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INTRODUCTION TO MOTION



Science 10

What kind of things are in motion?

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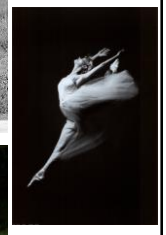

The answer is: EVERYTHING!

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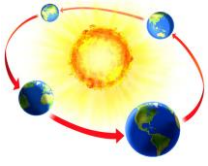
All matter is made up of atoms. Atoms are in constant motion!

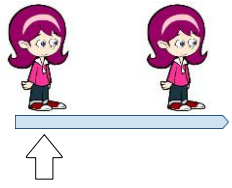


The Earth revolves around the sun!

The Earth spins on its axis!

What is Motion?

- any physical movement or change in position, relative to a frame of reference



Movement

Reference Point

Frame of Reference

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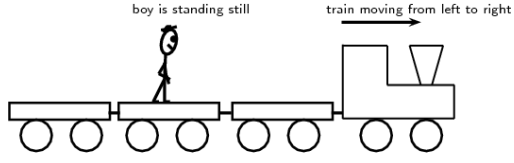
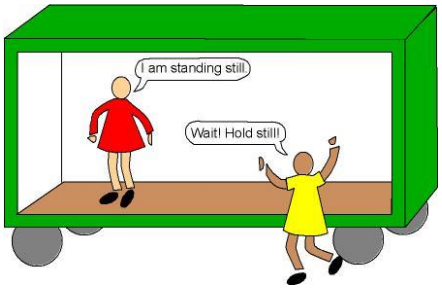
- random location from which the position of an object is being described

For example: If the tree is chosen as the reference point, then the people inside the bus are considered to be in motion.

But…if the bus seat is the reference point than the people are clearly not in motion



From your frame of reference the boy is moving from left to right.



Why do objects move anyway?

- Rest is the term for a complete lack of motion. Objects stay at rest unless a force causes the object to move.
- However, once an object is in motion, it cannot be stopped unless another force is applied.

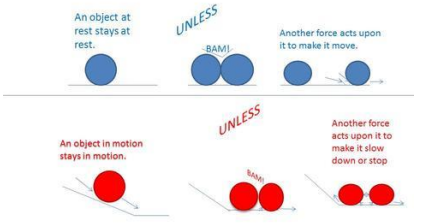
Why do objects move anyway?

- This is known as Newton's first Law of Motion:

An object at rest tends to stay at rest or an object in motion tends to stay in motion.

UNLESS….

It is acted upon by some net force!



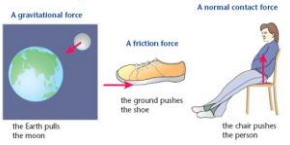
For example…

An astronaut floating in space will continue to float forever in a straight line unless some **external force** causes him/her to change speed or direction.

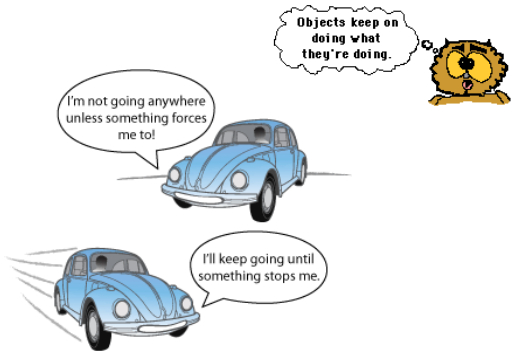
So…what is force?

- Force is a push or a pull
- Forces can make objects start moving, move faster or slower, or cause them to change direction

For example



Newton's First Law is sometimes thought of as:



Or in other words, it is the "Law of Inertia."

Inertia

- The tendency of an object stay at rest or to continue in motion is called inertia.
- All objects have inertia. The greater the mass of the object, the greater the inertia or the ability to resist change.

Types of Motion

- There are two types of motion: uniform and non-uniform.
- Uniform motion is motion at a constant speed in a straight line (i.e. going one direction).
- Non-uniform motion occurs when there is a change in speed AND / OR direction.

Non-uniform Motion

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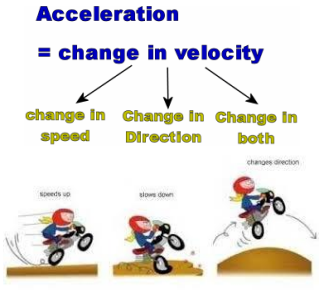
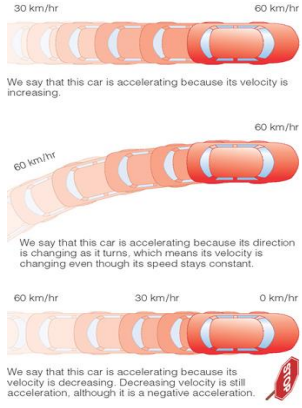
- In physics, non-uniform motion is known as acceleration.
- Why? Acceleration is when an object changes it speed, direction or BOTH!

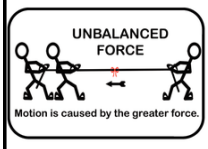




How does this relate to force?

- Forces often come in pairs.
- When forces are equal in size but opposite in direction, they are called balanced forces.
- Balanced forces cancel out and do not cause a change in an object's motion. (The object stays at rest or continues in uniform motion).

How does this relate to force?



- However, if one force is stronger, the forces are unbalanced and a net force results.
- This will cause a change in the object's speed and/or direction (otherwise known as acceleration or non-uniform motion).

In Summary:

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- A force is not needed to keep an object in motion. Objects stay at rest or in motion because of inertia.
- Unbalanced forces cause acceleration.
- Acceleration, also known as non-uniform motion, is a change in speed AND/OR direction.

Any Questions?

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