

Graphing Homework # _____

Momentum is a measurement that can be used in analyzing some accident scenes. When there is a collision between objects the momentum of the objects before the collision is equal to the momentum of the objects after the collision. In other words, the initial (beginning) momentum equals the final momentum. Imagine a head on collision between a 2000 kg truck travelling North and a 1000 kg car travelling south. If the truck and the car had the same initial velocity, the car and the truck would both travel north after they collide because the truck has twice the momentum of the car.

The momentum of an object depends on two factors, the mass of the object and the velocity of the object. Momentum is calculated with the formula $\text{Momentum} = \text{mass} \times \text{Velocity}$. The letter p is used to symbolize momentum so the formula for momentum can be written $p = mv$. The unit for momentum is $\text{kg}\cdot\text{m}/\text{sec}$. A 1000 kg truck travelling at a velocity of 5 m/s would have a momentum of 5000 $\text{kg}\cdot\text{m}/\text{sec}$.

The data below represents the momentum of a 100kg object moving at different velocities.

What happens to momentum during a collision?

Which has more momentum, a 100 kg motorcycle at 200 m/s or a 20,000 kg boat travelling at 5 m/s?

What two factors determine the momentum of an object?

| Velocity (m/s) | Momentum (kg•m/sec) |
|----------------|---------------------|
| 0 | 0 |
| 1 | 100 |
| 2 | 200 |
| 4 | 400 |
| 6 | 600 |
| 8 | 800 |
| 10 | 1000 |
| 12 | 1200 |

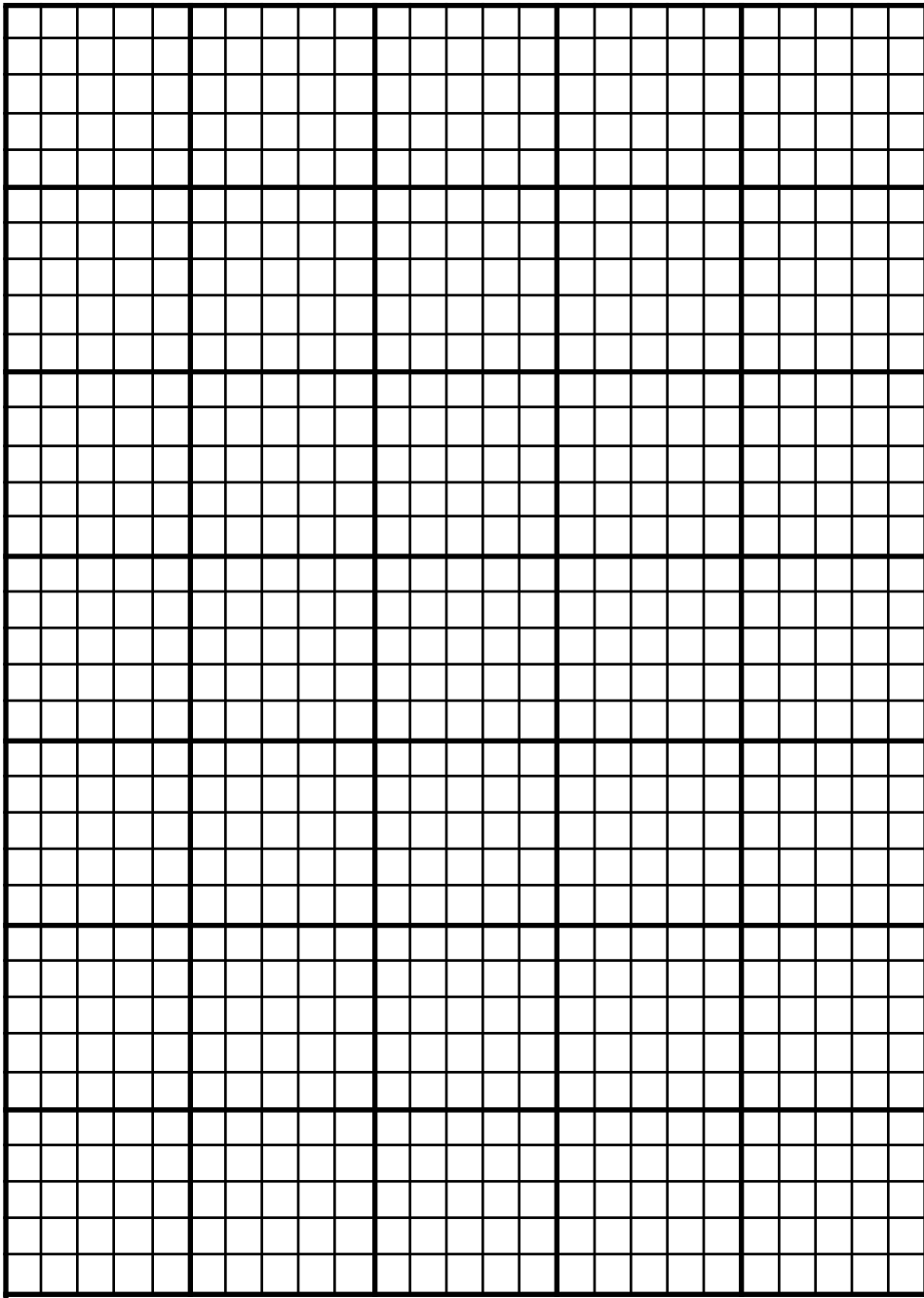
What is the symbol for momentum? _____

What is the unit for momentum? _____

Create a line graph from the data table on the attached graph paper. (12 points total)

Velocity in m/s should be plotted on the horizontal (x) axis and Momentum in $\text{kg}\cdot\text{m}/\text{sec}$ should be plotted on the vertical (y) axis.

- create a uniform scale for Velocity in m/s on the x - axis (2 points)
- label the x - axis with both a label and a unit. (2 points)
- create a uniform scale for Momentum in $\text{kg}\cdot\text{m}/\text{sec}$ on the y axis. (2 points)
- label the y - axis with both a label and a unit. (2 points)
- plot all eight points on your graph (2 points)
- connect the points to draw your line (1 point)
- put an appropriate title on top of your graph. (1 point)



**complete chart
(2 points)**

| | x-axis | y-axis |
|----------|--------|--------|
| Range | | |
| Boxes | | |
| Divide | | |
| Round up | | |

**Answer the following questions in complete sentences.
(2 points each)**

1) As the velocity increases what happens to the Momentum?

2) As the velocity of an object increases, what happens to the kinetic energy of the object?

3) What velocity would have a momentum of 700 kg•m/sec? (Draw a line on the graph above to show how you estimated your answer)

4) What is the momentum of the object if the velocity is 4.5 meters/sec?(Draw a line on the graph above to show how you estimated your answer)

5) What would happen to position of the line on the graph if the object had a larger mass but was moving at the same velocity as the data shows?