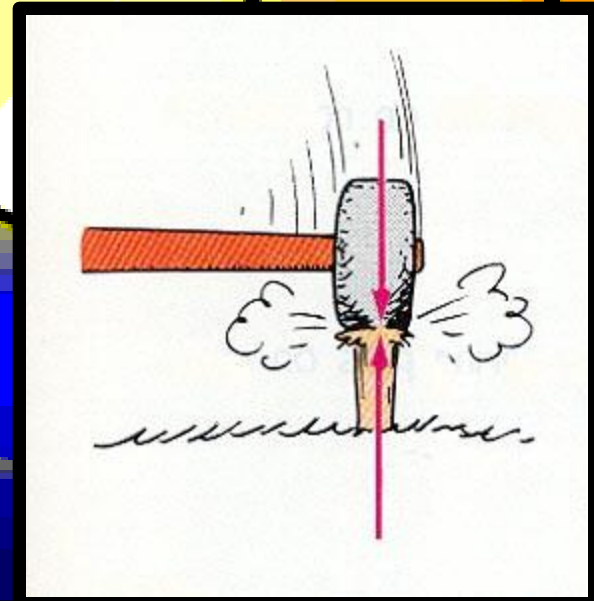
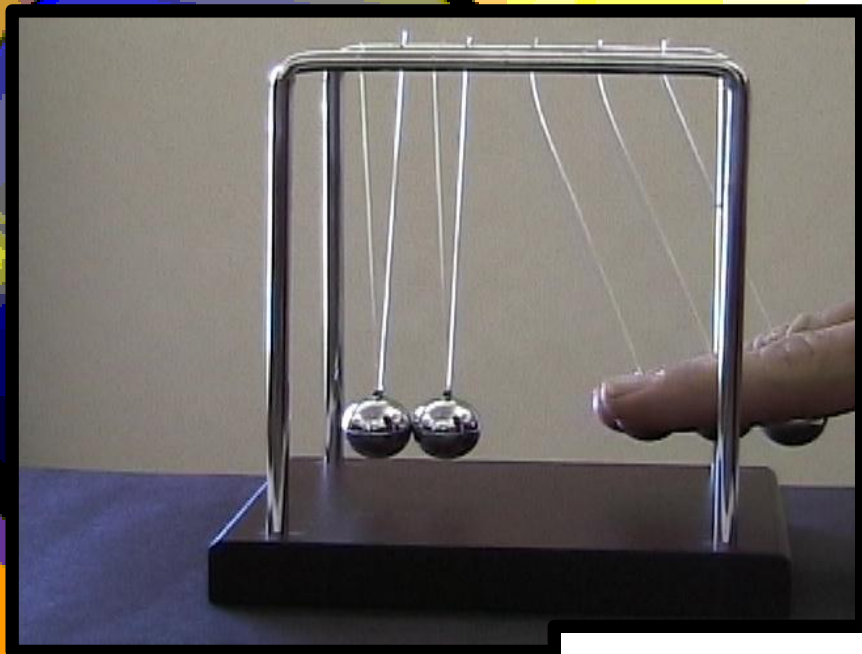


**Chapter 14,  
Lesson 1  
Newton's  
First Law –  
The Law of  
Inertia**

**force  
inertia  
friction  
position  
speed  
Newton's First Law of  
Motion  
velocity  
acceleration  
deceleration  
incline  
pendulum  
gravity**

