Name of the Student:_____
Max. Marks : 22 Marks **Time : 22 Minutes**

Q1.

(a) Complete the following sentence.

The momentum of a moving object has a magnitude, in kg m/s,

and a _____ .

(1)

(b) A car being driven at 9.0 m/s collides with the back of a stationary lorry.
The car slows down and stops in 0.20 seconds. The total mass of the car and driver is 1200 kg.

Calculate the average force exerted by the lorry on the car during the collision.

Show clearly how you work out your answer.

_____

_____

Force = _____ N

(2)

(c) Within 0.04 s of the car hitting the back of the lorry, the car driver's airbag inflates.
The airbag deflates when it is hit by the driver's head.

Use the idea of momentum to explain why the airbag reduces the risk of the drive sustaining a serious head injury.

_____

_____

_____

_____

_____

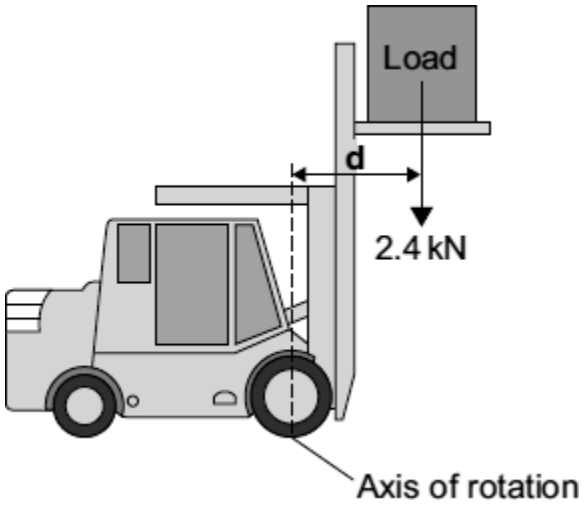
_____

(3)

(Total 6 marks)

Q2.

The diagram shows a fork-lift truck with a load of 2.4 kN. The clockwise moment caused by this load is 2880 Nm.



(a) Use the equation in the box to calculate the distance **d**.

moment	=	force	×	perpendicular distance from the line of action of the force to the axis of rotation

Show clearly how you work out the answer and give the unit.

_____

_____

_____

Distance **d** = _____

(3)

(b) This warning notice is in the driver's cab.

Warning

Maximum load 10.0 kN

This load must not be exceeded

Explain in terms of moments why the maximum load must not be exceeded.

_____

_____

_____

_____

_____

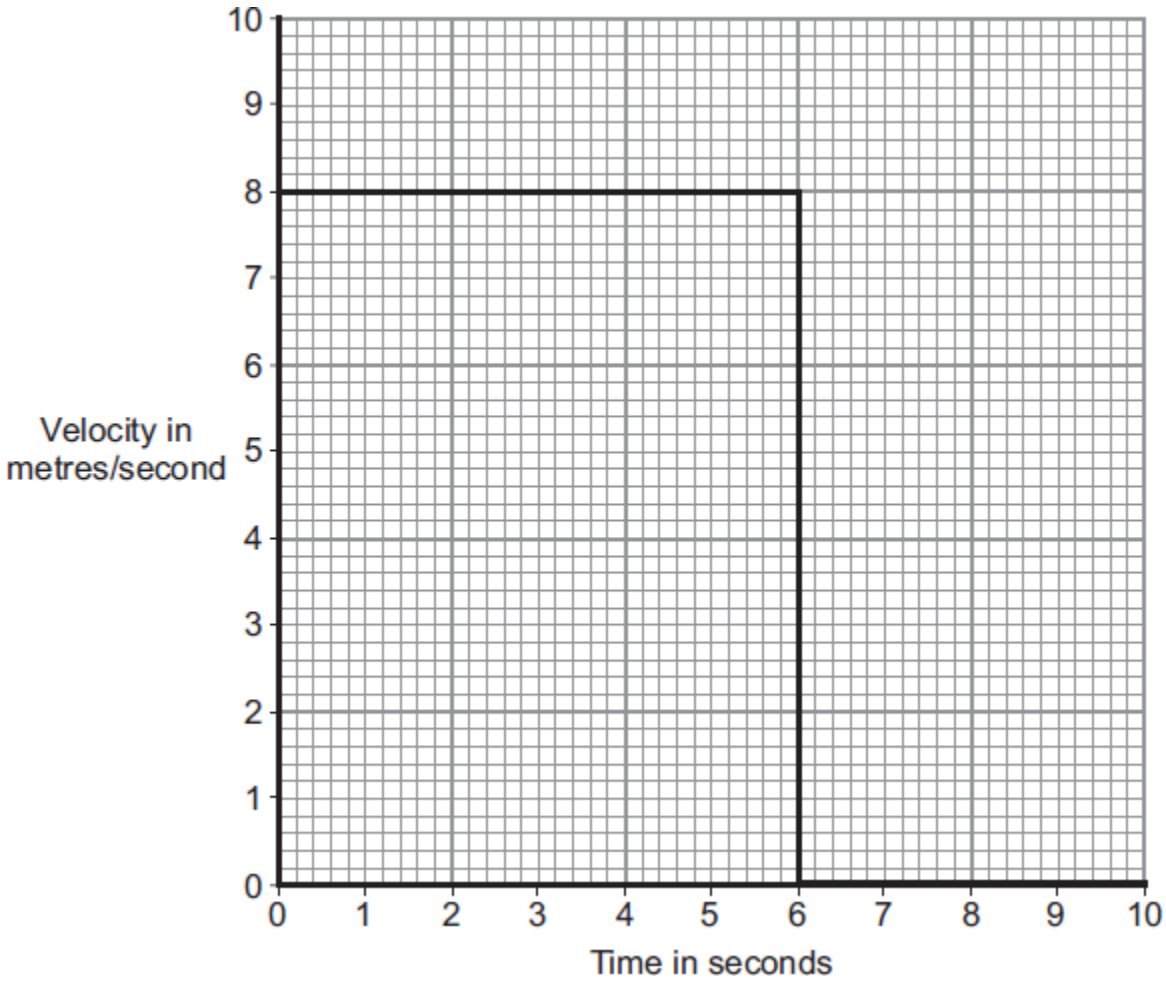
_____

(2)

(Total 5 marks)

Q3.

