Forces Review!

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Review of Concepts

-force is a vector (It has magnitude and direction).

-Mass: the measure of inertia of a body

-weight: force due to gravity

-newton's first law: An object will stay at rest or in motion at constant speed unless acted upon by an external, unbalanced net force.

-Force = Mass x Acceleration (F=ma)-Newton's second law

-force of gravity: $F_G = mg$

-normal force: constant force which acts perpendicular to a common surface of contact

-equilibrium: zero net force

-terminal velocity: fastest speed it will reach in freefall

Review of Concepts

-newton's third law: for every action there is an equal and opposite reaction

-air resistance is proportional to speed, so the faster you go, the harder the force will be

-free body diagrams: diagram showing all forces acting on an object

-types of forces:

- Tension: when a flexible cord pulls on an object
- Friction: contact force, occurs when one surface attempts to move along another surface, always opposes motion
  - Kinetic, rolling, fluid, static
  - Things that affect friction: smoothness of surface, weight (normal force)

Review of Concepts

-Friction force= the coefficient of friction x normal force ($F_f = \mu F_N$)

-The greek letter MU= coefficient of frictions

-objects on an incline: more convenient to think about vectors acting perpendicular to the incline.

-$F_{parallel} = F_G \sin \theta$

-$F_{perpendicular} = F_G \cos \theta$

MISCONCEPTION #1

NOrmal Force:

- It's not neutral or natural force, it's normal force
- Normal force is always perpendicular to the object being acted upon
- Does not always line up with gravity

The **normal force** is perpendicular to the surfaces in contact.
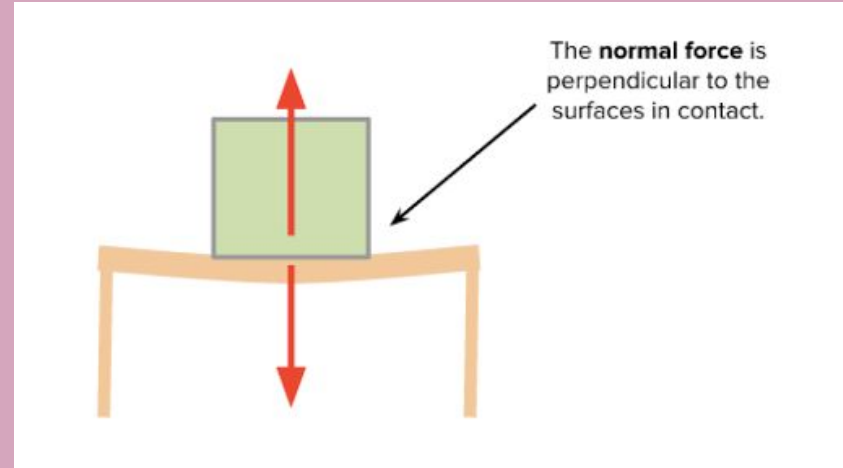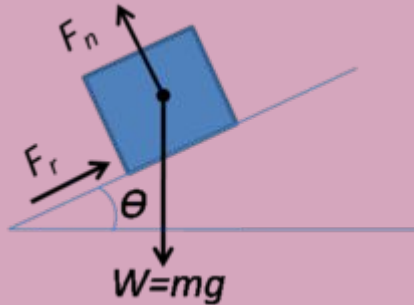
MISCONCEPTION #2

- MASS: The amount of matter that is in an object
- Never altered by location or the pull of gravity
- KG

- WEIGHT: the force of gravity acting upon an object
- Varies according to location in the universe
- Weight=mass x gravity
- Newtons
- "WEighing" yourself is not equivalent to mass or weight

MISCONCEPTION #3

CONSTANT FORCE = CONSTANT MOTION

- Misconception by aristotle
- In the absence of friction, an object will continue at a constant speed in a straight line
- An object will only slow down when a force is applied on it
- Law of inertia: an object in motion will stay in motion unless acted upon by an external force

Strategies

Step 1: Identify what type of problem you are doing
- Know what equation you need to use
- If it is asking for the force that is exerted: Force- $F=ma$
- If the project is asking for how much something weighs: $F_g=mg$
- If it is involving the normal force : $F_n=F_g$
  - It is always perpendicular to the surface that the object is resting
- Free body diagrams treat the object as a point
- When dealing with friction: $F_f=\mu F_n$

Step 2: Stay organized

Strategies

- Friction may ask what type of force is holding a car on the road
- Normal force may ask what force a surface is enacting on an object.
- Weight may involve being on different planets with different gravities
- It is important to Identify all of the forces acting on the object
  - Free body diagrams

Strategies

Step 2: Stay organized

- There are many formulas in this unit and there are many different forces acting on an object.
  - Free body diagrams can help organize your work.
- Write out the formulas that you may need
- Write out what variables that the problem provides.

How much does a **178g** peanut butter jar weigh on Earth?

- 1746 N
- 1.746N
- 17.46N
- 174.6N

The Answer! It weighs... 1.746N!

- 1746N
- **1.746N**
- 17.46N
- 174.6N

Remember! Convert grams to kilograms!

What term is used to label the net force or change in velocity being **ZERO?**

- Constant rate
- Static Friction
- Kinetic friction
- Equilibrium

The answer is… Equilibrium!

- Constant rate
- Static Friction
- Kinetic friction
- **Equilibrium**

What is Newton's **2nd** law?

- F=MA
- Any object stays at rest or in motion unless another force acts upon it
- For every action there's an equal and opposite reaction
- All objects deform slightly when they hit each other

His **2nd** law is… F=ma!

- F=MA
- Any object stays at rest or in motion unless another force acts upon it
- For every action there's an equal and opposite reaction
- All objects deform slightly when they hit eachother

What is the force of friction on a 2000kg car if the coefficient of friction is 0.56

- 19,620N
- 10,987N
- 109,870N
- 19,870

The answer is... 10,987N

- 19,620N
- **10,987N**
- 109,870N
- 19,870

What is the acceleration of a 76N force being applied to a 44kg box ?

- 17M/S
- 1.7M/S
- 172M/S
- 12.7M/S

The Answer is... 1.7m/s

- 17M/S
- 1.7M/S
- 172M/S
- 12.7M/S

That's Forces!