**force – a pull or push that acts  
on an object**




Forces are pushes or pulls


# inertia – then tendency of an object to resist a change in its state of motion

**Newton's Laws of Motion** ©2008 HowStuffWorks

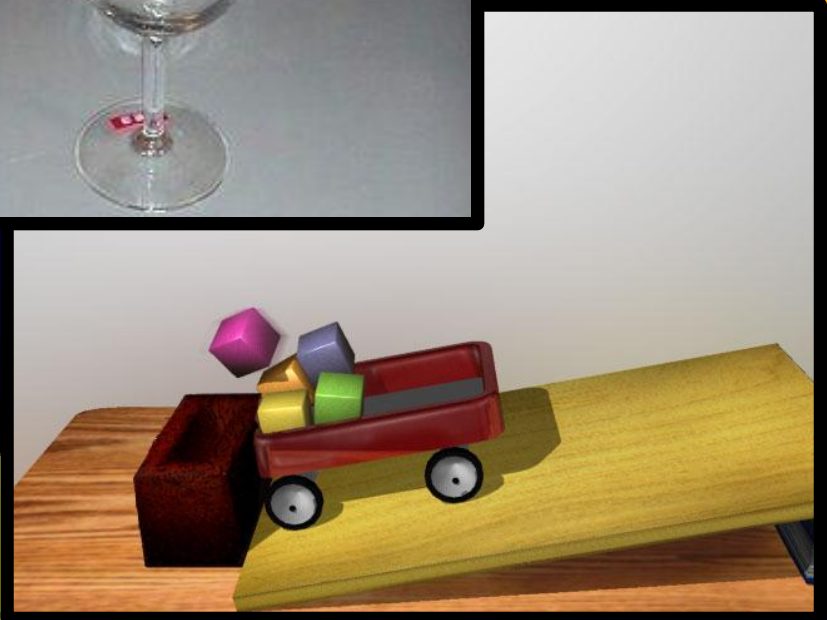
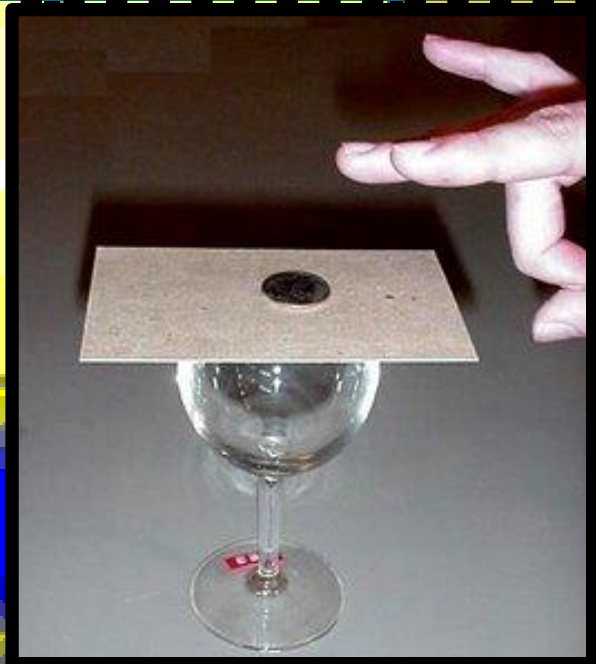

**Force** The marble speeds up rolling down the ramp.



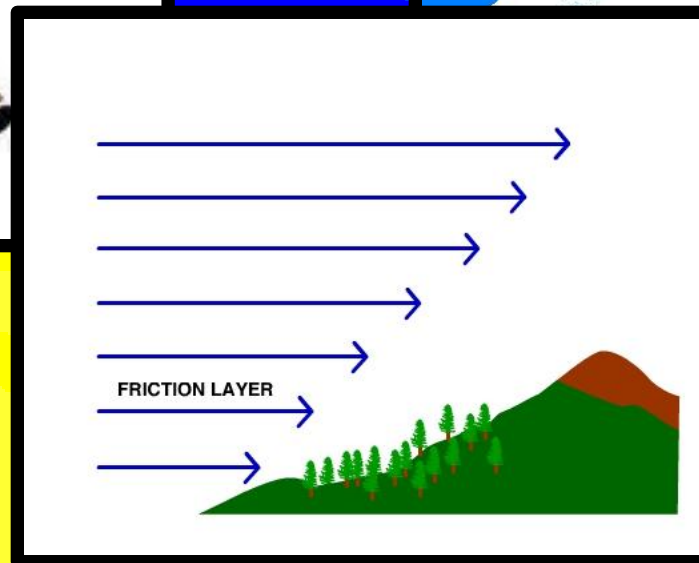
**Force** The marble slows down rolling up the ramp.



