

Forces and Motion Vocabulary

1. **Force:** A push or a pull. You know that a force is present if there is a change in shape or a change in motion. You measure a force by measuring the amount of change in shape or motion. You can use a tool called a force measurer to measure forces.
2. **Motion:** A change in position within a certain amount of time. The motion of an object can be described by its position, direction of motion and its speed.
3. **Speed:** The rate at which an object moves. Speed does not tell you the direction that an object is moving in.

Formula for speed: $s = d / t$

Let s = speed

Let d = distance

Let t = time

4. **Frame of Reference:** When you describe something that is moving, you compare it with something that is assumed to be stationary (non-moving). The none-moving object or background used for comparison is the frame of reference. The most common frame of reference is the earth or the ground.
5. **Relative Motion:** Movement is relative to a particular frame of reference. We often look at motion by comparing how an object is moving in relation to its frame of reference.
6. **Mass:** The amount of matter in an object. Mass is measured in grams using a triple beam balance.
7. **Weight:** The heaviness of an object- gravity has an affect on weight. Weight is a force.

Formula for calculating weight: $\text{weight} = \text{mass} \times \text{acceleration due to gravity}$

8. **Acceleration due to Gravity:** As objects fall, they accelerate (pick up speed) because of the downward pull of gravity. On earth, objects accelerate (speed up) at a rate of 9.8 meters per second for each second that they fall. This means that acceleration due to gravity on Earth is 9.8 m/s^2 .
9. **Gravity:** The force of attraction between all objects. The force of gravity depends on the mass of the two objects involved and the distance between them. Gravity is responsible for making an object speed up as it falls.
10. **Resistance:** Opposition to a force. A resistance works in the opposite direction of a force.
11. **Velocity:** A description of speed in a given direction. Example: 43 meters per second North.
12. **Acceleration:** The rate of change in velocity. (Technically this means that acceleration can be an increase or decrease in velocity or a change in direction.)
13. **Friction:** The force that acts in the opposite direction of motion. This force will cause a rolling object to slow down and finally stop. Without friction, motion would not be possible.

14. **Hypothesis:** A testable prediction
15. **Force Measurer:** A tool used to measure force. It works by changing shape (bending the blade) when a force is applied, and allows you to measure how much the shape (blade) changed by reading a scale on the tool.
16. **Newton:** The units for force. One Newton is the amount of force needed to move 1kg one meter per second. In physics, forces like weight and friction are measured in Newtons.
17. **Independent Variable:** The variable that you change on purpose (manipulate) in an experiment. This variable is always graphed on the x-axis.
18. **Dependent Variable:** The responding variable in an experiment- it depends on the independent variable. This variable is always graphed on the y-axis.
19. **Constant:** Something that you keep the same in an experiment so that you can be sure that it does not affect the results of your experiment.
Ex: If you were trying to see which plant food worked the best, you would want to keep the following things constant: the type of plant, the amount of water and fertilizer used, the amount of sun the plants got, etc.
- In experiment, you can only change one thing (variable) on purpose. Everything else should be kept constant.
20. **Vectors (Vector Diagrams):** These can be used to illustrate a force by showing the amount of force and the direction in which it is applied
21. **Inertia:** The tendency of objects to remain in motion or stay at rest unless acted on by an outside force. Heavier objects have a greater inertia because it takes more force to move them.
22. **Newton's 1st Law of Motion:** An object at rest will remain at rest and an object in motion will remain in motion at a constant velocity unless acted on by an unbalanced force. This law is also called Newton's Law of Inertia. This law explains why it is so important to wear a seatbelt in a moving car.
23. **Newton's 2nd Law of Motion:** Force = mass x acceleration
24. **Newton's 3rd Law of Motion:** For every action there is an equal and opposite reaction.
Example: Rocket blasters push downward on the ground and the ground pushes upward, thus allowing the rocket to take off.
25. **Volume:** The amount of space that an object takes up.