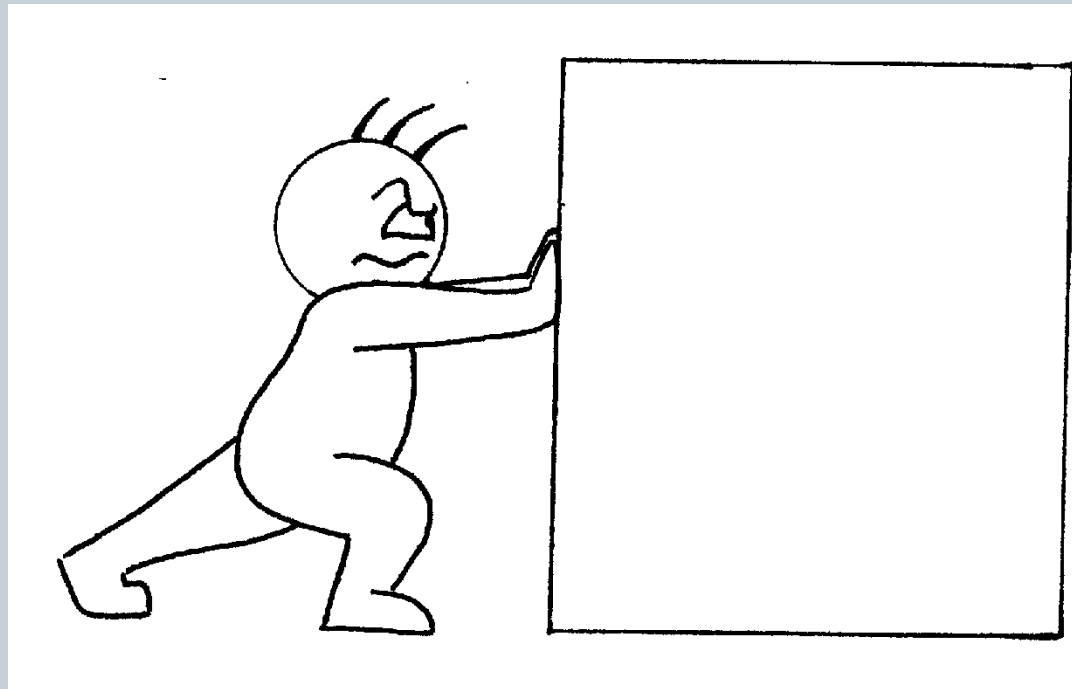


Force and Motion



Unit 2 Force and Motion



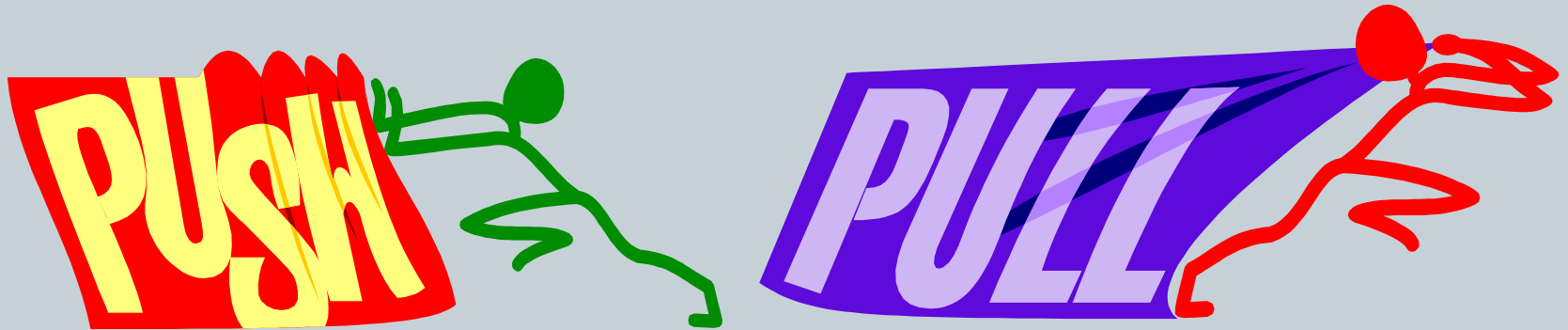
- Learning Goal (TEKS): Identify and describe the changes in position, direction, and speed of an object when acted upon by unbalanced forces.
- This means: We are going to learn about how the forces on earth create and cause the motion of objects.

