

Q1.

The image below shows a lorry.



- (a) The brakes of the lorry are in a poor condition.

What effect will the condition of the brakes have on thinking distance and the braking distance of the lorry?

Thinking distance _____

Braking distance _____

(2)

- (b) Using a hand-held mobile phone while driving is illegal in the United Kingdom.

The table below shows the effect of using a mobile phone on thinking distance.

	Thinking distance
Not using a mobile phone	19 m
Using a mobile phone with hands-free kit	23 m
Using a hand-held mobile phone	27 m

Explain why driving while using a hand-held mobile phone is more dangerous than using a mobile phone with a hands-free kit.

Use data from the table above.

(4)
(Total 6 marks)

Q2.

The stopping distance of a car depends on the thinking distance and the braking distance.

(a) Thinking distance depends on the driver's reaction time.

Give **two** factors that can affect reaction time.

1. _____

2. _____

(2)

(b) Give **one** factor that can affect the braking distance.

(1)

(c) The thinking distance is the distance travelled during the driver's reaction time.

A car was travelling at 13 m/s

The driver's reaction time was 0.6 s

Calculate the thinking distance.

Use the equation:

$$\text{distance travelled} = \text{speed} \times \text{time}$$

Thinking distance = _____ m

(2)

(d) The braking distance of the car was 14.0 m

What was the stopping distance of the car?

Stopping distance = _____ m

(1)

- (e) What is the link between speed and braking distance?

Complete the sentence.

The greater the speed, the _____

(1)

- (f) If a large braking force is applied, the car decelerates and stops in a very short distance.

Give **two** disadvantages of applying a large braking force.

1. _____

2. _____

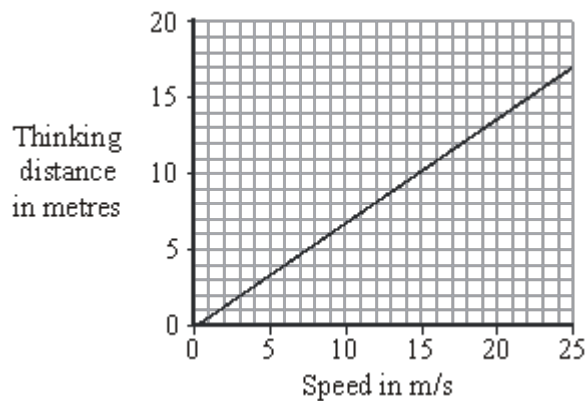
(2)

(Total 9 marks)

Q3.

- (a) A car driver takes a short time to react to an emergency before applying the brakes. The distance the car will travel during this time is called the 'thinking distance'.

The graph shows how the thinking distance of a driver depends on the speed of the car.



- (i) What is the connection between thinking distance and speed?

(1)

- (ii) Many people drive while they are tired.

Draw a new line on the graph to show how thinking distance changes with speed for a tired driver.

(1)

- (iii) The graph was drawn using data given in the Highway Code.

Do you think that the data given in the Highway Code is likely to be reliable?

Draw a ring around your answer.

Yes No Maybe

Give a reason for your answer.

(1)

- (b) The distance a car travels once the brakes are applied is called the 'braking distance'.

- (i) What is the relationship between thinking distance, braking distance and stopping distance?

(1)

- (ii) State **two** factors that could increase the braking distance of a car at a speed of 15 m/s.

1. _____

2. _____

(2)

(Total 6 marks)

Mark schemes

Q1.

- (a) thinking distance stays the same 1
- braking distance increases 1
- (b) reaction time is increased by using a mobile phone 1
- hand-held mobile phones increase the thinking distance more than hands-free phone
- allow thinking distance is increased by using a mobile phone* 1
- by 4 m more than the hands-free phone 1
- allow 2 marks for a hand-held mobile phone doubles the increase of the thinking distance*
- so overall stopping distance increases 1

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Q2.

- (a) any **two** from:
- alcohol
 - drugs
- allow named drugs*
- tiredness
 - distraction
- allow named distractions*
allow caffeine
allow age
ignore drinking unqualified 2
- (b) any **one** from:
- speed of vehicle
 - condition of tyres
 - condition of brakes
 - condition of road surface
 - water / ice / snow on road
 - braking force
- allow mass of vehicle* 1
- (c) (s =) 13×0.6 1

= 7.8 (m)

1

an answer of 7.8 (m) scores 2 marks

(d) 21.8 (m)

allow ecf from part (c)

1

(e) the greater the braking distance

1

(f) brakes overheat

allow damage to brakes

1

car goes out of control

allow skidding

allow damage to car or occupants

1

[9]

Q3.

(a) (i) as one goes up so does the other

or (directly) proportional

accept change by the same ratio

1

(ii) steeper straight line through the origin

judge by eye

1

(iii) Yes with reason

eg data would have been checked / repeated

accept produced by a reliable/ official/ government source

*do **not** accept it needs to be reliable*

or No with reason

eg does not apply to all conditions / cars / drivers

or are only average values

or Maybe with a suitable reason

eg cannot tell due to insufficient information

1

(b) (i) stopping distance = thinking distance + braking distance

1

(ii) any **two** from:

factors must be to do with increasing braking distance

- smooth road / loose surface

- rain / snow / ice
accept wet road/ petrol spills
*do **not** accept condition of road unless suitably qualified*
- badly maintained brakes
accept worn brakes
accept bad/ worn/ rusty brakes
*do **not** accept old brakes*
- worn tyres
accept bald tyres
accept lack of grip on tyres
*do **not** accept old tyres*
- downhill slope/gradient
- heavily loaded car

2

[6]