1. Momentum C	A. The total momentum will stay the same when objects interact.
2. kgm/sec B	B. Units for momentum.
3. Law of Conservation of Momentum A	C. Product of an object's mass and velocity.
4. Net momentum E	D. Means to add together all of the individual momentums ($p_1 + p_2 \ldots$).
5. Σp D	E. The total of all the momentums.

How is it possible that two objects have a net momentum equal to zero? *(There are two ways.)*

1. Both not moving
2. Going opposite direction pos p neg p

Number these from least (1) to most (5) momentum.

A bullet	A fast car	A slow baseball	A house	A fast train
3 high V	4	2	1 v=0 p=0	5 most m

If the tapetimer above shows the position of an object every second, how does the momentum of the object change?

accelerating, velocity increases

p increases

Find the momentum of a 25 kg object going 4 m/s to the right.

p ? m 25kg V 4m/s $p = mv$ $p = 25kg \cdot 4m/s = 100 kgm/s$

A 3 kg object is going 22 m/s *to the left*. Find its momentum.

p ? m 3kg V -22m/s $p = mv$ $p = 3kg \cdot -22m/s = -66 kgm/s$

A ball has 2 kgm/s of momentum when thrown 8 m/s to the right. Find the mass of the ball.

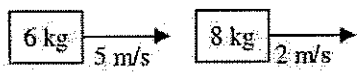
$p = 2kgm/s$ m ? $v = 8m/s$ $p = mv$ $m = p/v$ $m = \frac{2kgm/s}{8m/s} = .25kg$

A 25 kg cart has -125 kgm/s of momentum. How fast is the cart going?

$p = -125kgm/s$ $m = 25kg$ v ? $p = mv$ $v = p/m$ $v = \frac{-125kgm/s}{25} = -5m/s$

Two objects are at rest. Find the net momentum of the two.

$p_{net} = 0kgm/s$



Calculate the net momentum of these two objects.

$\Sigma p = p_1 + p_2$

$(6kg \cdot 5m/s) + (8kg \cdot 2m/s) = 30 + 16 = 46kgm/s$

How can an object have negative momentum?

neg velocity (to the left)

If a fast object hits a slower object, why does the slower object speed up?

Momentum is transfered

If two objects have 24 kgm/s of momentum before they collide. How much momentum do the two objects have afterwards?

$p_{net\ before} = 24kgm/s$ $p_{net\ after} = 24kgm/s$

How does a rocket fly in space if it has nothing to push on?

fuel goes backward + rocket goes forward by conservation of p

A 50 kg girl on ice skates throws a 5 kg ball to the left. If the ball ends up going 20 m/s, .

A) If the girl and ball are initially at rest, what was their velocities? $v_{1i} = v_{2i} =$ 0m/s

B) What is the net momentum of the girl and ball before $\Sigma p_{before} =$ 0kgm/s

B) How much momentum do the girl and ball have to have afterwards? $\Sigma p_{after} =$ 0kgm/s

C) Use the Law of Conservation of Momentum to find how fast the girl is going afterwards. $\Sigma p_B = \Sigma p_A$

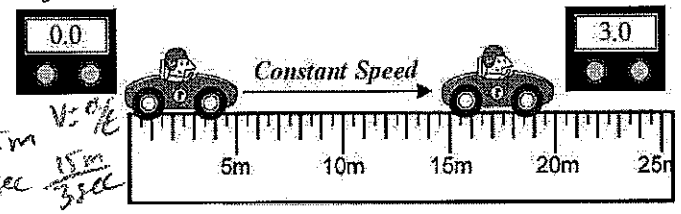
$0 = p_B + p_A$

$= (5kg \cdot -20m/s) + (50kg \cdot v)$ (5 ball, 50 girl)

$100 = 50v$

$\frac{100}{50} = \frac{50v}{50}$

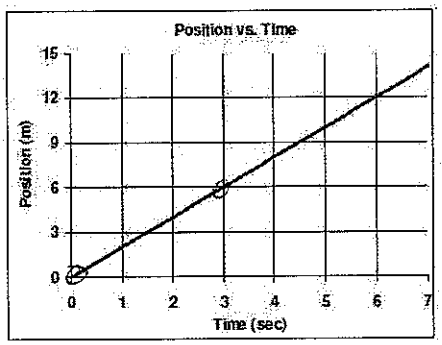
$v = 2m/s$ to the right



v: 0/t
d: 15m
t: 3sec
15m / 3sec

Calculate the momentum of the 100 kg car.

p ? m 100kg V 5m/s $p = mv$ $p = 100kg \cdot 5m/s$ $p = 500kgm/s$



If the object has 6 kg of mass, find its momentum from the graph.

$v = \frac{\Delta y}{\Delta x} = \frac{6m}{3s} = 2m/s$

$m = 6kg$

$p = mv$

$p = 6kg \cdot 2m/s = 12kgm/s$