M1. (a) (i) **E-F** (ticked)

1

(ii) **B-C or D-E**

accept both answers

1

(b) fast(er)

accept downhill

1

slow(er)

1

force

*do **not** accept distance*

1

[5]

M2. (a) 53 (m)

1

(b) (i) Similar shape curve drawn <u>above</u> existing line going <u>through (0, 0)</u>

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

2

(ii) rain on road

1

car brakes in bad condition

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
- cannot tell original contribution
  accept cannot tell which variable is affecting the drive (the most)
- need to measure one (variable) on its own
  accept need to test each separately
- need to control one of the variables

2

[9]

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) <u>straight</u> (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]

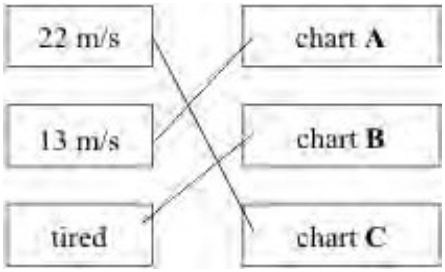
M6. (a) (i) constant

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

[5]

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

orthinking distance / stopping distance increases

do not accept braking distance increases

ordriver 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 <u>and</u> 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 × 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]