How to take notes



- Title your notes:
“Balanced and Unbalanced Forces”
- Write the titles of the slides when they are in red.
- Write the notes on the pages (slides) when the words are in red

What is a Force?



- **Definition:** A force is a push or pull that causes an object to move, stop, or change direction
- In physics a force is anything that makes an object accelerate

Notes Example:

- At the top of the page you should have the title
- You should then have “What is a force?”
- Then: A force is a push or pull that causes an object to move, stop, or change direction

Balanced and Unbalanced Forces	
•	What is a force?
	A force is a push or pull that causes an object to move, stop or change direction
•	
•	

Balanced and Unbalanced Forces



Forces occur in pairs and they can be either balanced or unbalanced.



Example of Forces

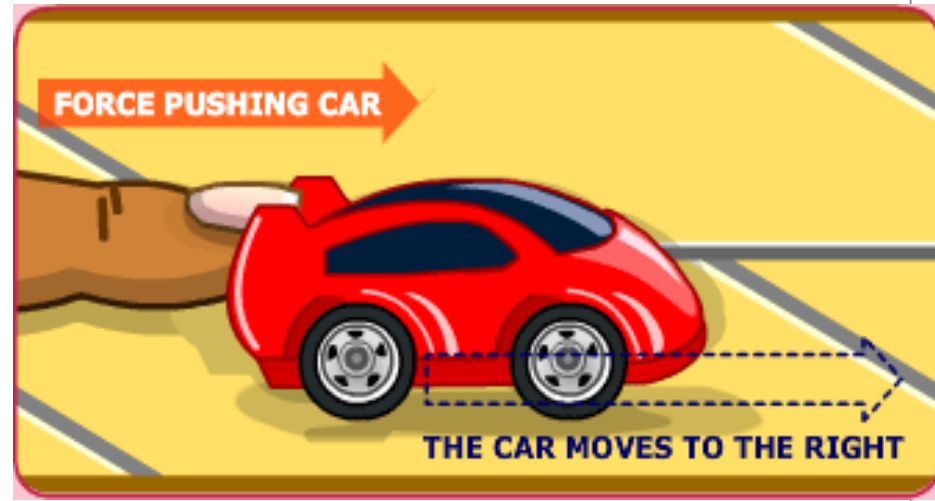


Picture A: The forces are balanced.

Picture B: The forces are unbalanced.



PICTURE A

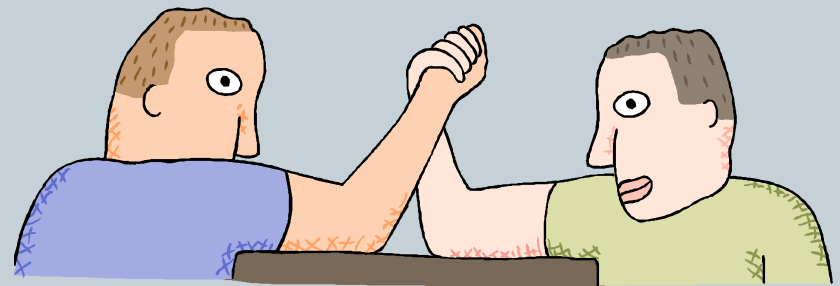
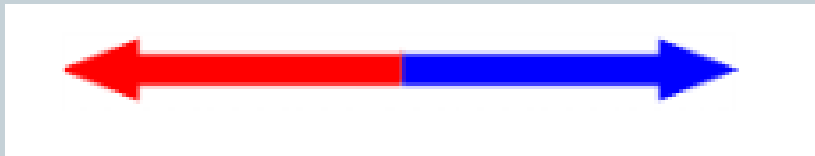
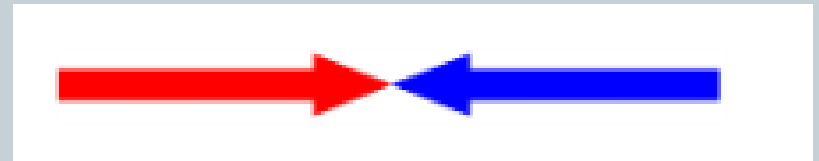
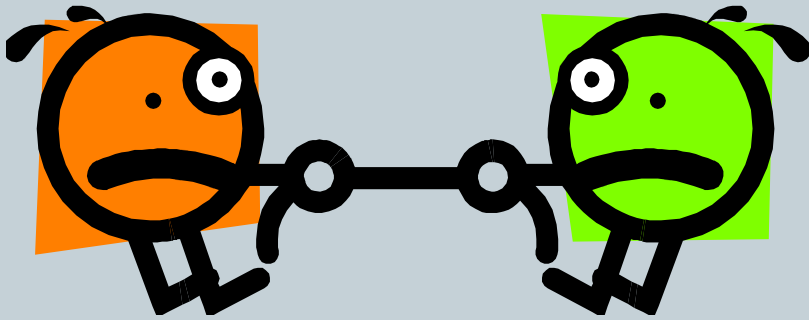