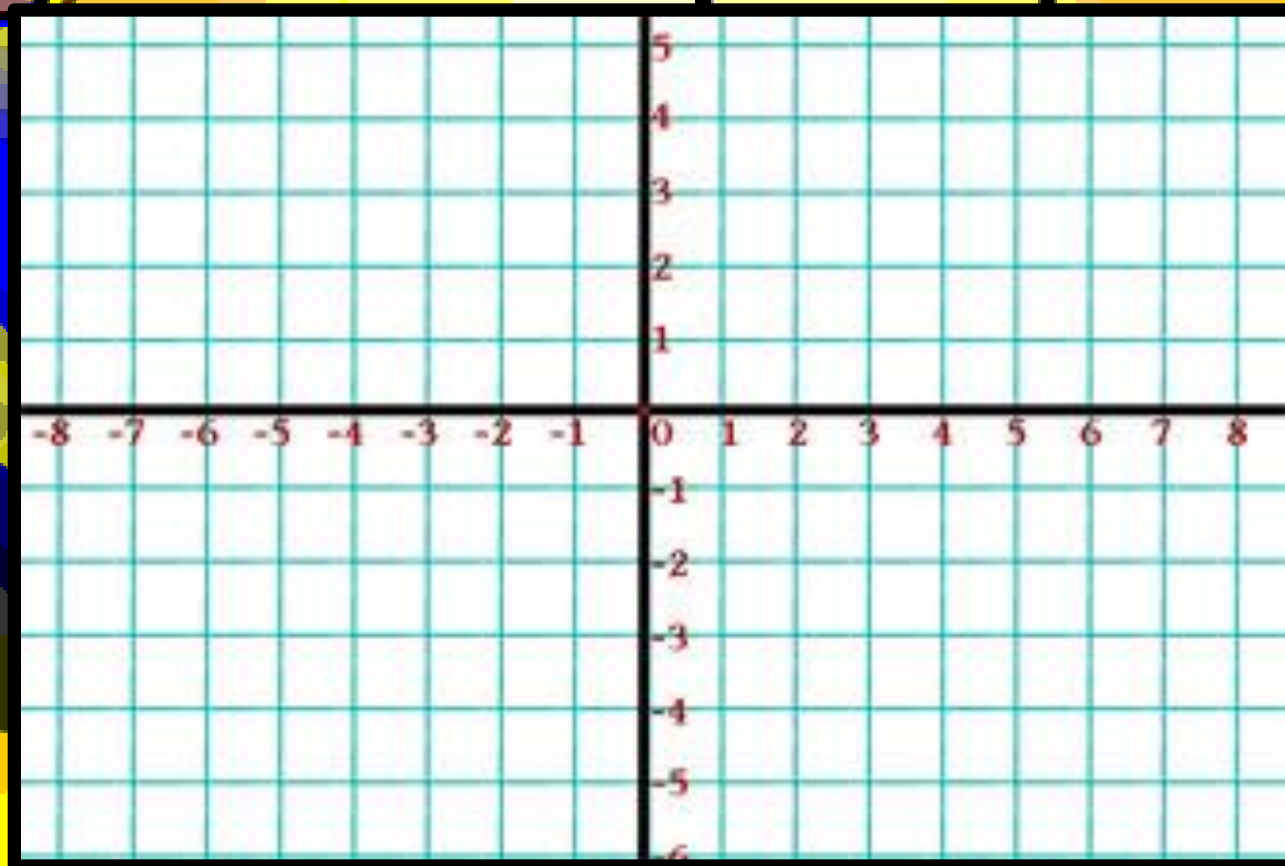
**Force** The marble will neither slow down nor speed up rolling on a perfectly horizontal surface.



