

MARK SCHEME

GCSE

PHYSICS

AQA - TRIPLE SCIENCE

P5 - TEST 2

VT, DT & Acceleration

Beginner

Mark schemes

- 1.** (a) equal to 1
- (b) deceleration / decelerate
braking is insufficient 1
- (c) $\frac{18}{6}$ 1
- 3 (m/s²)
an answer of 3 (m/s²) scores 2 marks
*allow other correct pairs of numbers taken from **A** to **B*** 1
- (d) the stopping distance increases 1
- by more than double 1
- [6]
- 2.** (a) **Level 2 (3–4 marks):**
A detailed and coherent description of a plan covering all the major steps is provided. The steps are set out in a logical manner that could be followed by another person to obtain valid results.
- Level 1 (1–2 marks):**
Simple statements relating to relevant apparatus or steps are made but they may not be in a logical order. The plan would not allow another person to obtain valid results.
- 0 marks:**
No relevant content.
- Indicative content**
- measure the distance the ruler falls before being stopped
 - the greater this distance the greater the reaction time
 - repeat measurements and calculate a mean
 - repeat several times with the student listening to music (through earphones). Calculate a mean.
 - a (significant) difference between the two means would show that music affects reaction time.
- 4
- (b) reaction time decreases with practice 1
- allow Y has a shorter reaction time*
- allow Y has faster reaction times (than X)*

(c) the stop clock was started before the computer test started

1

the student was distracted

1

[7]

3.

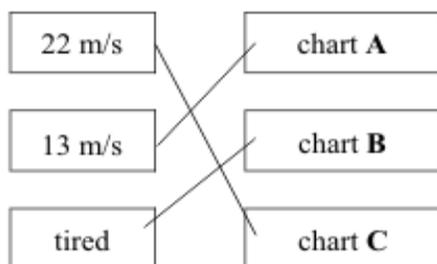
(a) (i) constant

1

(ii) heat

1

(b) (i) 3 links correct



allow 1 mark for 1 correct link

if more than one line is drawn from a condition mark all lines from that condition incorrect

2

(ii) increased

1

[5]

4.

(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

allow 1 mark for correctly identifying 60 s or 40 s from the graph

2

- (d) (i) straight line starting at origin
accept within one small square of the origin 1
- passing through $t = 200$ and $d = 500$ 1
- (ii) 166
accept any value between 162 and 168
accept where their line intersects
given graph line correctly read ± 3 s 1

[8]

5.

- (a) The driver has been drinking alcohol.
reason only scores if this box is ticked 1
- driver's reaction time increases
accept slower reactions
accept slower reaction time
- or**
- thinking distance / stopping distance increases
do not accept braking distance increases
- or**
- driver less alert
accept driver may fall asleep / be tired 1
- (b) they are all variables that could affect outcome / results
accept specific effect of changing one of the variables
accept to make the test valid
ignore reliable 1
- so data / barriers can be compared
accept to see which is / works best / safest
*do **not** accept fair test on its own* 1
- (c) ticks in both the top and middle boxes 1

[5]

6.

