Name: Key Date: _____

Science 7 Motion

Aim: I can explain how force, mass and acceleration are related.

Do Now:

_____

_____

Notes:

Acceleration:

- The rate of change in velocity.
- Speeding up, slowing down or changing direction.

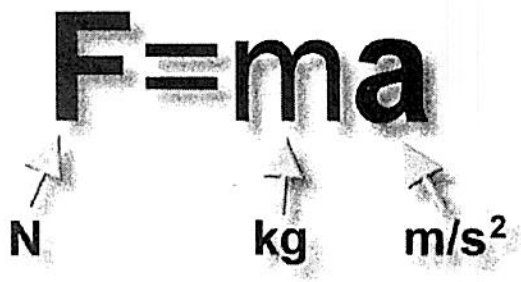
Acceleration

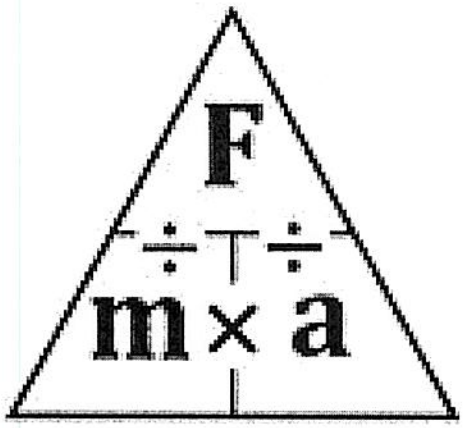
= change in velocity

change in speed | Change in Direction | Change in both

Newton's Second Law of Motion

- A net force acting on an object causes the object to move in the direction of the force.
- Acceleration is determined by the size of the force and the mass of the object.
- Force= Mass x acceleration
- F=MA
- Larger force creates greater acceleration
- Larger masses requires larger force





Examples:

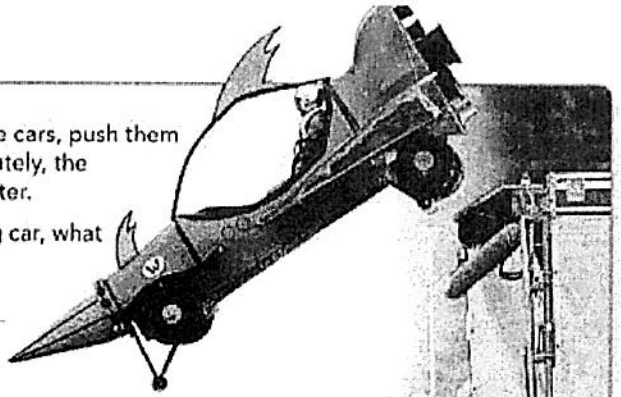
1. What net force is needed to accelerate a 15 kg cart at $9m/s^2$?

Formula:	$F = ma$
Substitute:	$F = 15kg\,(9m/s^2)$
Final Answer with Units:	$F = 135.0\ N$ -OR- $135.0\ kgm/s^2$

2. A boy pushed a shopping cart with a force of 12N, and the cart accelerates $3m/s^2$? What is the mass of the cart?

Formula:	$M = F/A$
Substitute:	$M = 12N/3m/s^2$
Final Answer with Units:	$M = 4.0\ kg$

do the math!



Every year in cities around the world, teams create cars, push them across platforms, and hope they will fly. Unfortunately, the cars always end up accelerating down into the water.

1. **Calculate** If a 100-N net force acts on a 50-kg car, what will the acceleration of the car be?

   $2.0m/s^2$

2. After that same car leaves the platform, gravity causes it to accelerate downward at a rate of 9.8 m/s^2. What is the gravitational force on the car?

   490.0 N

① $A = \frac{F}{M} = \frac{100N}{50kg} = 2.0m/s^2$

② $F = ma$
$= 50kg\,(9.8m/s^2)$
$= 490$