

Chapter 14, Lesson 2 Newton's Second and Third Laws of Motion

**mass
acceleration/force
acceleration/mass
balanced forces
unbalanced forces
momentum
action
reaction
work
simple machines
lever
fulcrum
effort arm
resistance arm
pulley
wheel and axle
inclined plane
wedge
screw**

mass – A measure of the amount of matter in an object. The mass of an object is related to the force required to accelerate it.

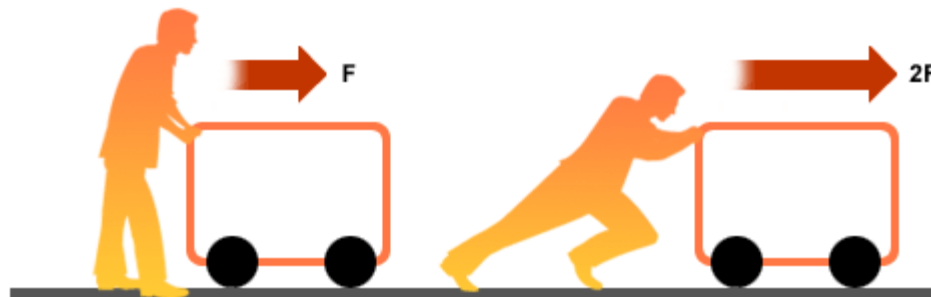


acceleration/force – the more force you apply, the greater the acceleration

Question

Look at the diagrams They show an unbalanced force F acting on two loaded trolleys.

a How would doubling the size of the unbalanced force F affect the acceleration of the trolley?



Click on the picture for some great questions about acceleration and force!

acceleration/mass – the greater the mass, the more force necessary to get an object to accelerate

NEWTON'S LAWS

FIRST LAW OF MOTION

SECOND LAW OF MOTION

THIRD LAW OF MOTION

Newton's Second Law of Motion tells us that

Force equals mass times acceleration.

You can tell how hard a moving object is going to hit by knowing how big it is (how much mass it has) and how fast it is speeding up (its acce



Click on the picture!

the pitcher throws the ball to

balanced forces – when all the forces on an object cancel each other out, you have balanced forces – no acceleration, no momentum

Example questions - balanced and unbalanced forces

Identify whether it is balanced forces or whether it is an unbalanced force that causes the following different types of movement.

Question

Formula 1 car accelerating from the starting grid

[REVEAL ANSWER](#)

Question

A cyclist braking

[REVEAL ANSWER](#)

Question

Click on the picture for some great questions about balanced and unbalanced forces.

unbalanced forces – when forces don't cancel each other out, there is movement. This is a result of unbalanced forces.

Unbalanced Forces

The seesaw is unbalanced because the forces are not equal.



Click on the picture for some information about unbalanced forces.

Some Types of Force

Gravity

Friction

Air Resistance

Turning

Moments

Pressure

Upthrust

Balanced Forces

Unbalanced Forces

Click on the picture for some information about kinds of forces.

momentum – momentum measures how difficult it will be to stop an object

Momentum



Momentum describes how

Because of momentum, a [planet](#) or a [star](#) that is moving in space will generally keep moving in the same direction unless something happens to push it another way. The [Sun](#) keeps going around the [Milky Way](#), and the [Earth](#) keeps going around the Sun. But on [Earth](#), [friction](#) with the ground or the air will gradually push an object and make it stop.