The diagram shows the velocity-time graph for an object over a 10 second period.



(a) Use the graph to calculate the distance travelled by the object in 10 seconds.

Show clearly how you work out your answer.

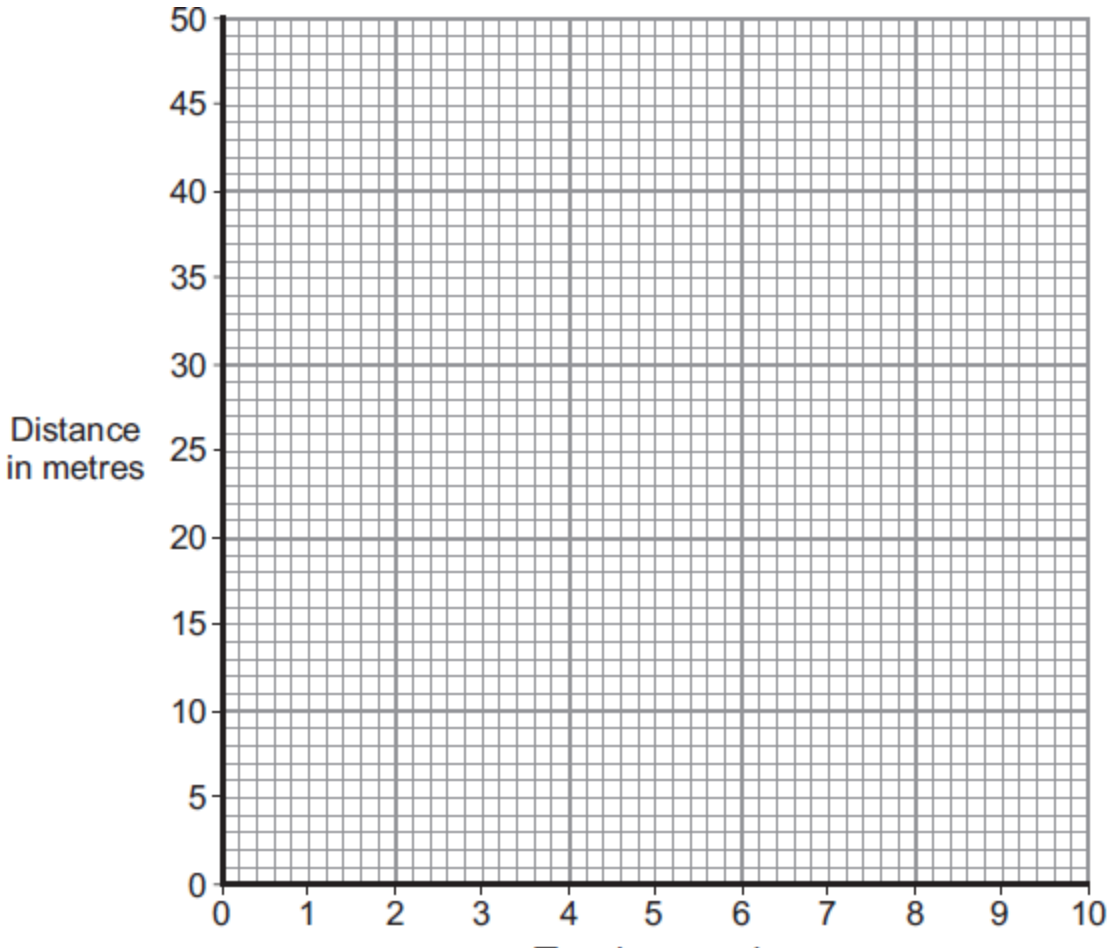
_____

_____

Distance = _____ m

(2)

(b) Complete the distance-time graph for the object over the same 10 seconds.



(2)

(Total 4 marks)

Q4.

(a) In any collision, the total momentum of the colliding objects is usually conserved.

(i) What is meant by the term 'momentum is conserved'?

_____

_____

(1)

(ii) In a collision, momentum is **not** always conserved.

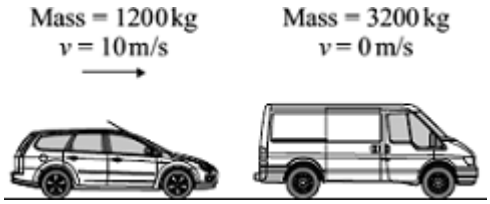
Why?

_____

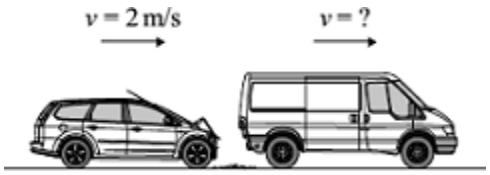
_____

(1)

(b) The diagram shows a car and a van, just before and just after the car collided with the van.



Before collision



After collision

(i) Use the information in the diagram to calculate the **change** in the momentum of the car.

Show clearly how you work out your answer and give the unit.

_____

_____

_____

_____

Change in momentum =_____

(3)

(ii) Use the idea of conservation of momentum to calculate the velocity of the van when it is pushed forward by the collision.

Show clearly how you work out your answer.

_____

_____

_____

Velocity =_____ m/s forward

(2)

(Total 7 marks)