PICTURE B

Balanced Forces



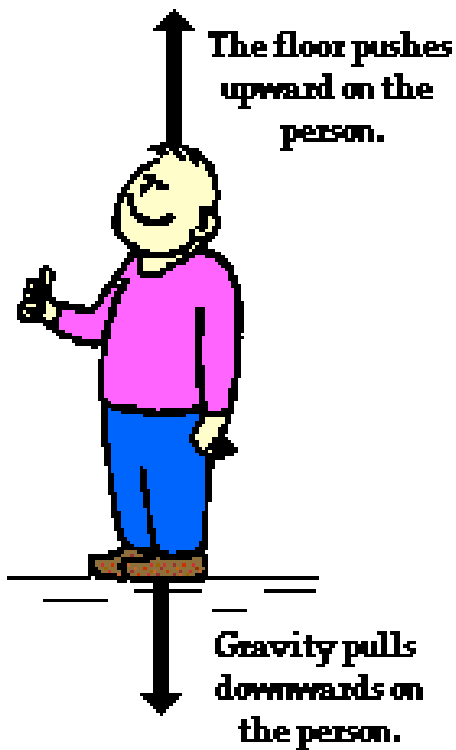
- Balanced forces do not cause change in motion
- They are equal in size and opposite in direction



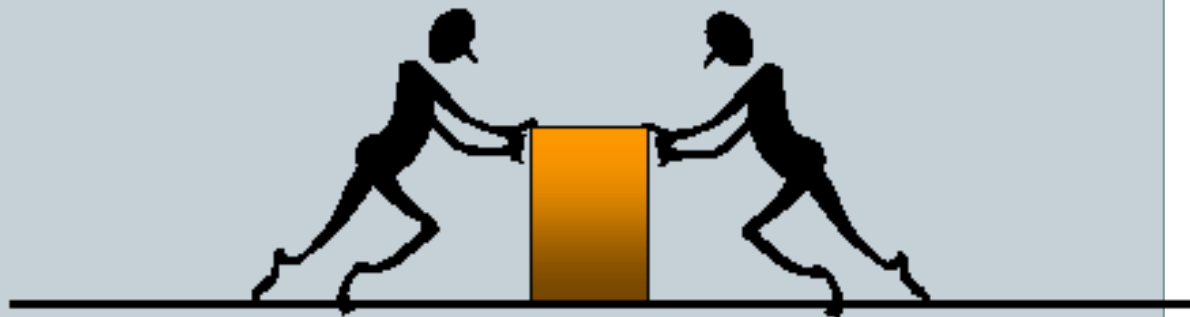
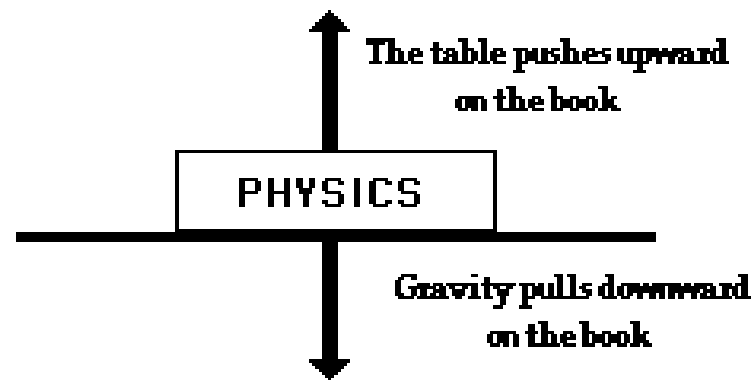
I need 2 volunteers!!

Examples of Balanced Forces – pick one to write down

The forces on the person are balanced.