One way to think of momentum is that momentum measures how hard it will be to stop the object. An object has more momentum if it is bigger, or if it is going faster - momentum is equal to [mass](#) times velocity (speed). So if a car (something with a lot of mass) is rolling down the street towards you, it's hard to stop it even if it is going pretty slowly. Or, if someone hits a baseball at you, it's hard to stop it even though it is pretty small, because it is going so fast. But a car going fast will be even harder to stop - then the car will have both a big mass and a fast speed. That's why it's dangerous to walk on train tracks - a train is big and goes fast, and the train as soon as he

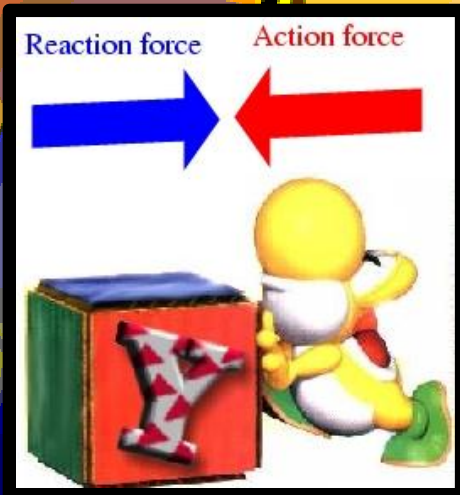
Surf Kidipede from A to Z

A-B-C-D-E-F-G-H-I-J-K-L-M-N-O
P-Q-R-S-T-U-V-W-X-Y-Z

aachen
abacus

Click on the picture for some information about momentum.

action – when one object applies a force to another object

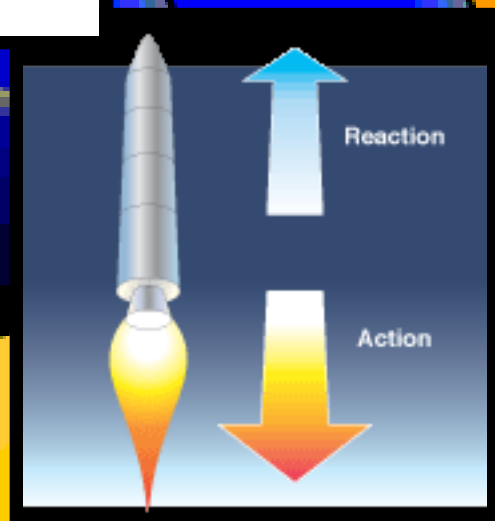
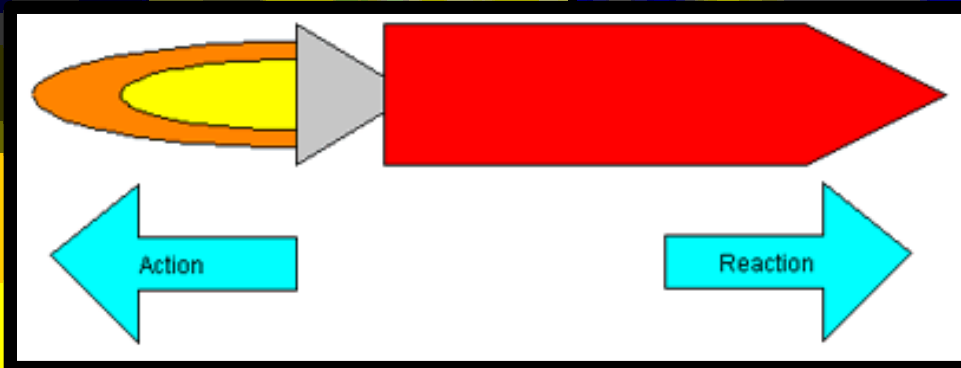


Newton's 3rd Law

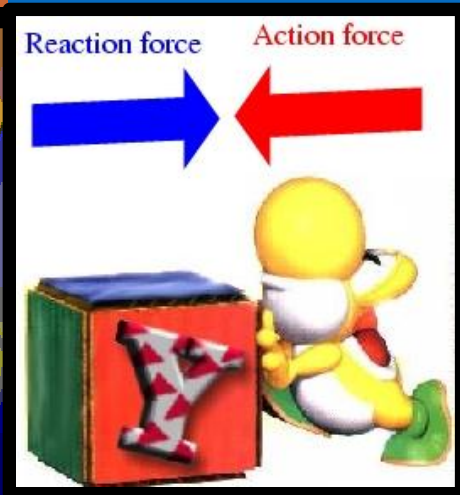
I push on the door } 3rd Law
Door pushes back on me } Pairs