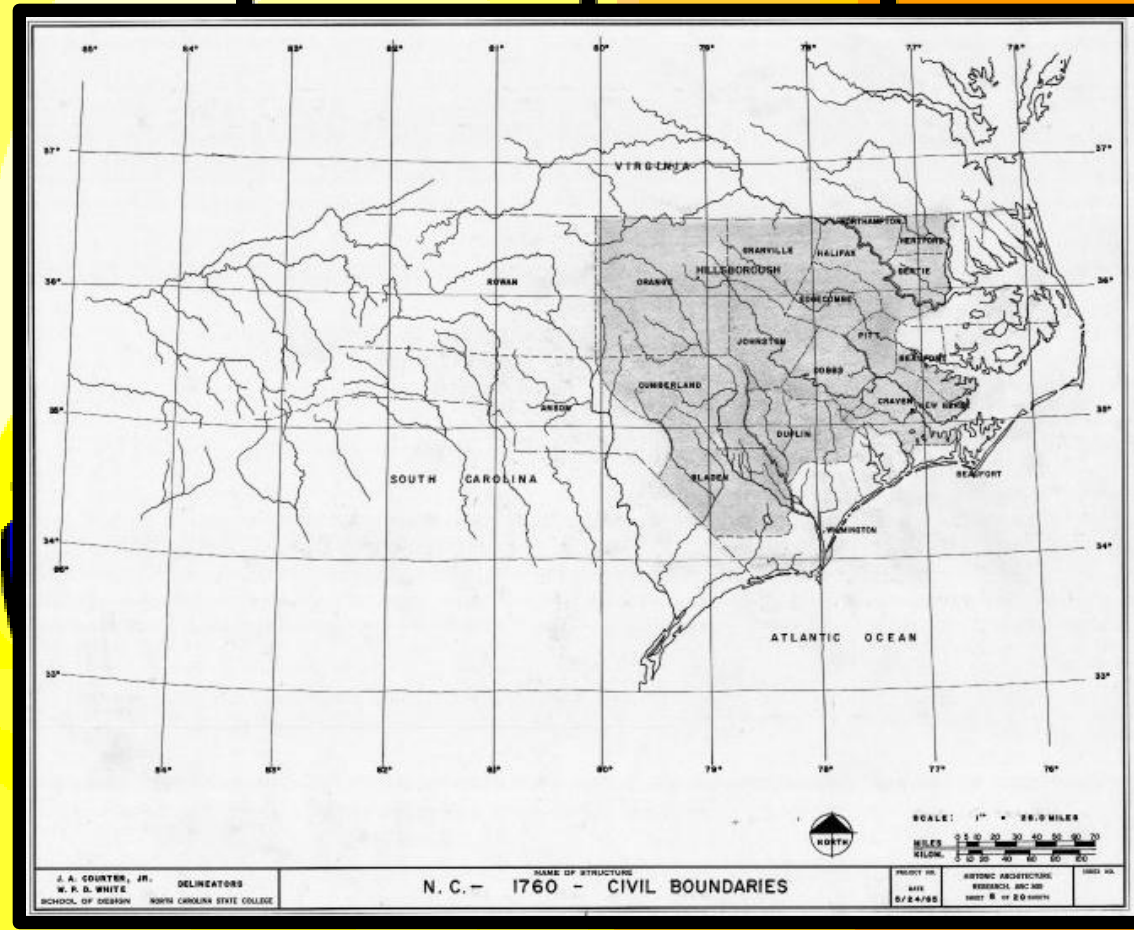
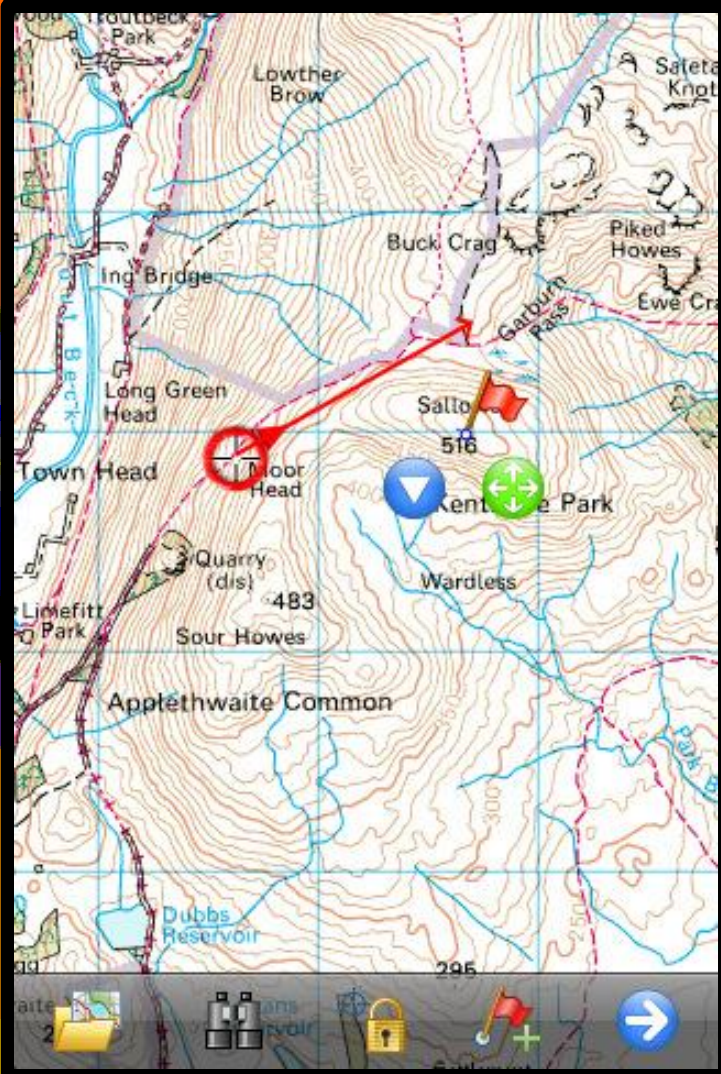
# friction – a force that opposes the motion of one object moving past another