The forces on the book are balanced.



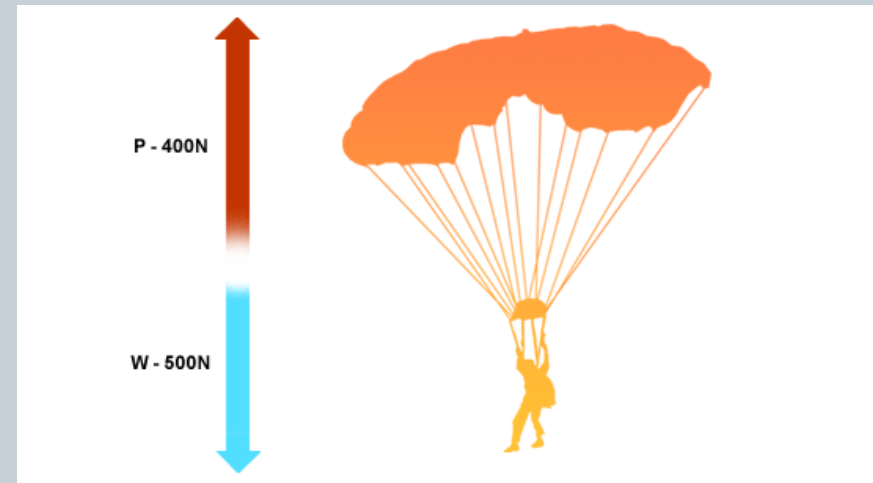
Unbalanced Forces



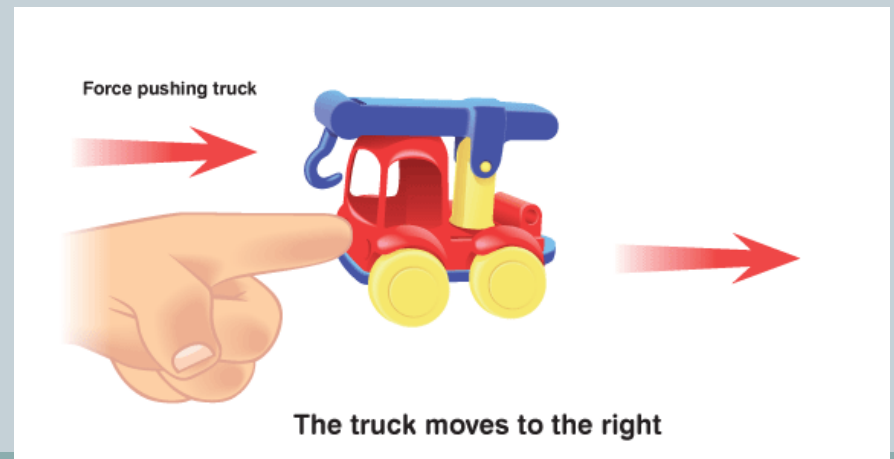
- An unbalanced force always causes a change in motion
- When unbalanced forces act in opposite directions you can find the net force
 - Net force is the overall force acting on an object. It is a combination of the magnitude and the direction.
 - ✦ Magnitude
 - The difference between the two forces
 - ✦ Direction
 - Direction of the largest force

Examples of Unbalanced Forces

Gravity is a constant force. The parachute is working against the force of gravity.



The person's finger is pushes the toy truck. The truck moves in the direction of the greatest force occurring on it. Be aware that there is some force acting against the finger, but that the force isn't strong enough to resist.



Examples of Unbalanced Forces – write one example down in your journal!

The soccer ball doesn't move until the girl provides an unbalanced force upon it.



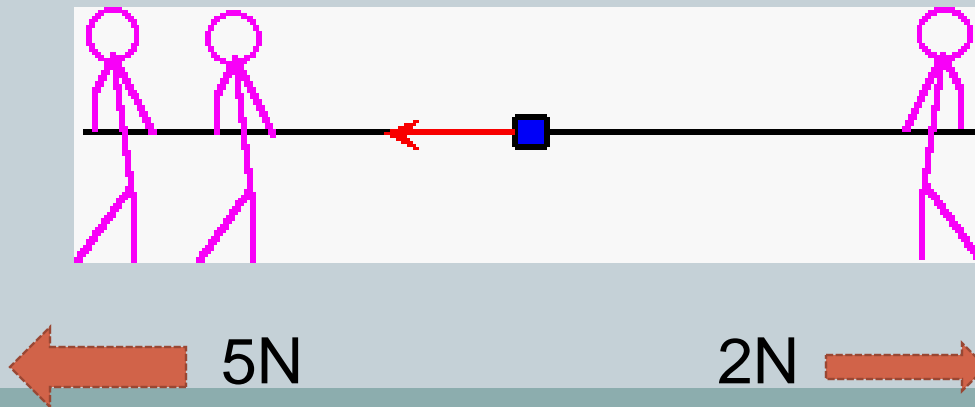
The tug of war doesn't have the same amount of people on each side, so the forces are unequal and one side will be moved more than the other.