I pull on the door } 3rd Law
Door pulls back on me } Pairs

My force on the door = Door's force on me
action force equals **reaction force**



reaction – the force the second thing returns (the result of an action)

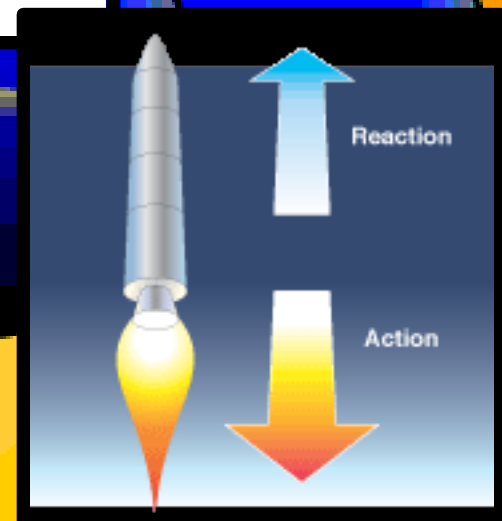
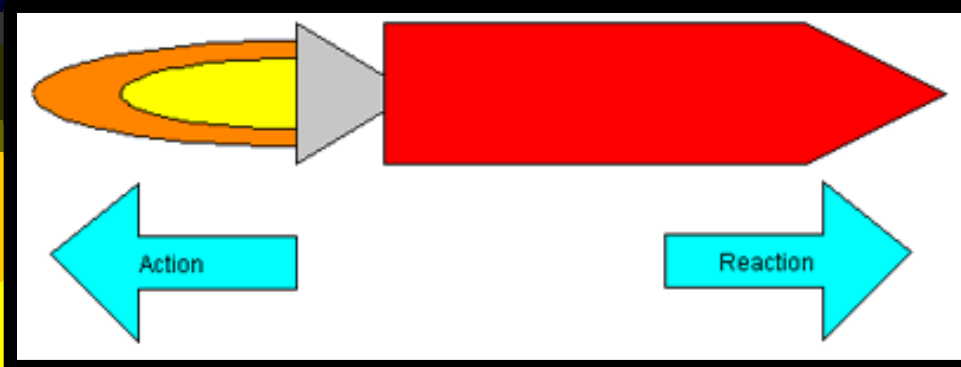


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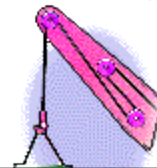
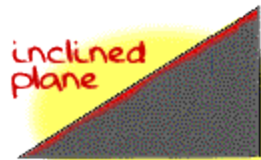


work – using force to move an object through a distance



simple machines – devices with few moving parts that make work easier to do.

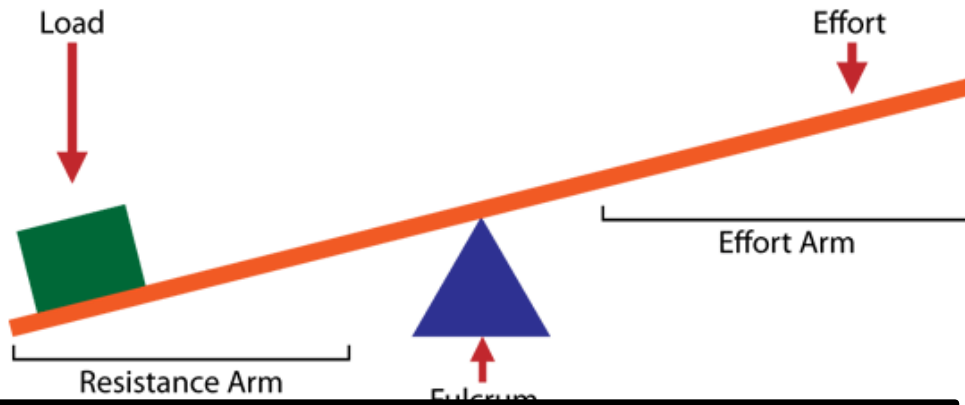
Simple Machines



Click on the picture for some information about simple machines.

