

M1. (a) (i)	<b>E-F</b> (ticked)	1
(ii)	<b>B-C or D-E</b> <i>accept both answers</i>	1
(b)	fast(er) <i>accept downhill</i>	1
	slow(er)	1
	force <i>do <b>not</b> accept distance</i>	1

[5]

<b>M2.</b>	(a)	53 (m)	1	
	(b)	(i)	Similar shape curve drawn <u>above</u> existing line going <u>through (0, 0)</u> <i>allow 1 mark for any upward smooth curve or straight upward line above existing line going through (0, 0)</i>	2
		(ii)	rain on road	1
			car brakes in bad condition	1
	(c)	(i)	all three lines correctly labelled <i>allow 1 mark for one correctly labelled</i>  top line – C <i>accept 1.2</i>  middle line – B <i>accept 0.9</i>  bottom line – A <i>accept 0.7</i>	2
		(ii)	any <b>two</b> from: <ul style="list-style-type: none"> <li>• (table has) both variables are together <i>accept tired and music as named variables</i></li> <li>• both (variables) could/ would affect the reaction time</li> <li>• cannot tell original contribution <i>accept cannot tell which variable is affecting the drive (the most)</i></li> <li>• need to measure one (variable) on its own <i>accept need to test each separately</i></li> <li>• need to control one of the variables</li> </ul>	2

- M3.** (a) MN  
*accept 5.8, 8 seconds must include unit* 1
- (b) LM  
*accept 0.8, 5.8 seconds must include unit* 1
- (c) (i) 0.8 1
- (ii) drinking alcohol 1
- (d) straight (by eye) line starting at 0.8 seconds 1
- line drawn steeper than LM starting before L  
*ignore lines going beyond 2 seconds but line must exceed  
 2.5 metres per second before terminating* 1

**[6]**

**M4.** (a) time 1

force 1

(b) any **three** from

- driver's reactions are slow(er)  
*accept driver could have taken drugs  
or alcohol or due to tiredness or  
distractions*
- poor weather conditions  
*accept raining or snowing or fog /  
mist (poor visibility)*
- greater mass or weight
- poor road conditions  
*oil / gravel / mud / leaves / wet / icy  
going downhill*
- poorly maintained brakes  
*do not accept driver's weak foot force*
- worn tyres

3

[5]

- M5.** (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]**

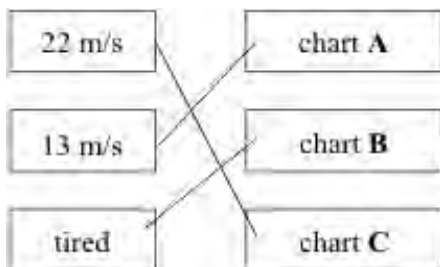
M6. (a) (i) constant

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

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- M7. (a) distance travelled under the braking force  
*accept braking (distance)* 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

[8]

**M8. (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]



- M9.** (a) time  
*correct order only* 1
- force 1
- (b) The car tyres being badly worn 1
- (c) (i) braking distance increases with speed  
*accept positive correlation*  
*do **not** accept stopping distance for braking distance* 1
- relevant further details, eg
- but not in direct proportion
  - and increases more rapidly after 15 m/s  
*accept any speed between 10 and 20*  
*accept numerical example*
  - double the speed, braking distance increases  $\times 4$  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]