photo by burningkarma

How to calculate net force

- Once again - the net force is the overall force or total amount of force acting on an object (a combination of the magnitude and direction)
- If there is a net force acting on an object, the force is unbalanced.
- For example, in this tug of war, the net force is 3N to the left



The forces are not equal and are in opposite directions. Subtract the numbers.

More examples of net force calculations



- Two people are trying to push away a box full of rotting eggs, who ends up with the box?

Sam
10N



Omar
15N

- If there are two people trying to get this box full of money, who ends up with it?

Lauren
20N



Abby
30N

Gravity as a Force



Let's look at a demonstration of gravity at work:

What's this?



What are these?



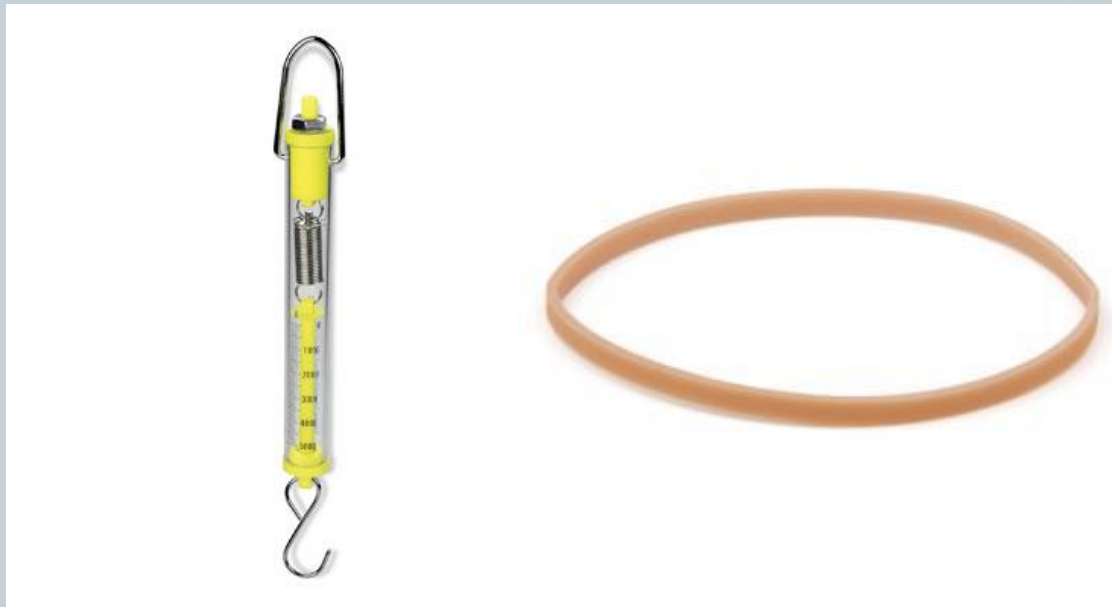
And this is a
rubber band



Gravity as a Force



- Explanation: the rubber band stretches as the weight pulls on it. The weight is being pulled down by the force of gravity. The spring scale measures in NEWTONS the amount of force acting on the rubber band.



Draw this example in your notes. Include arrows showing the direction of forces at work.

Gravity as a Force



- The rubber band in turn exerts an upward force on the weight.

