

Newton's Toy Box

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Glossary

A page number in boldface type indicates the page on which the word is defined in the text.

acceleration rate at which an object's velocity changes (5, 8, 12, 13)

air resistance fluid friction acting on an object moving through air; also called drag (7, 8)

average speed total distance traveled divided by the time it takes to travel that distance (3)

balanced forces forces that cancel each other because they are equal in strength and opposite in direction (4, 11)

compound machine combination of two or more simple machines that work together (15, 21)

displacement how far an object moved from its original position and in what direction the object moved (3)

distance how far it is from one point to another (2–5, 8, 14–20, 23)

efficiency in a machine, percentage of the work input that is changed to useful work output (16)

energy ability to do work or cause change (14, 16)

first-class lever lever with its fulcrum located between the input force and the output force (18, 19, 21)

force push or pull that acts on an object, causing it to move, change speed or direction, or stop moving (4–6, 8–23)

free fall when gravity alone is acting on an object (23)

friction force that opposes motion, or resistance caused when two surfaces touch or rub together (6, 7, 11, 13, 16)

fulcrum fixed point around which a lever rotates (18–21)

gear wheel with “teeth” around its edge (21)

gravity force that exists between any two objects that have mass, attracting or pulling them together (4, 8, 10, 11, 14, 22, 23)

inclined plane simple machine that is a slope, a surface with one end raised higher than the other end; also called a ramp (16, 17, 18)

inertia tendency of a still or moving object to resist a change in its motion (11)

input force force put into a machine (15–21)

joule unit of work or energy (14, 16, 17)

kinetic energy energy an object has due to its motion (14)

law of conservation of momentum the total momentum of a group of interacting objects does not change unless an outside force acts on the objects (9)

law of universal gravitation force of attraction that exists between any two objects with mass (22)

lever simple machine made up of a rigid bar that turns about a fixed point, or fulcrum (16, 18–21)

machine device that changes a force to make work easier (7, 15–18, 20, 21)

mass amount of matter in an object (8–13, 22)

mechanical advantage ratio of the input force to the output force for a given machine (15, 18–21)

momentum property of matter due to its mass and velocity (9, 16)

motion change in position or place (2–4, 6, 10–14, 18, 22, 23)

net force force that results from the combination of all the forces that act on an object (4, 5, 11–13, 23)

newton unit of force, equal to the force that causes a 1-kilogram mass to accelerate at a rate of 1 m/s^2 (4, 8, 12, 14)

Newton's first law of motion an object at rest will remain at rest and an object in motion will continue to move at the same speed in a straight line unless a net force acts on it (11)

Newton's second law of motion an object acted on by a net force will accelerate in the direction of the force. The object's acceleration equals the net force on the object divided by the object's mass. (12)

Newton's third law of motion for every action force exerted on an object, the object will exert an equal and opposite reaction force (13)

output force force produced by a machine (15–21)

position object's place or location (2–4, 14)

potential energy energy that is stored, available as a result of an object's position or condition (14)

power rate at which work is done; measured in watts (14)

pulley simple machine made up of a wheel with a groove in the rim for a rope or cable (15, 16, 21)

reference point stationary object used to determine the motion of another nearby object (2, 23)

satellite object that travels around, or orbits, another object (23)

screw simple machine that is an inclined plane wrapped around a cylinder (16, 18, 21)

second-class lever lever with the output force located between the input force and fulcrum (19, 20)

simple machine tool with few or no moving parts that changes the direction or size of a force in order to do work (15–18, 20, 21)

speed rate at which the position of an object changes (2, 3–5, 10, 11, 15, 20, 23)

terminal velocity constant velocity reached by a falling object when the force of air resistance equals the force of gravity (8)

third-class lever lever with the input force located between the fulcrum and the output force (19, 20, 21)

unbalanced forces forces that do not cancel each other out and result in a net force on an object (5)

velocity rate at which an object moves in a certain direction (3, 5, 8, 9, 11, 23)

wedge simple machine with one or two sloping sides that meet at a sharp edge or point (16, 17, 21)

weight measure of the force of gravity acting on an object (8, 14, 21)

wheel and axle simple machine made up of a wheel fixed to a smaller shaft; both rotate together (16, 20, 21)

work result of a force moving an object over a distance (14–17)

work input work done on a machine (16)

work output work done by a machine (16)