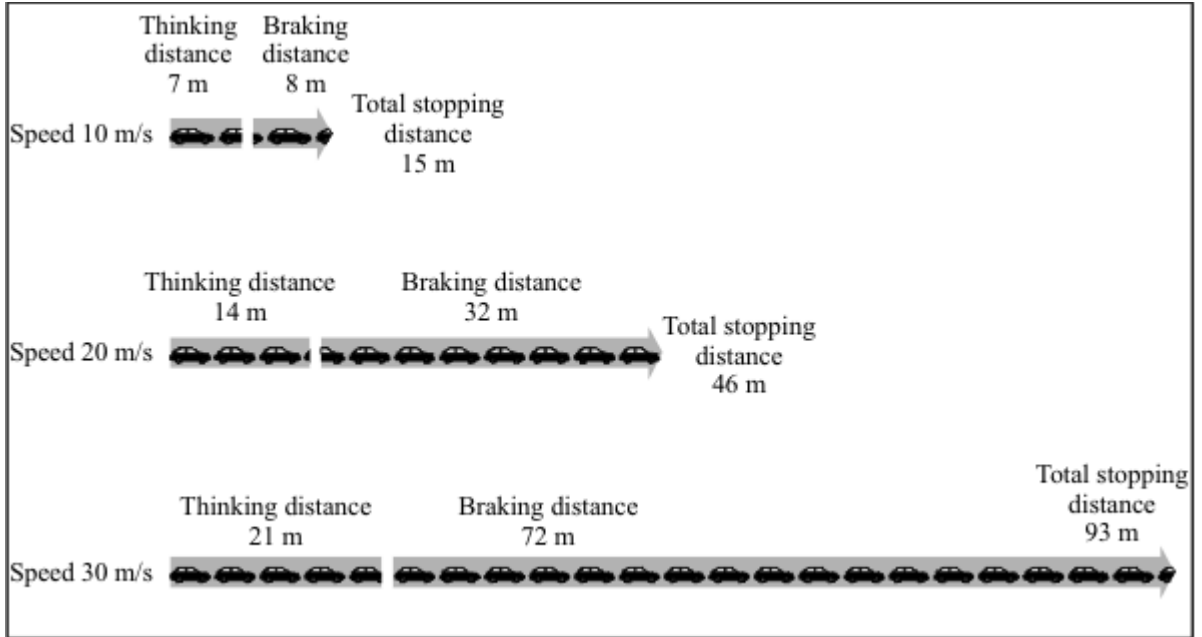


Q1.

The diagram below shows the thinking distances, braking distances and total stopping distances at different speeds.



(a) Look at the total stopping distances at each speed.

Complete the sentence by choosing the correct words from the box.

distance	force	mass	time
-----------------	--------------	-------------	-------------

The total stopping distance depends on the distance the car travels during the driver's reaction _____ and under the braking _____ .

(2)

(b) Give **three** other factors that could cause the total stopping distance of a car to be greater. Do **not** give the factors in **Figure 1**.

1. _____

2. _____

3. _____

(3)

(Total 5 marks)

Q2.

An investigation was carried out to show how thinking distance, braking distance and stopping distance are affected by the speed of a car.

The results are shown in the table.

Speed in metres per second	Thinking distance in metres	Braking distance in metres	Stopping distance in metres
10	6	6	12
15	9	14	43
20	12	24	36
25	15	38	53
30	18	55	73

- (a) Draw a ring around the correct answer to complete each sentence.

As speed increases, thinking distance

decreases.
increases.
stays the same.

As speed increases, braking distance

decreases.
increases.
stays the same.

(2)

- (b) One of the values of stopping distance is incorrect.

Draw a ring around the incorrect value in the table.