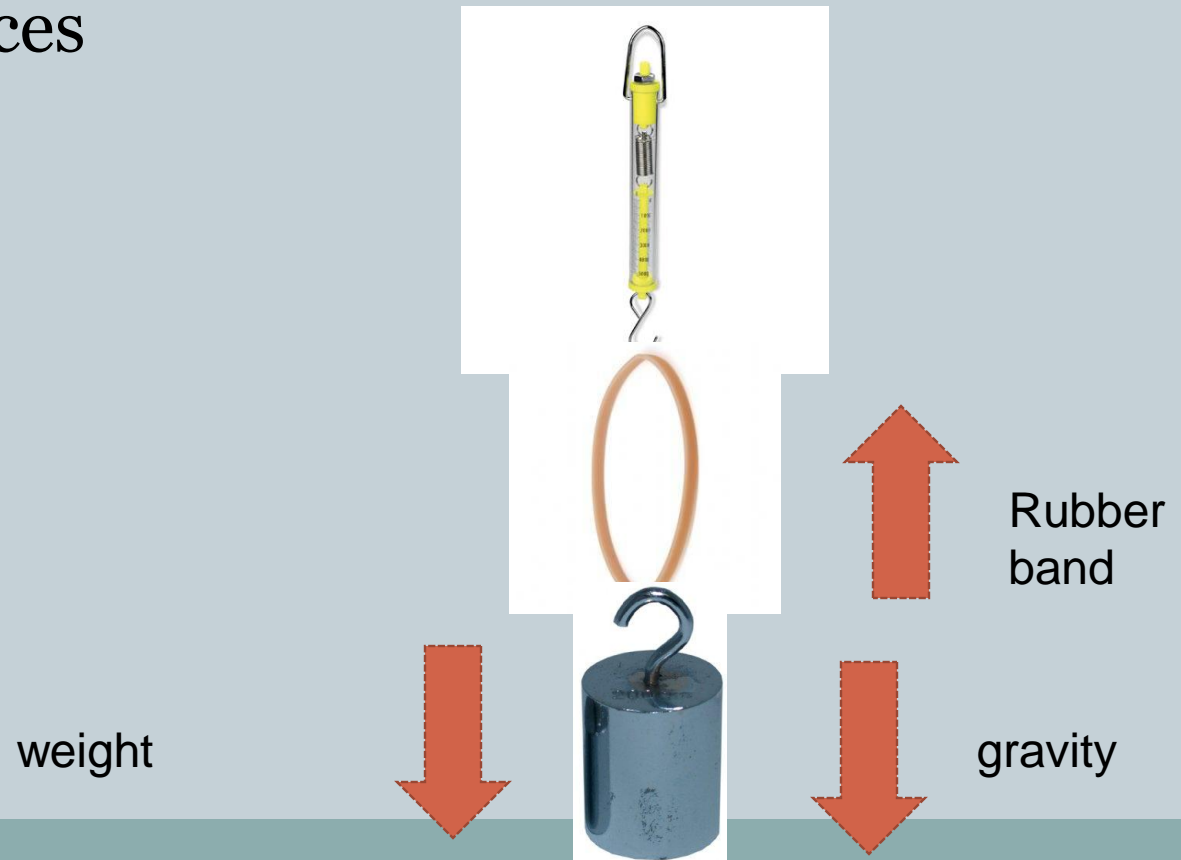
What happens when more weight is added?

- The additional weights add or **INCREASE** the amount of force acting on the rubber band. As this force increases, the length of the rubber band increases.
- **Weight is a downward force caused by the force of gravity pulling objects to the center of the Earth.**

Gravity as a force



- Rubber band example:
- Draw this picture and use arrows to draw the direction of forces



Newtons? Sir Isaac Newton?



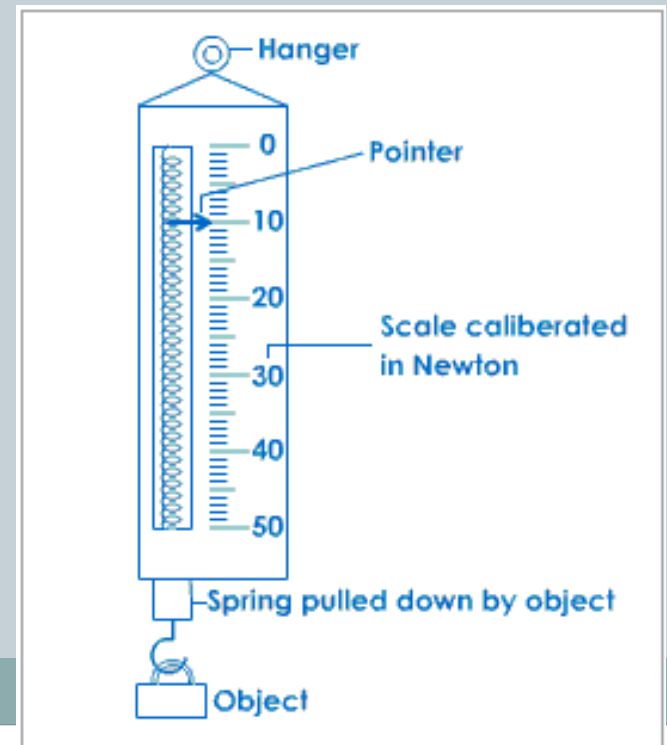
- Yes! **The unit for measuring force is NEWTON(S).**
- It is named for that famous scientist!



