2.1 Types of Forces

Problem 1 (1 pts)

A force is a ...

- ( ) power that compels people to do good
- ( ) imaginary entity that moves things
- ( ) mystical force used by little green men
- (X) push or a pull

The purpose of forces is to

- (X) change an object's state of motion
- ( ) make students do their homework
- ( ) move objects from rest
- ( ) lift things to different places

What are the units of force?

- ( ) Joule
- ( ) Watt
- ( ) Kilogram
- (X) Newton

In class we talked about how the force of gravity (or an object's weight) is equal to the mass of the object in kilograms times the acceleration of gravity (we'll use 10 m/s^2).

W = m*g

So if an object has a mass of 18kg how much is the force of gravity on it?

180N

If the force of gravity on a box is 3727N, how much mass does the box have?

372.7kg

A giant ant has a mass of 13 grams. How much is the force of gravity on the ant?

Make sure you convert the mass to kg first!

0.13N

If Jimmy weighs 175 pounds .... how much is the force of gravity on Jimmy?

1 kg of mass on the Earth weighs 2.25 pounds.

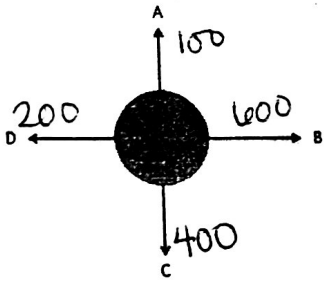
777N

To find the resultant (or net) force ...

- ( ) count how many forces you see
- (X) add up all the forces acting on the object
- ( ) multiply all of the forces acting on the object
- ( ) guess

When the forces acting on something are balanced you know that...

- (X) the object is moving at constant velocity
- ( ) the object is an accelerating
- ( ) there are stronger forces to the right than to the left
- ( ) there are stronger forces up than down



What is the resultant (or total) force in the x direction? 400 N right

Are the forces in the x direction balanced or unbalanced? unbalanced

Are the forces in the y direction balanced or unbalanced? unbalanced

What is the resultant (or net) force in the Y direction? 300 N down

2.2 Resultant Force

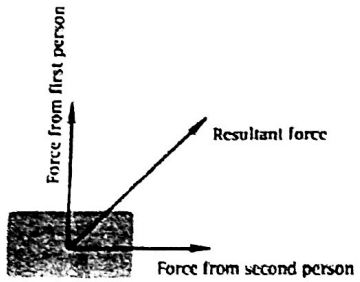
Fill in the following blanks with: less, greater, no change, or pickles.

If you were pushing a box across the room and your friend just happened to be putting very small animals into the box as you pushed, what would happen to the acceleration of the box over time?
It would be less.

Pickles taste great on a ham and cheese sandwich.

You and your friends are trying to push a beached whale back into the ocean. There are also some marauders peeling blubber off the whale to use in their lotions. The more blubber the marauders peel off the less force it will take you to get the whale back in the water.

If the acceleration of your car is too big. What would you need to do to the mass in the car to decrease the cars acceleration?
The mass would need to be greater, you could do this by filling the passenger seat with PICKLES.

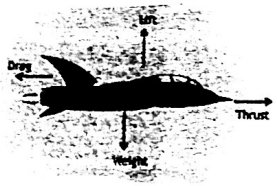


16.007 N

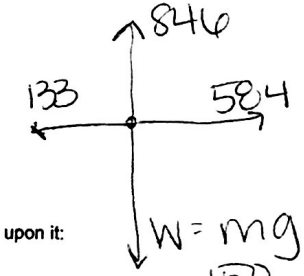
The first person pulls a 7.5 kg box with a force of 13.1N. The second person pulls with a force of 9.2N. What is the resultant force?

22.3 N

~~What is the total acceleration of the box?~~



A 150 kg plane is moving through the air with the following forces acting upon it:
Thrust = 584 N
Drag = 133 N
Lift = 846 N



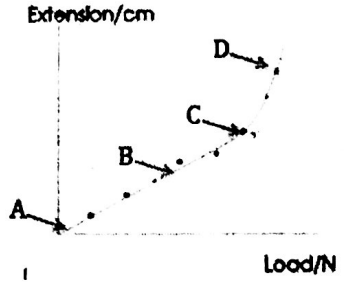
What is the magnitude of the resultant force on the plane?

Use g=10m/s^2 for acceleration due to gravity (in W=mg)

$451^2 + 654^2 = c^2$

$c = 794N$

On a load/extension graph, what is the point called where the spring has been stretched so far that is has begun to deform?

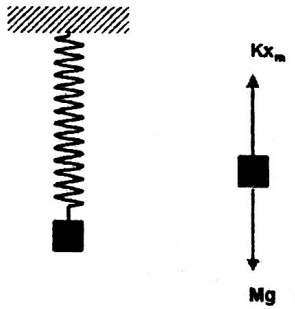


Where is that point on the graph above?

- A
- B
- X C
- D

In the equation F = kx, F stands for force, k stands for spring constant, and x stands for extension / compression

A certain spring has a spring constant of 6 N/m. How much force is required to stretch it 0.33 m?



$F = 6(0.33)$

$F = 1.98N$

A certain spring is stretched 8 cm with a force of 37 N. What is its spring constant?

$8cm = .08m$ $\quad F = kx$ $\quad k = \frac{37}{.08} = 462 N/m$

If a weight of 30 N is hung on the spring instead, how far does it stretch?

$30N = 462 N/m(x)$

$x = 0.065m$

$34.7 \cdot 10 = 347N$

$W = mg$

If a mass of 37.4 kg is hung on the spring instead, how far does it stretch? $\frac{347}{462} = \boxed{0.75m}$

If I compress an object, what happens to its mass?

- ( ) Decreases
- (X) No change
- ( ) Increases

What happens to its volume?

- ( ) Increases
- (X) Decreases
- ( ) No change

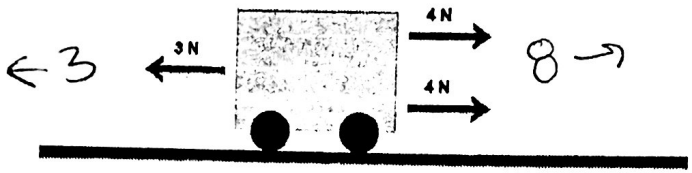
What happens to its density?

- ( ) Decreases
- (X) Increases
- ( ) No change

If a dog has a mass of 20 kg on the Earth, what is its mass on the moon?
The acceleration on the moon is 1.67 m/s^2.

- ( ) 330 kg
- ( ) 200 kg
- ( ) 2 kg
- ( ) 33 kg
- (X) 20 kg

What is the dog's weight on the moon? $W = mg = 20 \cdot 1.67 = \boxed{33N}$



What is the resultant or net force on the cart?

$8 - 3 = \boxed{5N \text{ Right}}$