

Forces

A force is a push or a pull. Forces can change the shape of something, its speed, or the direction that it is moving in.

For many forces, the thing providing the force needs to touch an object before the force can affect it. These are called **contact forces**. For example, when you throw a ball, you need to touch the ball to exert a force on it. When you go down a steep hill on a bicycle, the brakes need to touch the wheel to produce **friction** to slow you down. Contact forces include friction, **air resistance**, **water resistance** and **upthrust** (the force that makes things float).

Some forces can affect an object from a distance. These are called **non-contact forces**. **Gravity** is a force that pulls objects downwards (photo A). **Static electricity** can attract things (photo B). In photo C, the man is climbing the side of a ship using magnets. Magnets have **magnetism**, which attracts objects made of iron and some other metals. Magnets can also repel other magnets.

Quantity	Unit name	Symbol
length	metre	m
area	metre squared	m ²
volume	metre cubed	m ³
mass	kilogram	kg
time	second	s
force	newton	N
pressure	pascal	Pa (1 Pa = 1 N/m ²)
energy	joule	J
speed	metres per second	m/s

How extension depends on force

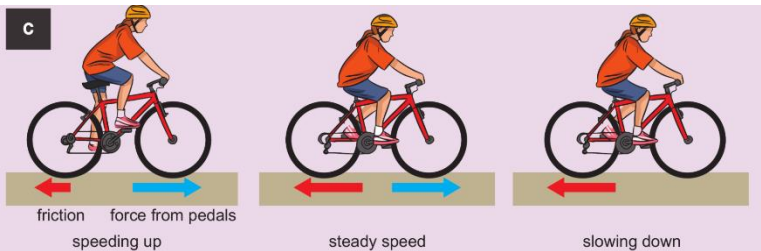


Materials and objects can be **stretched** (made longer) or **compressed** (made shorter). The amount of stretch or compression in the material depends on the type of material and the size of the force. It takes a very big force to change the size of some materials.

We use this formula to calculate pressure:

$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

Force is measured in newtons (N) and area is measured in square metres (m²), so the units for pressure are newtons per square metre (N/m²). This unit is also called a **pascal (Pa)**. 1 Pa = 1 N/m².



- 1] The forwards force is bigger than the backwards force. The bike speeds up.
- 2] The forces are equal. Because the bike is already moving, it continues to move at the same speed.
- 3] The girl has stopped pedalling so there is no forwards force. The bike will slow down until it stops.

Ecosystems

The place where an organism lives is called a **habitat**. The Yanomami people live in a jungle habitat.

Each habitat has many different types or **species** of organisms living in it. **Variation** is the word used to describe the differences between organisms. The conditions in a habitat are its **environment**. The conditions are mainly caused by **physical environmental factors**, such as the amount of light, how wet it is, how windy it is and the temperature. The factors are described as 'physical' because they are not alive.

Organisms have features that let them survive in the environments where they live. We say that organisms are **adapted** for their habitats.



A | polar bear adaptations

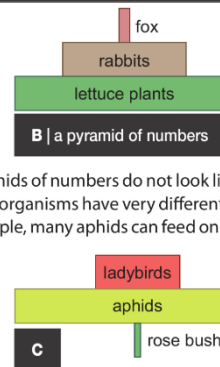


B | cactus adaptations

To survive and grow, organisms need **resources** from a habitat. Animals need resources such as **oxygen**, space, shelter, food, water and mates. Plants need light, air, water, warmth, mineral salts and space to grow. If any of these are missing, the numbers of an organism (its **population**) will go down.

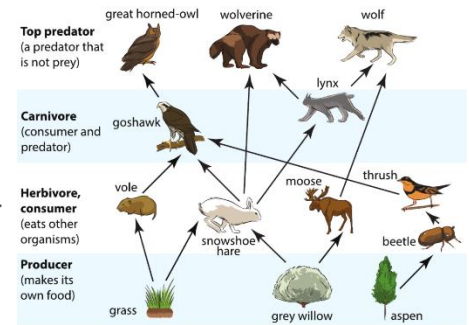


C | jack rabbit adaptations



B | a pyramid of numbers

Pyramids of numbers do not look like pyramids if the organisms have very different sizes. For example, many aphids can feed on one rose bush.



C | a food web in northern Canada

Vocabulary:

Air resistance – A force on objects moving through air

Adaptation – The feature that something has to enable it to do a certain job or survive in a particular place

Competition – There is competition between organisms that need the same thing as each other.

Community – All the organisms that live in a habitat

Contact force – A force where there needs to be contact between two objects before the force can have an effect

Discontinuous variation – when the value of a variable changes in a discontinuous way it shows “discontinuous variation”

Force: a push, pull or twist

Habitat – The place where an organism lives

Magnetic – A material such as iron, that is attracted to a magnet

Organism – Living thing

Pascal – A unit for measuring pressure

Physical environmental factors – Physical (non living) features of an environment (eg. Light intensity, temperature, etc)

Predator – An animal that catches and eats other animals

Pressure – The force pushing on a certain area. A way of saying how spread out a force is.

Spring – a coil of wire can be stretched or compressed

Videos



Quizzes