Let's examine the Spring Scale more closely

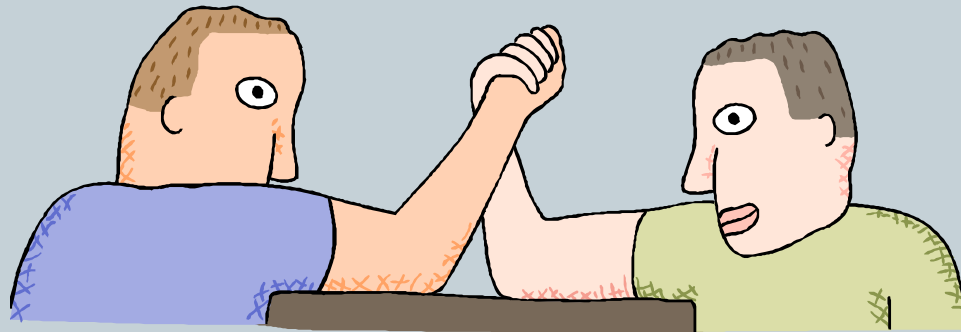


- Definition: **A spring scale is a tool used to measure force.**
- It works in the same way the rubber band does. The spring inside it stretches based on the amount of force added to it.



“Reading” Pictures of Unbalanced Forces

1. In pictures about force, there will be a graphic demonstrating the force.
2. Then there are arrows showing the direction and magnitude or strength, of the forces.
3. The formula shows even more detail.

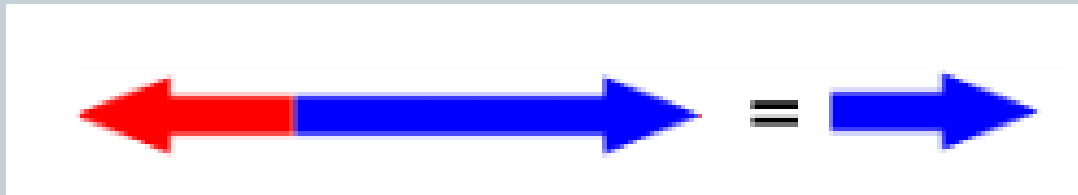
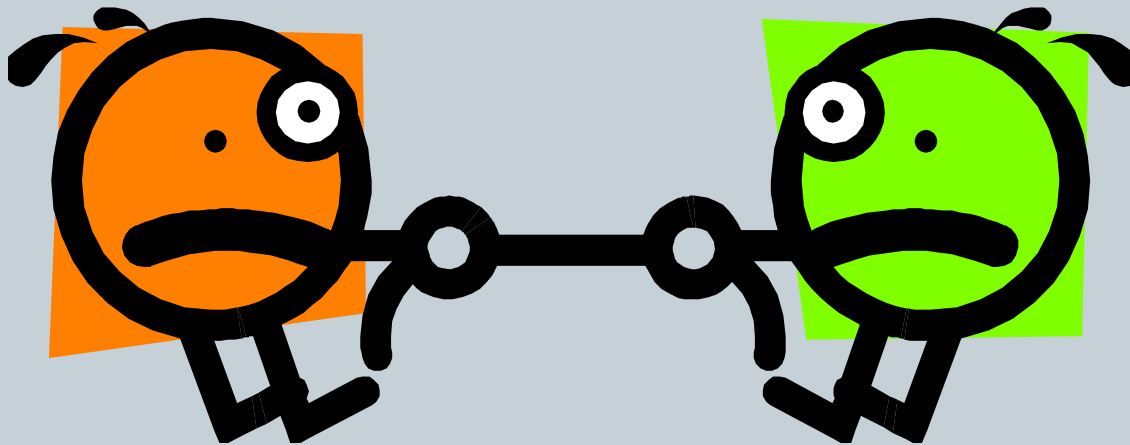


$3 \text{ N, right} - 6 \text{ N, left} = 3 \text{ N, left}$
Number means magnitude,
and the direction of the force is left

Unbalanced Forces Pictures



Tell me what is going on in this picture:



$$4 \text{ N, left} - 10 \text{ N, right} = 6 \text{ N, right}$$

Unbalanced Forces Pictures



What if the two forces acting on an object are going the same direction?
Then what do we do?

