1 (a) A car driver sees a rabbit on the road.

The driver makes an emergency stop after he sees the rabbit.

Figure 6 shows the speed of the car from the time the driver sees the rabbit until the car stops.

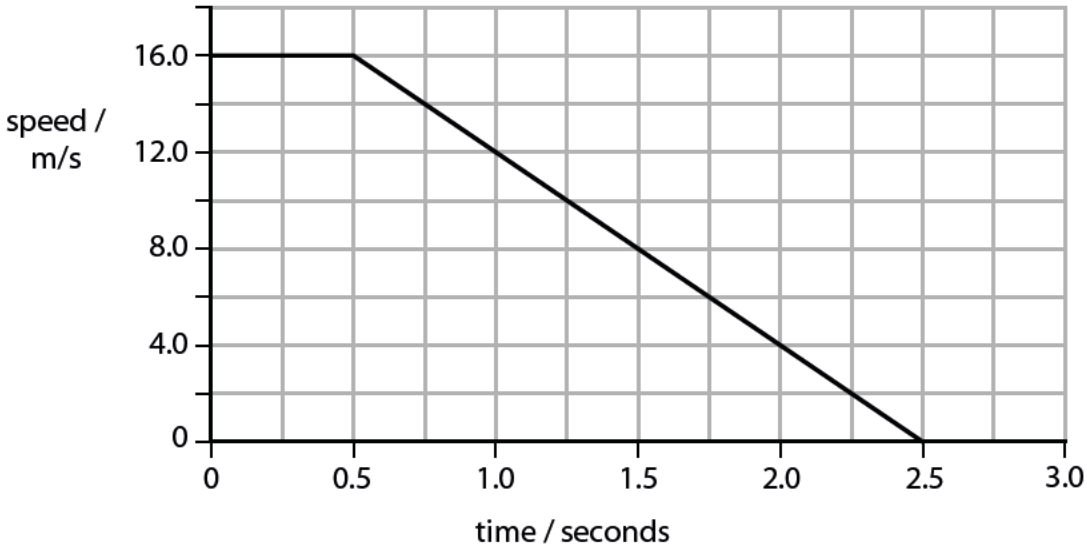

Figure 6

(i) The distance travelled by the car from the time the driver first sees the rabbit to when car starts to slow down is the

(1)

- ☒ **A** average distance
- ☒ **B** braking distance
- ☒ **C** stopping distance
- ☒ **D** thinking distance

(ii) Calculate the distance that the car travels in the first 0.5 seconds.

(3)

distance = ... m

(iii) Which equation relates acceleration to change in velocity and time?

(1)

☒ **A** $a = \frac{(v - u)}{t}$

☒ **B** $a = \frac{t}{(v - u)}$

☒ **C** $a = t(v - u)$

☒ **D** $a = v - \frac{u}{t}$

(iv) Calculate the deceleration of the car.

(3)

deceleration = ... m/s^2

(b) Two students, Alice and Bob, carry out an experiment to measure the speed of cars.

Alice paces out the distance between two lamp posts.

She records:

'*Distance between lamp posts = 20 paces*'

Bob starts to count when a car passes the first lamp post. He stops counting when he thinks it has passed the second lamp post.

He records:

'My estimate for the time taken for the car to pass between the two lamp posts = 3'

Give **three** ways the students could improve their experimental procedure.

(3)

1 .....

.....

2 .....

.....

3 .....

.....

(Total for Question = 11 marks)

2 A car accelerates at a constant rate of 1.83 m/s^2 along a flat straight road.

(a) The force acting on the car is 1.870 kN.

Calculate the mass of the car.

Give your answer to three significant figures.

(3)

mass = ... kg

(b) The car accelerates from rest for 16 s.

Calculate the speed of the car after 16 s.

(3)

speed = ... m/s

*(c) Figure 12 is a speed-time graph for a different car moving on a horizontal road.

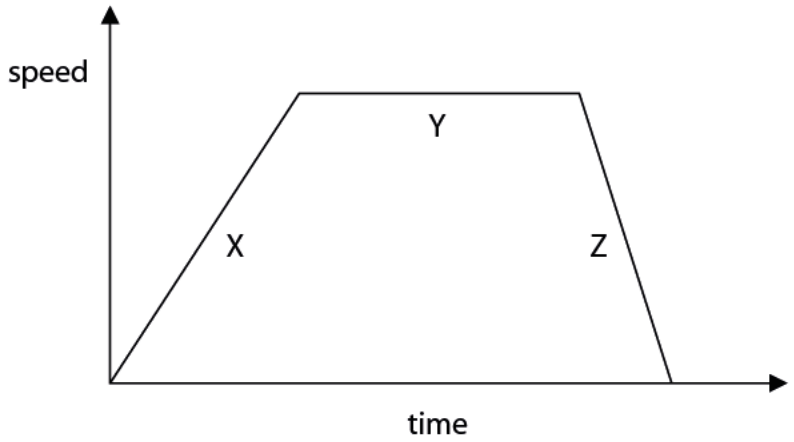

Figure 12

Describe the energy transfers taking place during the movement of the car.

You should refer to energy stores as well as transfers between energy stores for all three sections of the graph.

(6)

(Total for Question = 12 marks)