**position – a comparison of an object's location on a map to other things on the map**



# position – a comparison of an object's location on a map to other things on the map



**speed – how fast the position of an object changes with time at any moment**

## Speed formula

The formula for the average speed of an object is given below.

$$\text{Speed} = \frac{\text{Total distance travelled}}{\text{Time taken}}$$

It is made up of three parts, distance, time and ofcourse speed. If we know any two of these we can find the third.

For example . If we know the speed of an object and the time over which it travelled we can work out the distance it covered. We first change the formula to make it equal to distance. This easily done by transposition. Look at the image on the right.

*Ask your teacher for more information on transposing formulae.*

The distance formula

$$\text{Speed} \times \text{Time} = \text{Distance}$$

Try this exercise. A car travelled at an average speed of 55km/hr for 6 hours. How far did it travel?

Easy. Using the formula for distance below

$$\text{Distance} = \text{speed} \times \text{time}$$

we calculate

$$\text{Distance} = 55 \times 6 = 330 \text{ kilometres.}$$

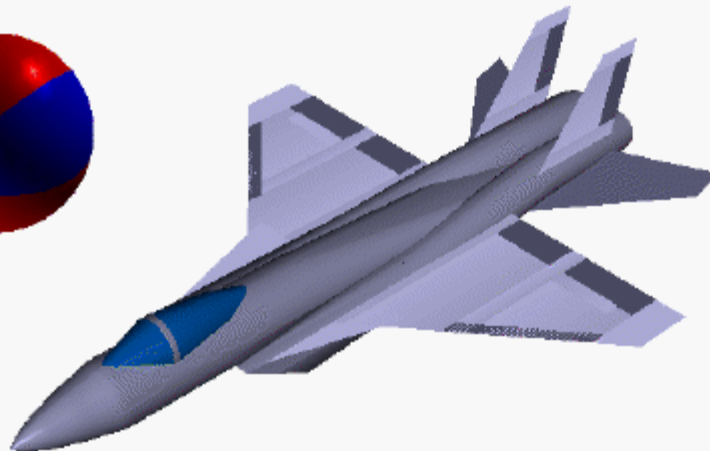
**Newton's First Law of Motion – “An object at rest tends to stay at rest; an object in motion tends to stay in motion.”**



## *Newton's First Law*

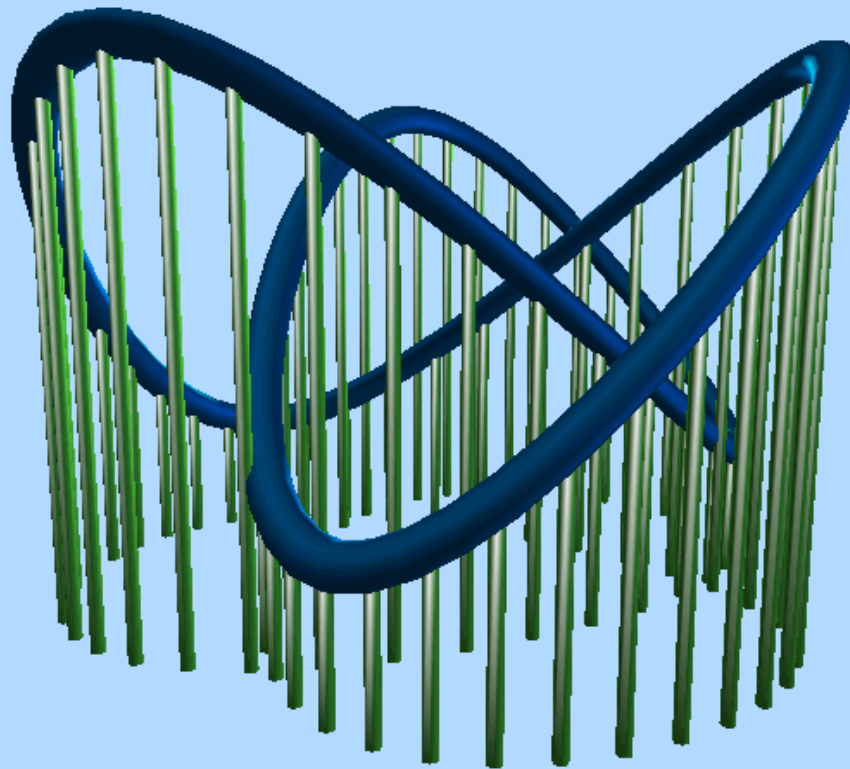
Glenn  
Research  
Center

"Every object persists in its state of rest or uniform motion in a straight line unless it is compelled to change that state by forces impressed on it."