lever – a rigid (solid, hard) bar that rests on a pivot point

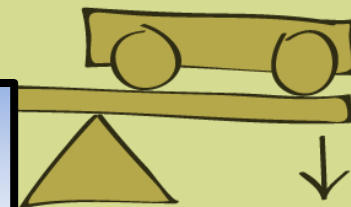
Click on the picture for a video on levers.



Click on the picture for directions on how to build a lever.

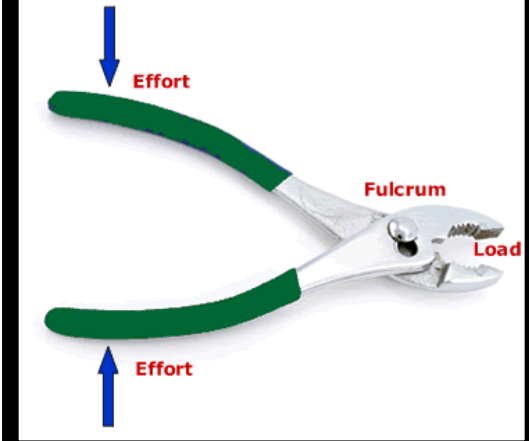
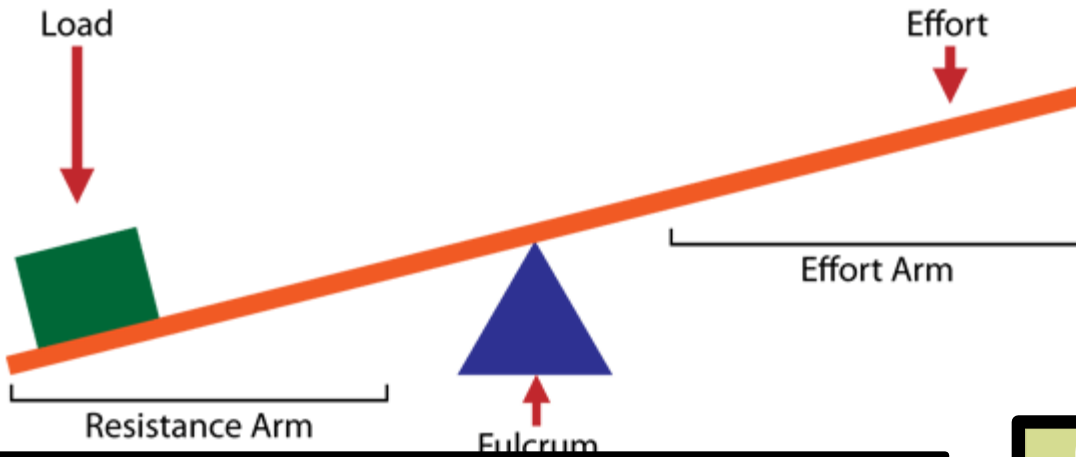


point and that is used to move an object at a second point by a force applied at a third: one of the simple machines.



Click on the picture for some contraption videos using simple machines. Built by kids!

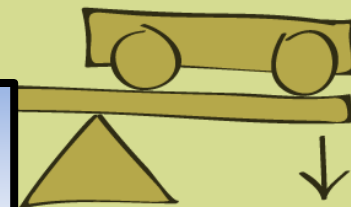
fulcrum – a pivot point that a lever rests on. The (triangle in the diagrams below.)



Click on the picture for directions on how to build a lever.

