Name of the Student:_____
Max. Marks : 24 Marks **Time : 24 Minutes**

Q1.

The diagram below shows a girl bowling a ball along a ten-pin bowling lane.

The girl is trying to knock down the ten pins at the end of the bowling lane.

(a) Velocity is a vector quantity, speed is a scalar quantity.

Describe what is meant by a vector quantity and a scalar quantity.

Vector quantity _____

_____

Scalar quantity _____

_____

(2)

(b) The bowling lane is horizontal.

Explain why the bowling ball decelerates as it travels along the lane.

_____

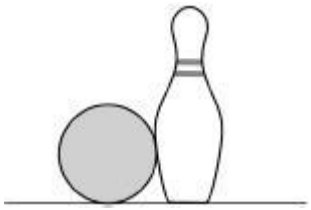
_____

_____

_____

(2)

The diagram below shows the bowling ball hitting one of the pins.



(c) Write down the equation that links mass (*m*), momentum (*p*) and velocity (*v*).

_____

(1)

(d) The bowling ball has a velocity of 5.0 m/s when it hits the pin.

The momentum of the bowling ball is 26 kg m/s

Calculate the mass of the bowling ball.

_____

_____

_____

_____

_____

_____

Mass = _____ kg

(3)

(e) Explain why the bowling ball slows down when it hits the pin.

You should use ideas about momentum in your answer.

_____

_____

_____

_____

_____

_____

(3)

(Total 11 marks)

Q2.

The speed limit on many roads in towns is 13.5 m/s

Outside schools this speed limit is often **reduced by** one-third.

(a) Calculate the reduced speed limit.

_____

_____

_____

_____

Reduced speed limit = _____ m/s

(2)

(b) A reduced speed limit may reduce air pollution.

Explain **one** other advantage of a reduced speed limit.

_____

_____

_____

_____

(2)

(c) **Figure 1** shows a car being driven at a constant speed past a speed camera.

Figure 1

The camera recorded two images of the car 0.70 s apart.

The car travelled 14 m between the two images being taken.

The maximum deceleration of the car is 6.25 m/s^2

Calculate the minimum braking distance for the car at the speed it passed the speed camera.

Minimum braking distance = _____ m

(6)

(d) **Figure 2** shows a delivery van full of packages.

Figure 2

The driver delivers all the packages.

The empty van has a shorter stopping distance than the full van when driven at the same speed.

Explain why.

_____

_____

(3)

(Total 13 marks)