

Name of the Student: _____

Max. Marks : 24 Marks

Time : 24 Minutes

Q1.

The stopping distance of a car is the sum of the thinking distance and the braking distance.

- (a) The thinking distance is affected by the reaction time of the driver.

Which **two** of the following can affect the reaction time of the driver?

Tick (✓) **two** boxes.

Damaged brakes

☐

Taking drugs

☐

Tiredness

☐

Wet roads

☐

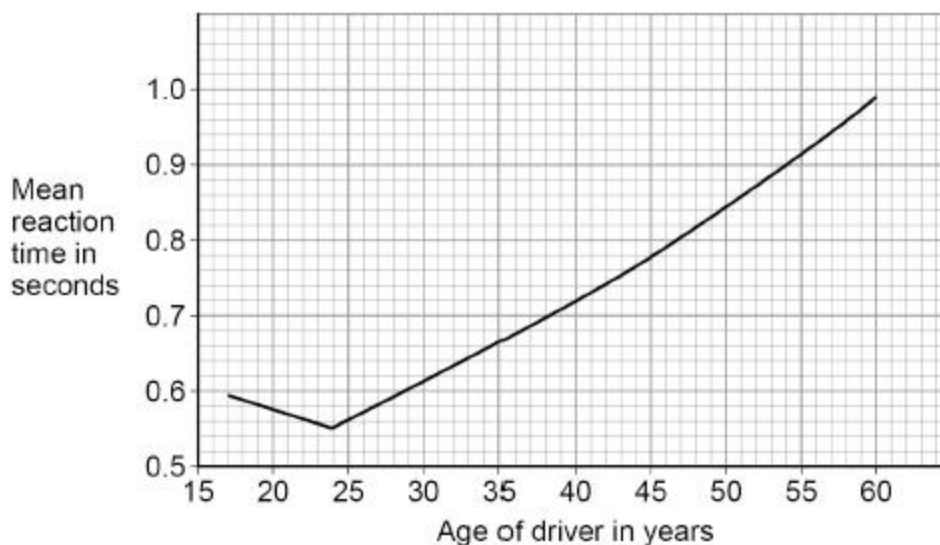
Worn tyres

☐

(2)

Scientists measured the reaction time for drivers of different ages.

The graph below shows the results.



- (b) At what age did the drivers have the lowest mean reaction time?

Age = _____ years

(1)

- (c) What was the lowest mean reaction time?

Time = _____ seconds

(1)

The braking distance of a car is the distance travelled between the driver applying the brakes and the car stopping.

- (d) Complete the sentences.

Choose answers from the box.

Each answer may be used once, more than once or not at all.

decreases

stays the same

increases

When the brakes are applied, the kinetic energy of the car _____.

The temperature of the brakes _____.

(2)

- (e) A car is travelling at a speed of 12 m/s.

The driver applies the brakes and the car decelerates at a constant 3.0 m/s^2 .

Calculate the braking distance of the car.

Use the equation:

$$\text{braking distance} = \frac{(\text{speed})^2}{2 \times \text{deceleration}}$$

Choose the unit from the box.

m

kg

s

Braking distance = _____ Unit _____

(3)

- (f) To pass the UK driving test, people must know the typical stopping distance of a car at certain speeds.

Suggest **one** reason why.

Q2.

Scientists are developing a rocket aeroplane designed to travel much faster than jet aeroplanes.

- (a) The rocket aeroplane must accelerate along a runway to take off.

What would happen to the air resistance acting on the rocket aeroplane as it accelerates?

(1)

- (b) An upward force called lift will act on the wings of the rocket aeroplane when it moves.

Complete the sentence.

Choose the answer from the box.

less than	denatured	the same as
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As the rocket aeroplane starts to accelerate along the runway, the lift force on the wings will be _____ the weight of the rocket aeroplane.

(1)

- (c) During the first 14 seconds the average speed of the rocket aeroplane on the runway will be 35 m/s.

Calculate the distance that the rocket aeroplane will travel during the first 14 seconds.

Use the equation:

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

Distance travelled = _____ m

(2)

- (d) Write down the equation which links distance (s), force (F) and work done (W).

(1)

- (e) When the rocket aeroplane travels a distance of 270 m on the runway the engines will do 54 000 000 J of work.

Calculate the average force exerted by the engines.

Average force = _____ N **(3)**

(f) The rocket aeroplane will fly at a greater height than a jet aeroplane.

The height that an aeroplane flies at affects the radiation dose a passenger will receive each hour.

The table below shows the speed of each aeroplane and the radiation dose a passenger will receive each hour.

Aeroplane	Speed in metres per second	Radiation dose each hour in millisieverts
Rocket aeroplane	8000	0.006
Jet aeroplane	250	0.003

Exposure to ionising radiation has risks and possible consequences.

Evaluate the risks and possible consequences of flying in a rocket aeroplane and in a jet aeroplane.

Assume the same journey is made in each aeroplane.

Use values from the table above.

(6)
(Total 14 marks)