- (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

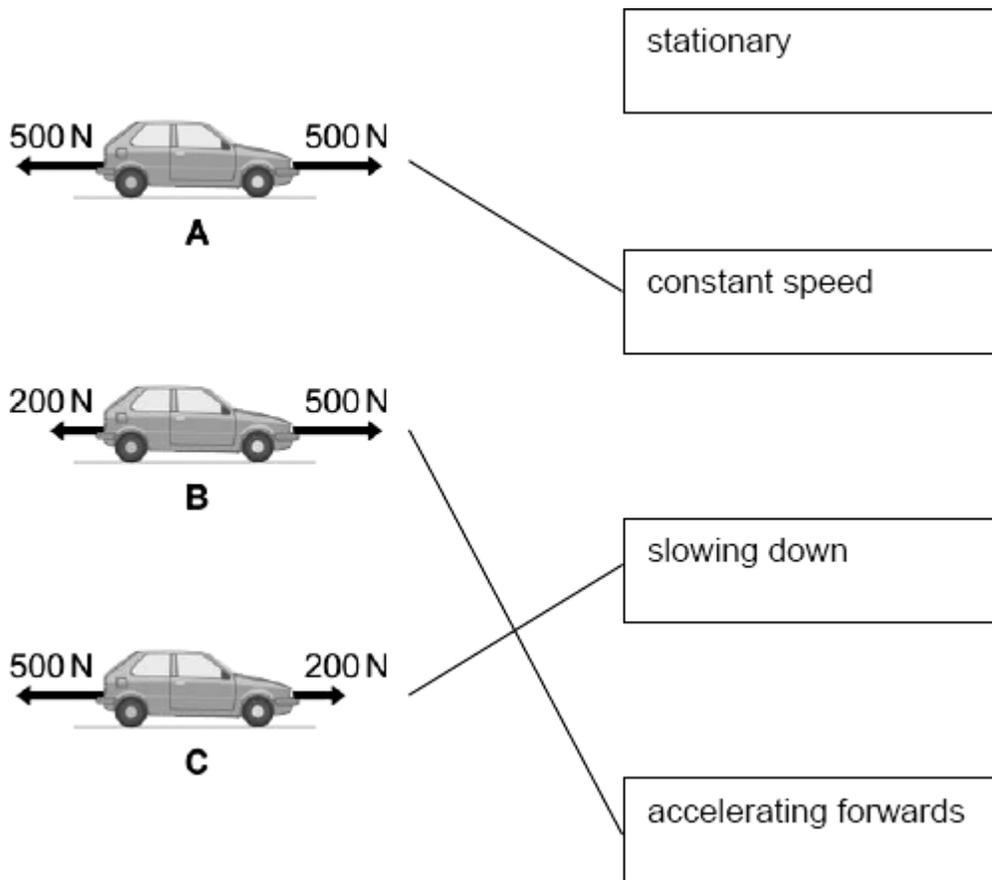
(b) **B**

1

[4]

7.

- (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]

8.

(a) 96 (m)

1

(b) (i) similar shape curve drawn above existing line going through (0,0)
*allow 1 mark for any upward smooth curve or straight upward line
above existing line going through (0,0)*

2

(ii) Rain on the road

1

(c) (i) all three lines correctly labelled
allow 1 mark for one correctly labelled

top line – **C**
accept 1.2

middle line – **B**
accept 0.9

bottom line – **A**
accept 0.7

2

(ii) any **two** from:

- (table has) both variables are together
accept tired and music as named variables
- both (variables) could / would affect the reaction time
accept cannot tell which variable is affecting the drive (the most)
- cannot tell original contribution
- need to measure one (variable) on its own
accept need to test each separately
- need to control one of the variables
fair test is insufficient

2

[8]

9.	(a) any two from:		
	<ul style="list-style-type: none"> • (make shape / body) more streamlined <i>accept a correct description</i> <i>accept lower the seating position of the driver</i> • increase power of engine <i>faster engine is insufficient</i> • reduce mass / weight (of go-kart) <i>change wheel size is insufficient</i> 		2
	(b) (i) A–B		
	<i>reason only scores if A–B is chosen</i>		1
	steepest / steeper gradient / slope		1
	(iii) 1820		
	<i>allow 1 mark for correct substitution, ie 140 × 13 provided no subsequent step shown</i>		2
			[6]
10.	(a) time		
	<i>correct order only</i>		1
	force		1
	(b) The car tyres being badly worn		1
	(c) (i) braking distance increases with speed		
	<i>accept positive correlation</i>		
	<i>do not accept stopping distance for braking distance</i>		1
	relevant further details, eg		
	<ul style="list-style-type: none"> • but not in direct proportion • and increases more rapidly after 15 m/s <i>accept any speed between 10 and 20</i> <i>accept numerical example</i> • double the speed, braking distance increases × 4 		1

- (ii) line drawn above existing line starting at the origin
*as speed increases braking distance must increase
each speed must have a single braking distance*

1

- (d) (i) reaction time / reaction (of driver) does not depend on speed (of car)

1

- (ii) (on the reduced speed limit roads) over the same period of time
accept a specific time, eg 1 year

1

monitor number of accidents before and after (speed limit reduced)
*allow 1 mark only for record number of vehicles / cars using the (20 mph) roads **or** collect data on accidents on the (20 mph) roads
to score both marks the answer must refer to the roads with the reduced speed limit*

1

[9]

11.

- (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]

12.

- (a) (i) 3000 N

1

- (ii) air resistance

1

(b) (i) the gradient of the sloping line

1

(ii) the area under the graph

1

(iii) horizontal line above previous one

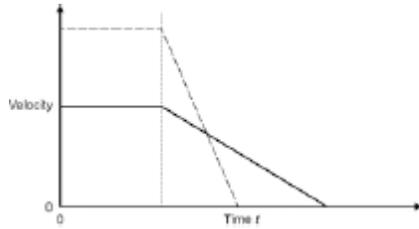
1

for the same time

1

sloping line cutting time axis before previous line

eg



1

- (c) Marks awarded for this answer will be determined by the Quality of Communication (QC) as well as the standard of the scientific response. Examiners should also refer to the information on page 5 and apply a 'best-fit' approach to the marking.

0 marks

No relevant content.

Level 1 (1–2 marks)

One factor is given that affects thinking distance

or

one factor is given that affects braking distance

Level 2 (3–4 marks)

One factor and a description of its effect is given for **either** thinking distance **or** braking distance

Level 3 (5–6 marks)

One factor and a description of its effect is given for **both** thinking distance and braking distance

plus

some extra detail

Examples of the points made in the response

stopping distance = thinking distance + braking distance

the faster the car travels the greater the stopping distance

thinking distance is the distance travelled from when the driver sees an obstacle to when the brakes are applied

braking distance is the distance travelled from when the brakes are applied to when the car stops

thinking distance:

- tiredness increases thinking distance
- taking drugs increases thinking distance
- drinking alcohol increases thinking distance
- distractions in the car increase thinking distance.

braking distance:

- poor condition of brakes increases braking distance
- poor condition of tyres increases braking distance
- wet roads increase braking distance
- icy roads increase braking distance.