Draw in your notes how the arrows for this picture might look.



Where you right?

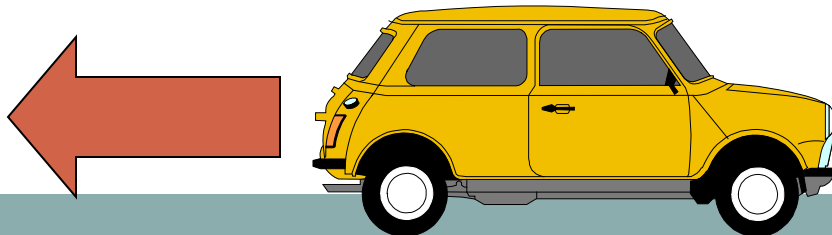
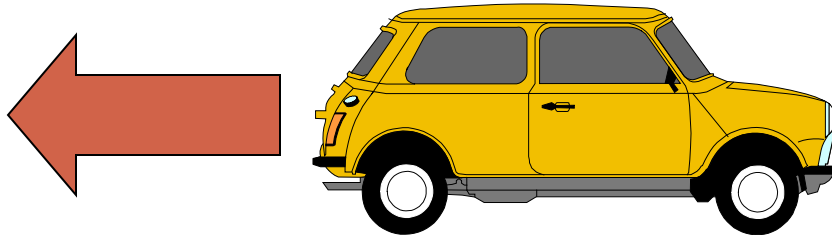
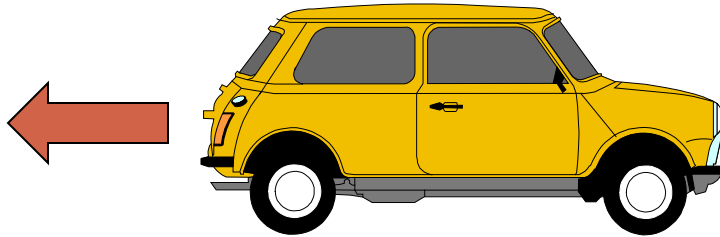
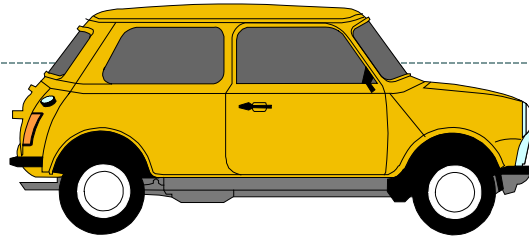
If not, fix it now!



$$5 \text{ N, right} + 10 \text{ N, right} = 15 \text{ N, right}$$

Are these Balanced or Unbalanced Forces?

Notice the size of the arrows!



Force

Balanced Force

Unbalanced Force

Net Force

Newton

Spring Scale

Force -



Examples:



Balanced Force

Examples:



Unbalanced Force

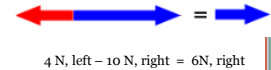
Examples:



Net Force -



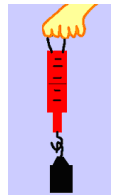
Example:



4 N, left - 10 N, right = 6 N, right

Newton (N) -

Examples:



Spring Scale -

Example:



Force - A push or pull on an object



Examples: pushing a shopping cart or pulling a wagon



Balanced Force - Equal forces acting on an object in opposite directions. (Object is still)



Examples:



Unbalanced Force - Unequal forces acting on an object which causes it to move



Examples:



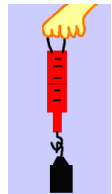
Net Force - a combination of the magnitude (difference between 2 forces) and direction (direction of largest force)



Example:

4 N, left - 10 N, right = 6 N, right

Newton (N) - The metric unit of measuring force



Examples:

Spring Scale - A device that measures the tension force acting on an object



Example: