is greater than on Mars</i>	1	
			<b>[4]</b>
<b>3.</b>	(a) (i) walking at constant speed	1	
	(ii) standing still	1	
	(b) is higher <b>or</b> faster <i>accept less time to walk more distance (both time and distance must be mentioned)</i>	1	
	the slope of graph is steeper <i>accept slope is more</i>	1	
	(c) $\text{speed} = \frac{\text{distance}}{\text{time}}$  <i>accept suitable symbols used in correct formula do not accept a triangle</i>	1	
			<b>[5]</b>

4.

(a) thinking distance stays the same

1

braking distance increases

1

(b) reaction time is increased by using a mobile phone

1

hand-held mobile phones increase the thinking distance more than hands-free phone

*allow thinking distance is increased by using a mobile phone*

1

by 4 m more than the hands-free phone

1

*allow 2 marks for a hand-held mobile phone doubles the increase of the thinking distance*

so overall stopping distance increases

1

[6]

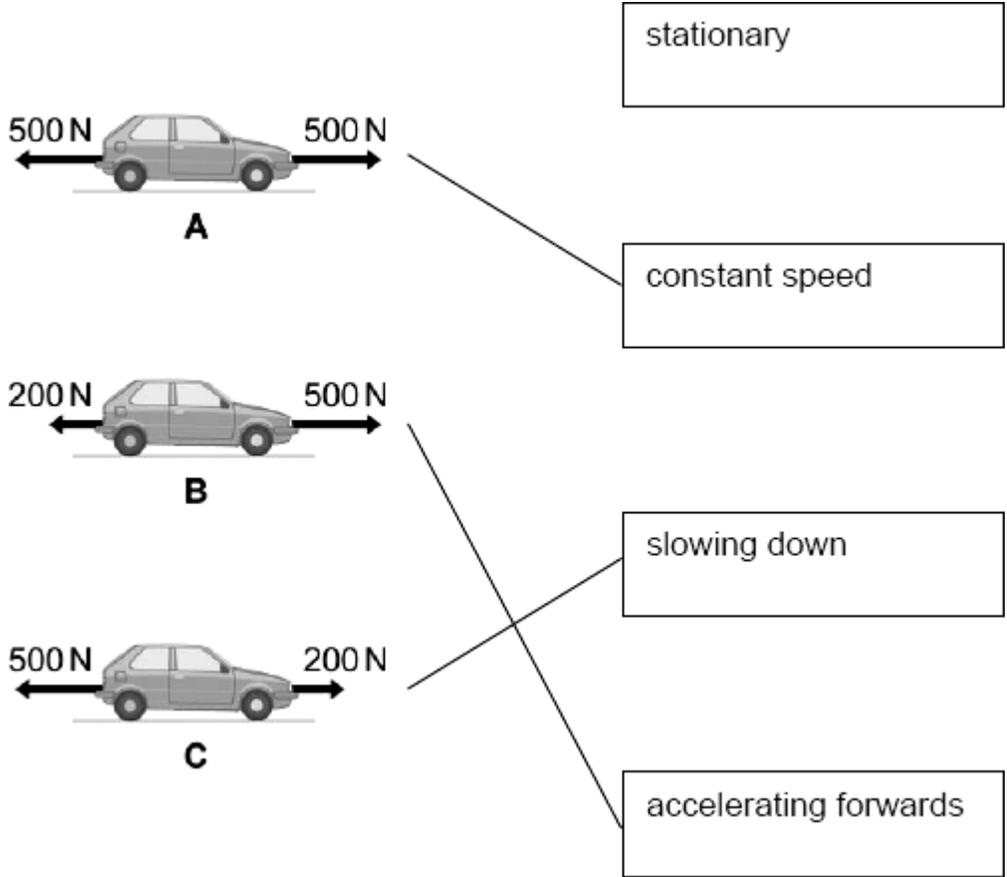
5.

(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



3

- (b) (i) horizontal arrow to the right  
*judge by eye*  
*accept an arrow drawn outside the box if it is labelled correctly* 1
- (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]**

**6.**

- (a) any **two** from:
- alcohol
  - drugs  
*allow named drugs*
  - tiredness
  - distraction  
*allow named distractions*  
*allow caffeine*  
*allow age*  
*ignore drinking unqualified*
- 2
- (b) any **one** from:
- speed of vehicle
  - condition of tyres
  - condition of brakes
  - condition of road surface
  - water / ice / snow on road
  - braking force  
*allow mass of vehicle*
- 1
- (c) (s =)  $13 \times 0.6$
- 1
- = 7.8 (m)
- 1
- an answer of 7.8 (m) scores 2 marks*
- (d) 21.8 (m)
- 1
- allow ecf from part (c)*
- (e) the greater the braking distance
- 1

(f) brakes overheat  
*allow damage to brakes* 1

car goes out of control  
*allow skidding*  
*allow damage to car or occupants* 1

[9]

**7.** (a) increases 1

(b) the band returns to its original shape  
*allow band gets shorter* 1

because there is an elastic force  
*allow because the stretching force has been removed*  
*if no other mark has been scored, allow for 1 mark the elastic potential energy decreases* 1

(c) any **two** from:  
• initially the band does not stretch when a force is applied  
*allow a certain force is needed before the band extends*  
• (when extending) as force increases the extension increases  
• the relationship is non-linear  
*allow the increase is not proportional*  
*do **not** accept directly proportional* 2

(d) straight diagonal line from bottom left to top right  
*allow the line to curve upwards beyond the elastic limit* 1

straight line through the origin 1

(e) force = spring constant × extension  
*allow  $F = k e$*  1

(f)  $7.5 \text{ cm} = 0.075 \text{ m}$

1

$F = 1\,600 \times 0.075$

*this mark may be awarded if e is incorrectly / not converted*

1

$F = 120 \text{ (N)}$

*allow an answer that is consistent with their value of e*

1

*an answer of 120 (N) scores 3 marks  
an answer of 12 000 (N) scores 2 marks*

[11]

8.

(a) the arrows have different lengths

*allow forces can have different sizes*

1

the arrows point in different directions

*allow forces can have different directions*

1

(b) **D**

1

(c) **B**

1

(d) both variables are continuous

1

(e) it is moving at a constant velocity

1

(f)  $24.5 \text{ (m/s}^2\text{)}$

1

(g)  $5 \text{ g} = 49 \text{ (m/s}^2\text{)}$

1

$49 \text{ m/s}^2 > 24.5 \text{ m/s}^2$

1

so the ride is safe

*allow ecf from (f) (ie if their answer to (f) was greater than 49, then the ride is unsafe)*

1

(h) force =  $58 \times 24.5$

*allow ecf from (f)*

1

force = 1421

1

Newtons

*allow N*

1

[13]

9.

(a) vector

1

direction

*must be in this order*

1

(b) 42 (km)

1

210 (minutes)

1

(c) moving at constant speed

1

(d) **A to B**

1

(e) the gradient / line is the steepest (in this section)

1

(f) straight line from origin

1

finishing at 42 km **and** 120 minutes (2 hours)

*allow ecf from part (b)*

1

(g) 1.5 (m/s)

1

(h)  $\frac{1.5}{60}$

*allow ecf from part (g)*

1

0.025

*an answer of 0.025 scores 2 marks*

1

m/s<sup>2</sup>

1

(i) **B**

**1**  
**[14]**