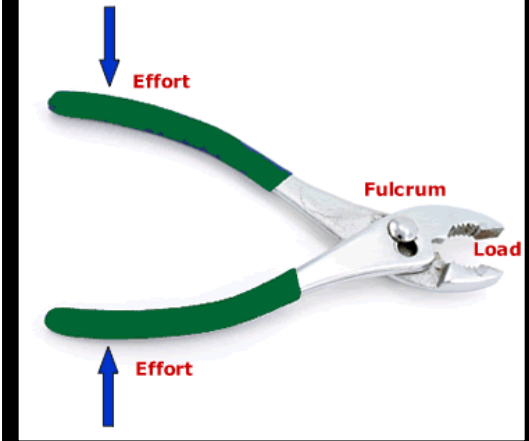
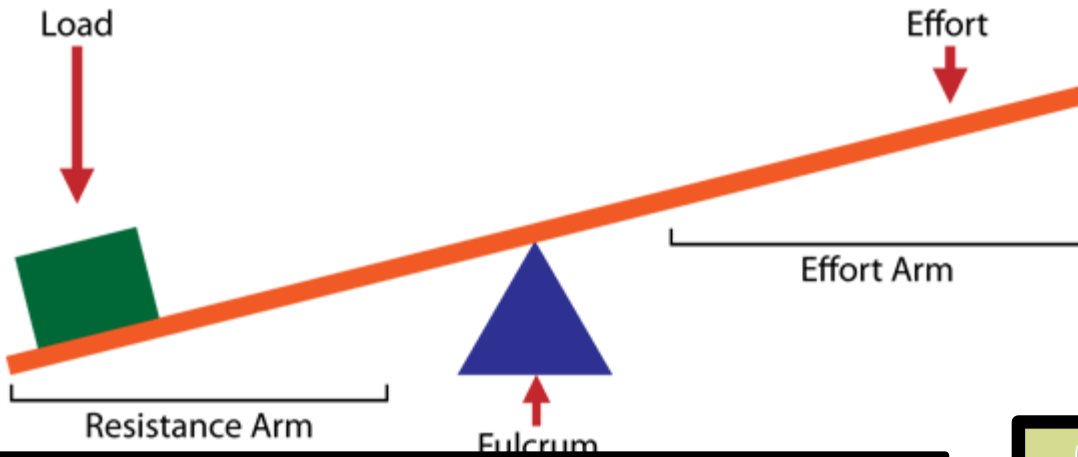
lever [lee-ver]

noun. a rigid bar that pivots about one point and that is used to move an object at a second point by a force applied at a third: one of the simple machines.



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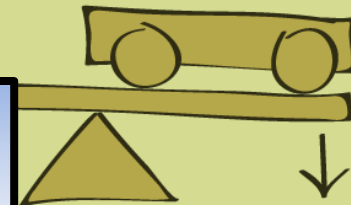
effort arm – the part of the lever that you apply force to (input force).