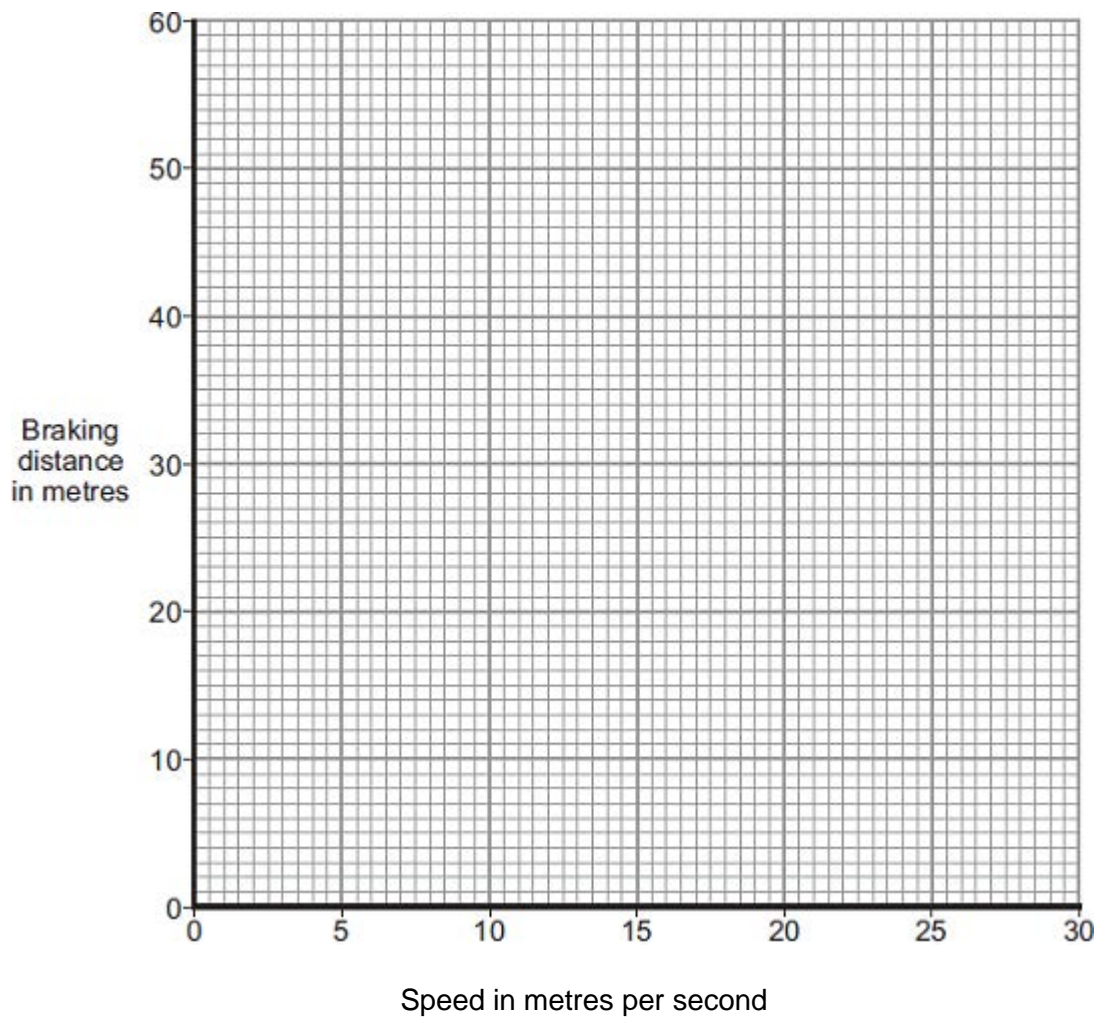
Calculate the correct value of this stopping distance.

Stopping distance = _____ m

(2)

- (c) (i) Using the results from the table, plot a graph of braking distance against speed.

Draw a line of best fit through your points.



(3)

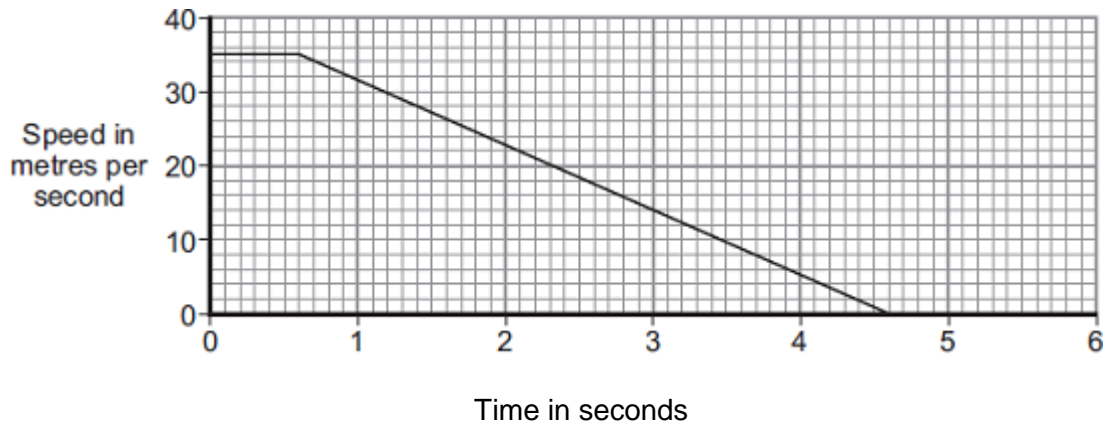
- (ii) Use your graph to determine the braking distance, in metres, at a speed of 22 m / s.

Braking distance = _____ m

(1)

- (d) The speed–time graph for a car is shown below.

While travelling at a speed of 35 m / s, the driver sees an obstacle in the road at time $t = 0$. The driver reacts and brakes to a stop.



- (i) Determine the braking distance.

Braking distance = _____ m

(3)

- (ii) If the driver was driving at 35 m / s on an icy road, the speed–time graph would be different.

Add another line to the speed–time graph above to show the effect of travelling at 35 m / s on an icy road and reacting to an obstacle in the road at time $t = 0$.

(3)

Force = _____ N

(2)

(Total 14 marks)

Mark schemes

Q1.

- (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]

Q2.

- (a) increases 1
- increases 1
- (b) 23 (m)
*accept 43 circled for 1 mark
accept 9 + 14 for 1 mark* 2
- (c) (i) all points correctly plotted
*all to $\pm \frac{1}{2}$ small square
one error = 1 mark
two or more errors = 0 marks* 2
- line of best fit 1

- (ii) correct value from their graph ($\pm \frac{1}{2}$ small square) 1
- (d) (i) 70
 $\frac{1}{2} \times 35 \times 4$ gains 2 marks
attempt to estimate area under the graph for 1 mark 3
- (ii) line from (0.6,35) 1
- sloping downwards with a less steep line than the first line 1
- cutting time axis at time > 4.6 s
accept cutting x-axis at 6 1
- [14]