**velocity – the speed of a moving object taken together with its direction of travel**



# acceleration – a change in velocity

**SPEED, VELOCITY, ACCELE** - BY SANMCCARRON

www.toondoo.com

I better duck quick before I get hit!

5.5 m/sec

At the rate my jet is going, no way can she duck fast enough!

Zoe's jet is speeding down the hall.

speed =  $d/t$

The velocity of my soccerball changed when it hit the wall.

Speed and direction

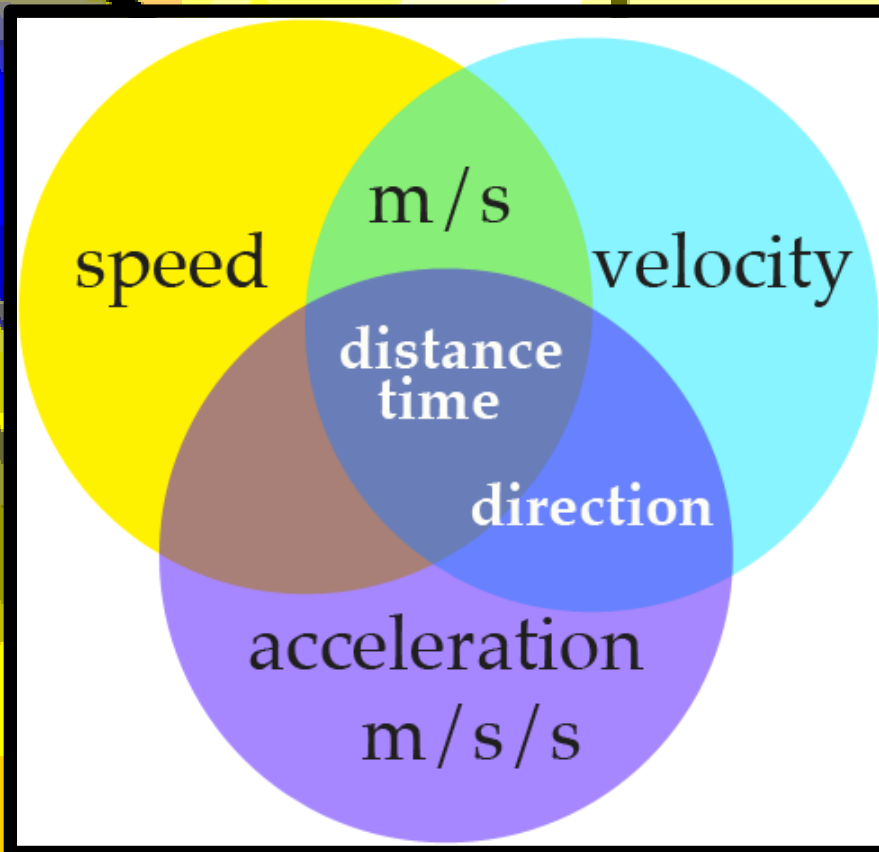
$v = d/t$ , with a direction

$a = v/t$

My spaceship accelerates as it goes from sitting still to speeding away at g-force 7.

