

# MARK SCHEME

# GCSE

## PHYSICS

## AQA - COMBINED SCIENCE

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P5 - TEST 1

FORCES

Beginner

## Mark schemes

<b>1.</b>	(a)	(i)	0.6		
				<i>allow 1 mark for correct substitution</i>	2
				newtons	
				<i>accept N</i>	
				<i>do <b>not</b> accept n</i>	
				<i>accept Newtons</i>	1
		(ii)		the same as	1
	(b)	(i)		changed velocity	
				<i>accept increased/ decreased for change</i>	
				<i>accept speed for velocity</i>	
			<i>accept <u>change</u> direction</i>		
			<i>accept getting faster/ slower</i>		
			<i>accept start/ stop moving</i>		
			<i>accept correct equation in terms of change in speed or change in velocity</i>	1	
	(ii)		down(wards)		
			<i>accept towards the ground</i>		
			<i>accept ↓</i>		
			<i>do <b>not</b> accept south</i>	1	
				<b>[6]</b>	
<b>2.</b>	(a)	(i)	50 (N)		
				<i>ignore any units</i>	1
		(ii)		resultant force	1
		(iii)		4000	
				<i>accept their (a)(i) × 80 correctly calculated for 2 marks</i>	
				<i>allow 1 mark for correct substitution i.e. 50 × 80 or their (a)(i) × 80</i>	
				<i>ignore any units</i>	2
(b)	(i)		joule	1	
	(ii)		heat	1	
				<b>[6]</b>	

<b>3.</b>	(a) (i) horizontal arrow pointing to the left <i>judge by eye</i> <i>drawn anywhere on the diagram</i>	1
	(ii) 60 (N)	1
	(at steady speed) resultant force must be zero <i>accept forces must balance/are equal</i> <i>accept no acceleration</i> <i>do <b>not</b> accept constant speed</i>	1
	(b) 1680  <i>allow 1 mark for correct substitution, ie 60 x 28 provided no subsequent step shown</i>	2
	joule  <i>accept J</i> <i>do not accept j</i>	1
		<b>[6]</b>

<b>4.</b>	(a) B  more aerodynamic <b>or</b> most streamlined shape <b>or</b> smaller (surface) area  <i>accept less air/wind resistance <b>or</b> less drag <b>or</b> less friction clothing</i> <i>traps less air <b>or</b> rolled up into ball <b>or</b> arms, legs drawn in</i> <i>accept converse</i>	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]

5.

(a) 1800 (N)

*allow 1 mark for correct substitution ie  $180 \times 10$  provided no further steps shown*

2

(b) 3780

**or**

their (a)  $\times 2.1$  correctly calculated

*allow 1 mark for correct substitution*

*ie 1800 **or** their (a)  $\times 2.1$  provided no further steps shown*

2

joule

*accept J*

*accept any clear indication of correct answer*

1

(c) 0

*reason does not score if 0 not chosen*

1

work is only done when a force makes an object move

*accept distance moved is zero*

*accept no energy transfer (to the bar)*

*accept the bar is not moving/is stationary*

*'it' refers to the bar/weights*

1

[7]

<b>6.</b>	(a) 3 (.0)	2
	<i>allow 1 mark for correct substitution i.e. <math>25 \times 0.12</math> provided no subsequent step</i>	
	(b) (i) elastic potential	1
	<i>correct order only</i>	
	kinetic	1
	(ii) increases	1
	to 80 (mm) (or more)	
	<i>accept any number greater than 75</i>	
	<i>an answer 'it (more than) doubles' gains both marks</i>	1
	(c) (i) weight	1
	(ii) downward speed increases	1
		<b>[8]</b>
<b>7.</b>	(a) equal to	1
	(b) weight = $85 \times 9.8$	1
	weight = 833 (N)	
	<i>allow weight = 830 (N)</i>	1
	<i>an answer of 833 (N) or 830 (N) scores 2 marks</i>	
	(c) work done = $833 \times 0.63$	1
	<i>allow their calculated value from part (b) <math>\times 0.63</math></i>	
	work done = 525 (J)	
	<i>allow an answer that is consistent with their calculated value from part (b)</i>	1
	<i>an answer that rounds to 525 (J) scores 2 marks</i>	
	(d) work done = 0 (J)	1

(e) force =  $62 \times 11$

1

force = 682 (N)

*allow force = 680 (N)*

1

*an answer of 682 (N) or 680 (N) scores 2 marks*

[8]

8.

(a) 1.5 m/s

1

(b) 6.0 m/s

1

(c) **C** = 3.8 (s) **and D** = 8.6 (s)

1

(t =) 4.8 (s)

*allow correct subtraction of incorrect values given for C and / or D*

1

(d) straight line from **E** to x-axis

1

finishing at 14 s

1

(e) C-D

1

(f) C-D

1

(g) distance travelled

1

(h) (resultant) force = mass  $\times$  acceleration

*allow  $F = m a$*

1

(i)  $a = \frac{11.6}{3.2}$

1

= 3.625 (m/s<sup>2</sup>)

*allow 3.6 (m/s<sup>2</sup>) or 3.63 (m/s<sup>2</sup>)*

1

*an answer of 3.6 / 3.625 / 3.63 (m/s<sup>2</sup>) scores 2 marks*

[12]

9.

(a) Any **three** factors from any of the

groups of factors below (1) each a clear and correct statement of the effect of the particular factor on the stopping distance (1) each

*do not credit mobile phones do not credit other distractions*

2

examples: (factors relating to the driver)

\* (driver's) reaction time or time for the driver to apply the brakes

the longer the reaction time the longer the s.d.

*which may be related to age, experience, sobriety, effect of drugs, mental capacity, physical capacity, driver fatigue, confusion and panic*

*does not depend on the driver's eyesight as this affects the occurrence of the 'need-to-stop' realisation rather than the stopping distance*

examples: (factors relating to the car)

4

\* force applied by the brakes the greater the force the shorter the s.d.

\* speed (of the car) the greater the speed the longer the s.d.

\* mass **or** weight (of the car) the greater the mass **or** weight the longer the s.d.

\* ABS answers

examples: (factors relating to the road or tyres)

\* tread on the tyres **or** friction the more tread **or** friction the shorter the s.d.

\* slipperiness of the road the greater the slipperiness the longer the s.d.

\* it is raining

*does not depend on the visibility as this affects the occurrence of the 'need-to-stop' realisation rather than the stopping distance*

(b) velocity

*accept speed*

1

mass

*accept weight **or** shape **or** aerodynamics*

*do not credit size*

1

(c) any **two** ((1) + (1)) each of  
*do not credit a description*

\* friction (between the tyres and the road) backwards or opposite to the direction of motion  
*do not credit the direction if the force not specified*

\* air resistance **or** drag **or** wind resistance backwards **or** opposite to the direction of motion  
*do not credit wind*

\* weight **or** gravity down (wards) **or** towards the centre of the Earth  
*do not credit mass **or** inertia*

\* reaction (of **or** from the road) upwards

4

(d) direction

*allow bearing(s)*  
*do not credit orientation*

1

**[13]**