Glossary

We have tried to make the glossary as clear and practical as possible without resorting to complex equations and long explanations.

Angle The inclination of two straight lines or planes that intersect, measured in degrees or radians.

Axle A rod through the centre of a wheel. An axle provides support for a wheel. If the axle is fastened to the wheel, it can transmit force to the wheel (as an engine makes the wheels of a car move).

Belt A continuous band stretched around two pulley wheels so one can turn the other. It is usually designed to slip if the driven wheel suddenly stops turning.

Compound gearing A combination of gears and axles where at least one axle has two gears of different sizes. Compound gearing results in very big changes to the speed or force of the output compared to the input.

Counterbalance A force often provided by the weight of an object used to reduce or remove the effects of another force. A crane uses a large concrete block on the short arm of its jib to counter the unbalancing effect of the load of the other, longer, arm.

Crank An arm or handle connected to a shaft (or axle) at right angles, enabling the shaft to be turned easily.

Drive gear/pulley A gear or pulley that is turned by an applied force. In a machine, usually the part (a gear, pulley, lever, crank or axle) where the force first comes into the machine.

Driven gear/pulley Usually a gear wheel or pulley that is turned by another gear wheel or pulley. Also called a follower.

Effort The force or amount of force that is put into a machine.

A

B

C

D

E

Fair testing — Measuring the performance of a machine or model by testing and comparing its performance more than once.

F

First class lever — (see Lever, first class)

Fixed pulley — (see Pulley, fixed)

Follower — (see Driven gear/pulley)

Force — A push or a pull.

Friction — A force that resists the movement of one object in contact with another. Also the resistance met by an object when moving over or turning against another object. Friction makes a moving object tend to slow down and eventually stop unless additional force is applied, e.g. when a sledge is pulled across snow. Friction produces heat which often wastes a lot of energy, reducing the efficiency of a machine.

Fulcrum — Another word for a pivot (see Pivot).

G

Gear — A gear is a toothed wheel. A way to classify gears is by the number of teeth they have, e.g. an 8-tooth gear or a 40-tooth gear. Gears can be used to transfer force, to increase or reduce speed of rotation, and to change the direction of rotary motion. The teeth of gears mesh together to transmit movement.

Gear, at an angle — (see Gear, crown)

Gear, crown — A crown gear is a specialised gear wheel with teeth protruding to one side (looking like a crown). Because of its special teeth, a crown gear can mesh with an ordinary gear at a 90-degree angle.

Gearing down — An arrangement in which a small drive gear turns a larger driven gear, resulting in a slowing down of the turning. Gearing down produces a more powerful turning force.

Gearing up — An arrangement in which a large drive gear turns a small driven gear, resulting in a speeding up of the turning. Gearing up reduces the turning force.

Grip — The grip between two surfaces depends on the amount of friction between them. Tyres grip dry road surfaces better than wet road surfaces.

I

Idler — A gear wheel that is turned by a drive gear and which turns another driven gear. It does not transform the forces in the machine, but affects direction of rotation of the driven gear.

L

Lever — A bar that pivots or rotates about a fixed point when a force (effort) is applied.

Lever, first class — A lever in which the pivot is between the effort and the load. This lever changes the direction of the effort force, and can change the amount of effort needed to lift a load. A long effort arm and short load arm amplify the force at the load arm, e.g. when prying the lid off a can of paint.

Lever, second class — A lever in which the load is between the effort and the pivot. This lever does not change the direction of the effort force, but can reduce the amount of effort needed to lift a load, e.g. in a wheelbarrow.

Lever, third class — A lever in which the effort is between the load and the pivot. This lever does not change the direction of the effort force, but can increase the distance the effort moves a load, e.g. in sweeping with a broom.

Load — An object to be raised or moved. The load is sometimes called the resistance.

M

Machine and/ or Mechanism — A device that makes work either easier or faster to do by changing the size or the direction of effort (force) needed, or by changing the distance through which the effort must move. However, a machine or mechanism cannot increase the amount of work done; if it reduces the effort needed, at the same time it increases the distance the effort has to move. A machine usually contains mechanisms. A mechanism is a simple arrangement of components that transforms the size or direction of a force, and the speed of its output. For example, a lever or two gears meshing are mechanisms.

Mesh — To fit together or to be engaged. The teeth of two gear wheels can mesh if they have the same spacing, and if the gear wheels are brought into contact with each other.

P

Pawl and ratchet — An arrangement of a block or wedge (pawl) and a gear wheel (ratchet) that lets the gear turn in one direction only.

Pivot — The point around which something turns or rotates, such as the pivot of a lever. The axle or rod supporting the middle of a see-saw is an example of a pivot. The pivot does not always have to be in the middle of the lever. In some types or classes of levers, the pivot point may be at one end, as in a wheelbarrow. See also Fulcrum.

Pulley — A pulley is a simple machine which usually consists of a grooved wheel round which a rope, belt, cable or chain is placed. A pulley is used to transfer force, alter speed of rotation, or to turn another wheel.

Pulley, fixed — Changes the direction of the applied force. A fixed pulley does not move with the load.

S

Slip or slippage — A belt or rope slipping, usually on a pulley wheel as a safety feature.

T

Torque — Turning force, for example from an axle.