Name _____ Class _____ Date _____ /_____ /20_____

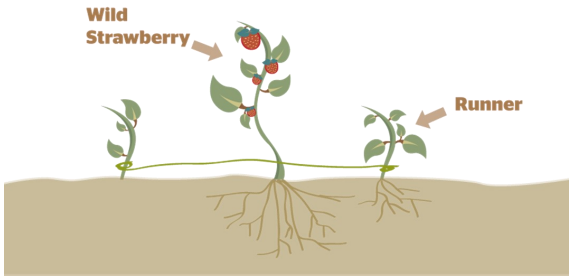
# Cloning

A **clone** is an organism that is genetically identical to its parent. This means that it has the same genes as its parent, and will therefore look identical.

When bacteria reproduce, they divide in half. Each half contains identical genes, resulting in two identical organisms, called clones. The production of clones is useful when bacteria are used to make chemicals such as insulin.

When an organism reproduces sexually, the offspring will inherit characteristics from both parents, however organisms that can reproduce without any 'partner' will create CLONES of themselves by ASEXUAL reproduction.

One such plant is the wild strawberry which can produce small plants on stems (stolons).




ADVANTAGES OF PLANT CLONING

New plants can be produced quickly and cheaply.
All of the plants will be clones so they will all have the characteristics of the source plant.

DISADVANTAGES OF PLANT CLONING

Cloning plants reduces variation, ie: the variety of genes in the gene pool. This can enhance the risk of disease or an inability to adapt to a change in the plant's environment.

Dolly was a female domestic sheep, and the first mammal cloned from an adult somatic cell, using the process of nuclear transfer.

**Born:** 5 July 1996, Scotland

**Died:** 14 February 2003

**Named after:** Dolly Parton

**Cause of death:** Lung disease and severe arthritis

**Offspring:** Six lambs (Bonnie; twins Sally and Rosie; triplets Lucy, Darcy and Cotton)

**Sheep Cloning** - The process by which "Dolly" was cloned is called "nuclear transfer" from an adult somatic cell. The organism to be cloned has its DNA extracted from a donor cell, and this is inserted into a second "denucleated" cell, ie: a second cell from which the nucleus has been removed. The genetic material fuses (electrical shock stimulation) and is implanted in a host organism to develop. The offspring will be a clone of the organism which provided the DNA.

## Uses of animal cloning

Possible uses of animal cloning include:

- Mass producing animals with desirable characteristics, such as cows that produce a lot of milk
- Producing animals that have been genetically engineered to provide human products, such as insulin or organs for transplant
- Producing human embryos to supply stem cells for therapy

**However, there are ethical dilemmas concerning human cloning.**

## Ethical issues

Animal cloning raises ethical issues about how far humans should be allowed to interfere in the production of new life. Regulations currently restrict scientific research into human cloning.

Cloning plants is easier than cloning animals. Cloning expensive food crops has been carried out for many years. This causes the public fewer ethical and moral concerns than animal cloning.