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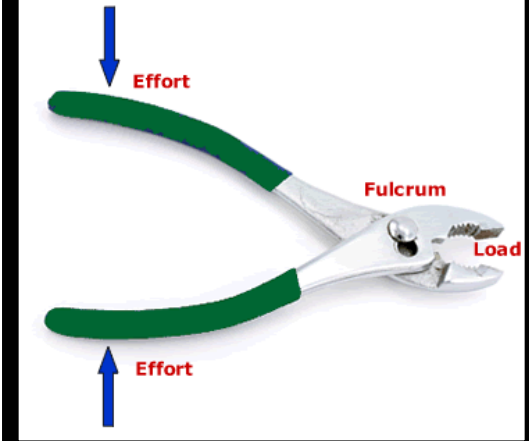
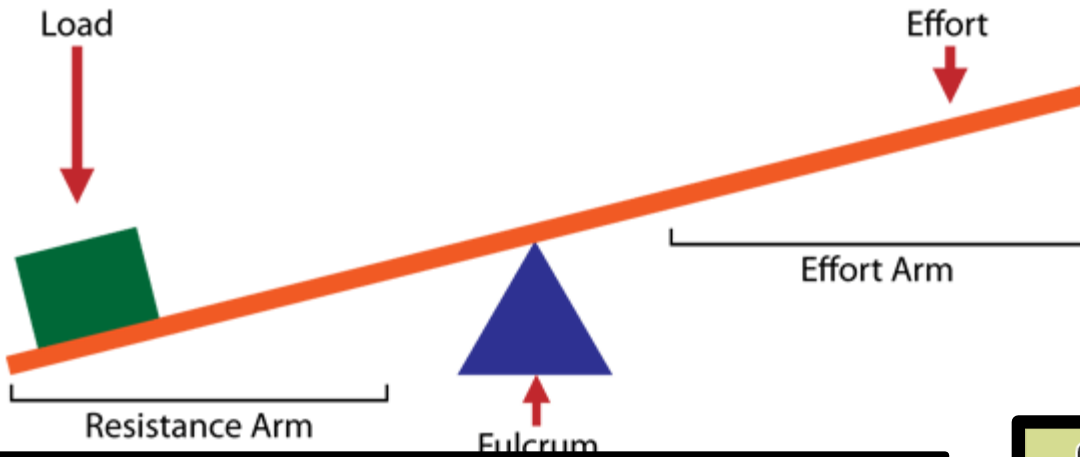
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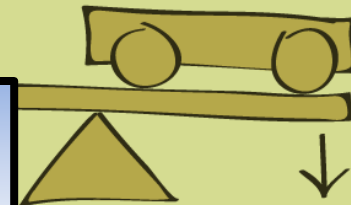
resistance arm – the part of the lever that lifts the load (output force.)



Click on the picture for directions on how to build a lever.

lever [lee-ver]

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Click on the picture for some contraption videos using simple machines. Built by kids!

inclined plane – a ramp/slope

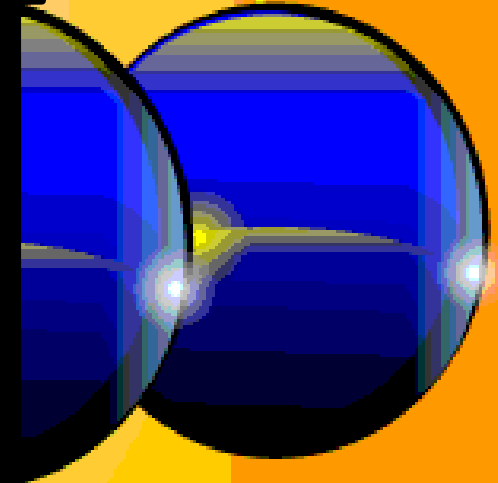
The Inclined Plane

Click on the picture below watch a video incline planes.



pulley – a wheel with a groove in the rim. A rope fits in the groove and helps lift the load.

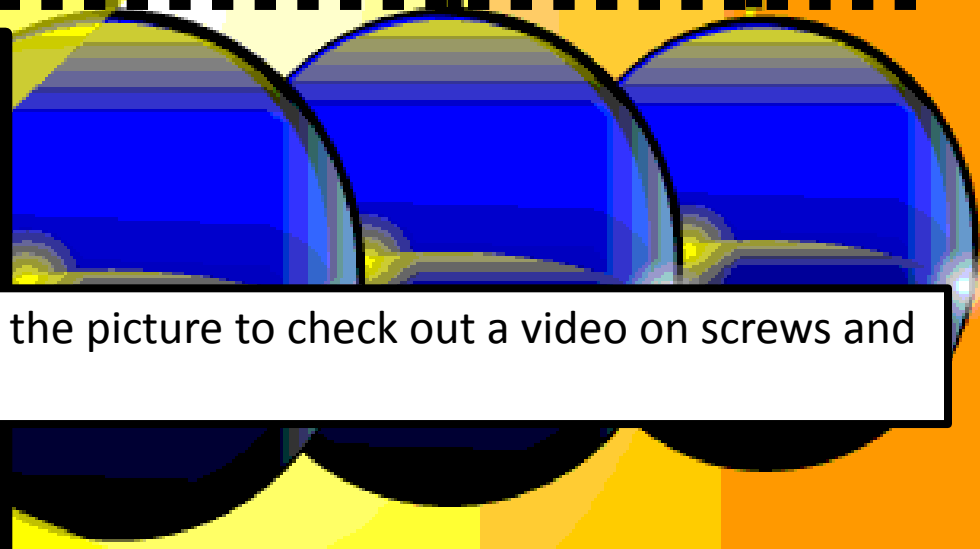
Click on the picture below watch a video on pulleys.



