1. (a) Any **three** factors from any of the 2

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

examples: (factors relating to the
driver)
* (driver's) reaction time or time for the driver to apply the brakes 4
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)

* 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 occurance of the 'need-to-stop' realisation rather than the stopping distance

(b) velocity 1
accept speed

mass 1
*accept weight **or** shape **or** aerodynamics*
do not credit size

(c) any **two** ((1) + (1)) each of 4

do not credit a description

* <u>friction</u> (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 <u>resistance</u> **or** drag **or** wind <u>resistance</u> 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

(d) direction 1

allow bearing(s)

do not credit orientation

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2. (a) time 1

force 1

(b) any **three** from 3

- 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

[5]

3. (a) (i) tiredness / boredom
drugs
alcohol
distraction
any two for 1 mark each 2

(ii) A greater / longer
B no effect
C greater / longer
each for 1 mark 3

(b) on a wet road:
there is less friction / grip
for 1 mark 2

braking distance is greater / takes longer to stop
or car skids / slides forward
for 1 mark

(c) (i) deceleration = gradient or 30 / 4.8
each for 1 mark 2

(ii) force = mass × acceleration or 900 × 6.25
each for 1 mark 2

(iii) distance = area under graph or 0.5 × 4.8 × 30 **or** average speed × time **or** 15 × 4.8
Accept answer in terms of change in k.e. = work done
if incorrect unit given (eg 72km) then no mark
each for 1 mark 2

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