That's the same as velocity/time

# acceleration – a change in velocity

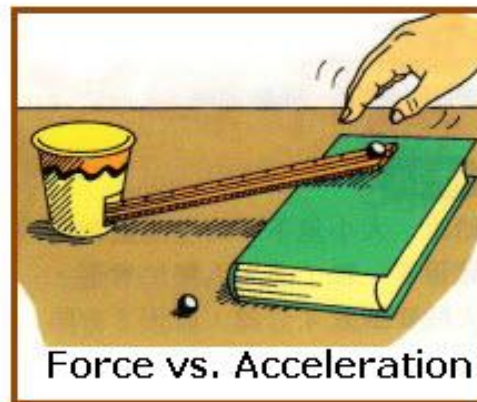
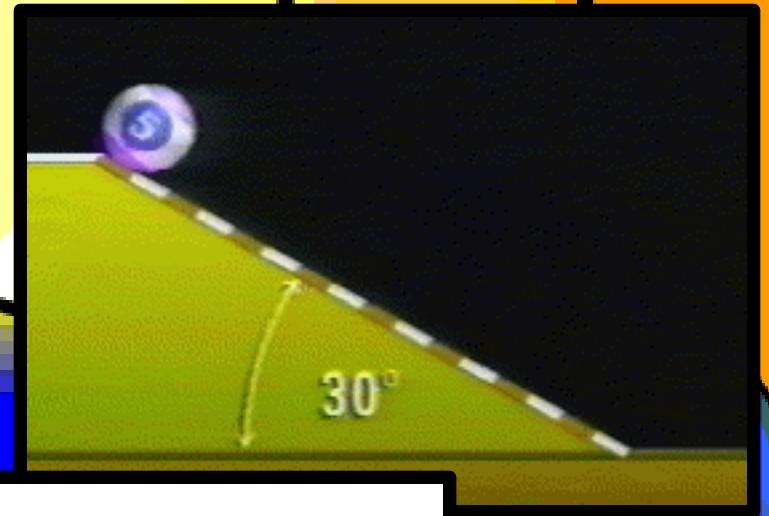
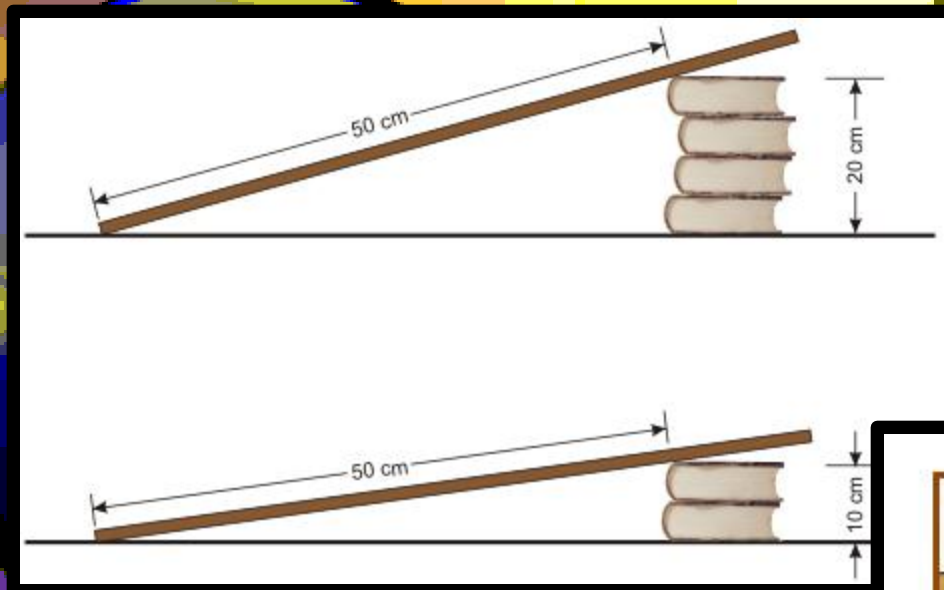


**deceleration – when a force causes the speed of an object to decrease**

**Deceleration**



# incline – a ramp/slope

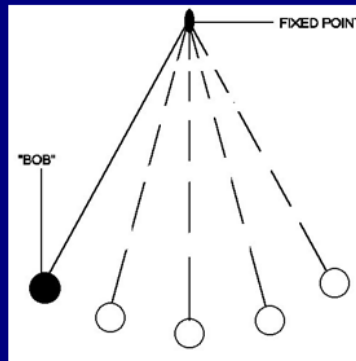


Force vs. Acceleration

**pendulum – something hanging from a fixed point that swings due to gravity and then out due to inertia**

Click on the picture below to check out a link on pendulums

### What is a Pendulum?



A pendulum is loosely defined as something hanging from a fixed point which, when pulled back and released, is free to swing down by gravity and then out and up because of its inertia, or "tendency to stay in motion."

[So, what is a pendulum good for?](#)

**gravity – something hanging from  
a fixed point that swings due to  
gravity and then out due to inertia**

Click on the picture below to check out a link on gravity.