wheel and axle – a wheel is a large diameter circle attached to a small diameter axle. A small amount of input force on the wheel creates a large amount of output on the axle.



Click on the picture to check out a video on screws and wheels.



**screw – an inclined plane wrapped
in a spiral around a cylinder or
cone.**



Click on the picture to check out a video on screws and wheels.

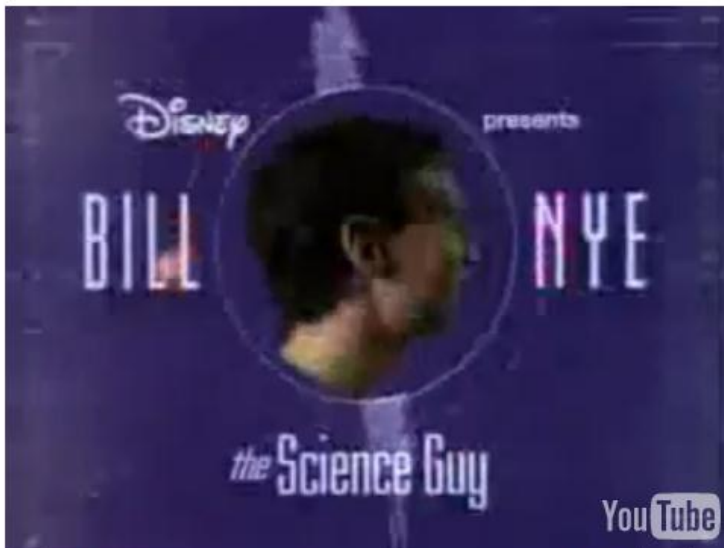
**screw – an inclined plane wrapped
in a spiral around a cylinder or
cone.**



Click on the picture to check out a video on screws and wheels.

**wedge – an inclined plane wrapped
in a spiral around a cylinder or
cone.**

Simple Machines, part 1/2

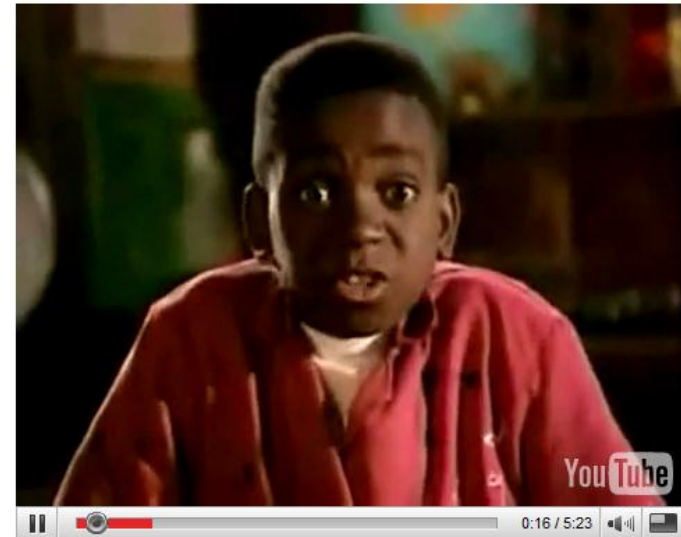


View :

[Part 1](#)

[Part 2](#)

Simple Machines, part 2/2



View :

[Part 1](#)

[Part 2](#)

Click on the picture to check out a Bill Nye Videos on simple machines.