

Biological



Systems

Being a Biologist

Summary Sheets

Gleniffer High School

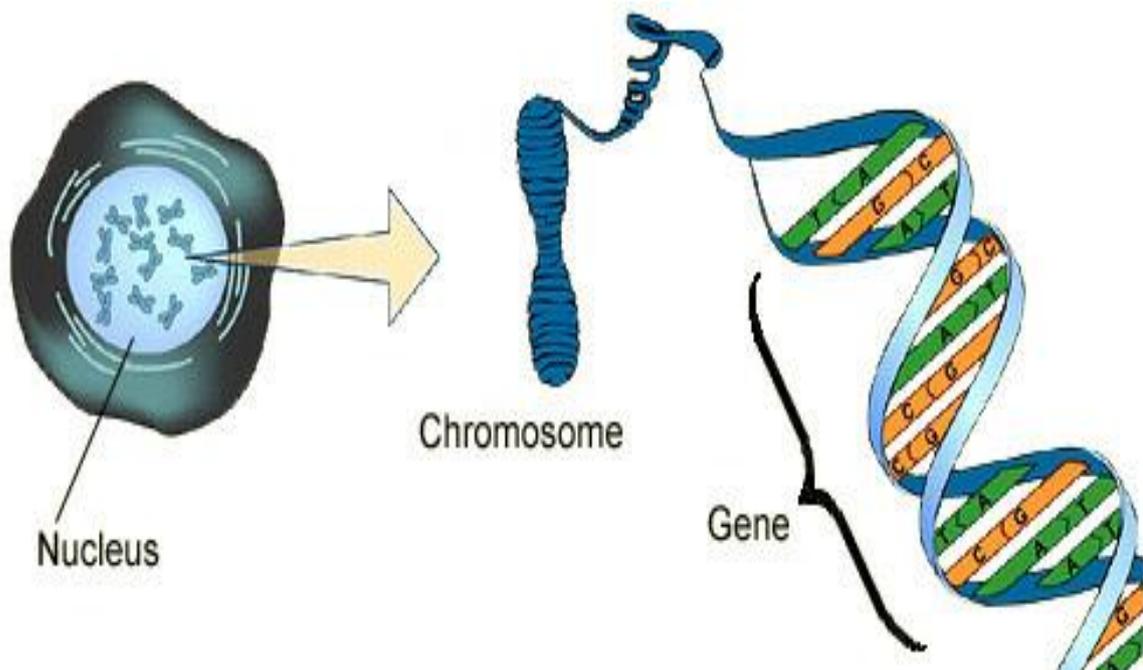


I have extracted DNA and understand its function.
I can express an informed view of the risks and
benefits of DNA profiling.

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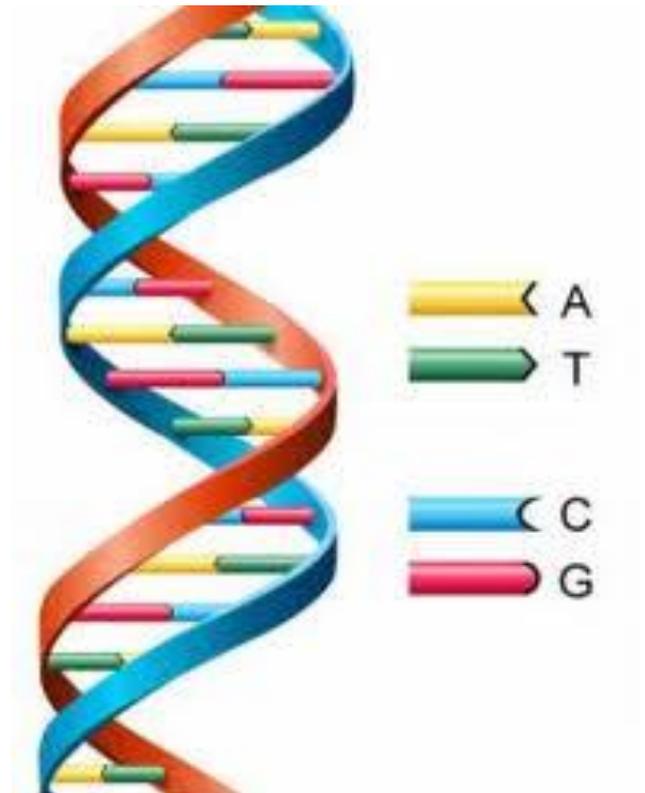
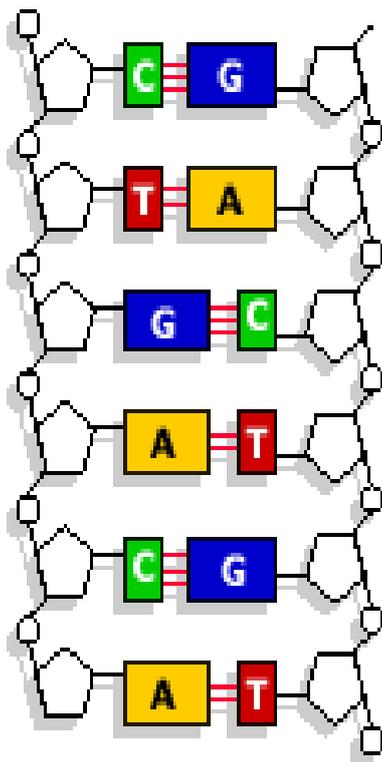
DNA

- Chromosomes are found in the nucleus of every living cell
- Chromosomes contain genes and are made of DNA



- The full name for DNA is deoxyribonucleic acid
- DNA contains genetic information for an individual
- DNA is made of two strands that are wound into a double helix

- DNA is made up of 4 bases (ATGC) which carry the genetic code
- These bases hold the two strands together
 - A pairs with T
 - G pairs with C



- These bases are arranged in a specific sequence
- Long sequences of DNA are known as genes
- Genes are the codes which are used to make proteins in the cell
 - Human insulin gene codes are used for the production of hormone insulin

- Different species have different numbers of chromosomes (this is the chromosome complement)
 - The Human chromosome complement is **46**
- Inheritance is the passing on of genes (characteristics such as tongue rolling ability) from parents to offspring

DNA Profiling

This is the process of using DNA to identify an individual

It involves analysis of DNA from things like:

- A few skin cells
- A strand of hair
- A tiny splatter of blood or saliva

DNA profiling can be beneficial for:

- Solving crimes
- Proving that people are/are not related
- Predicting certain medical conditions

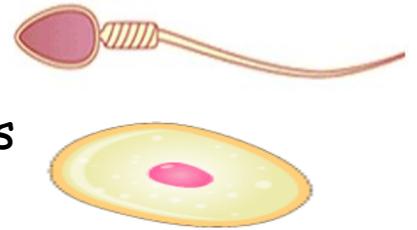
The disadvantages may include the knock-on effects of the knowledge of certain diseases (i.e. life insurance) and the fact that DNA profiling carried out properly (looking at many thousands of bases) is very costly.

I understand the process of fertilisation and embryonic development and can discuss possible risks to the embryo.

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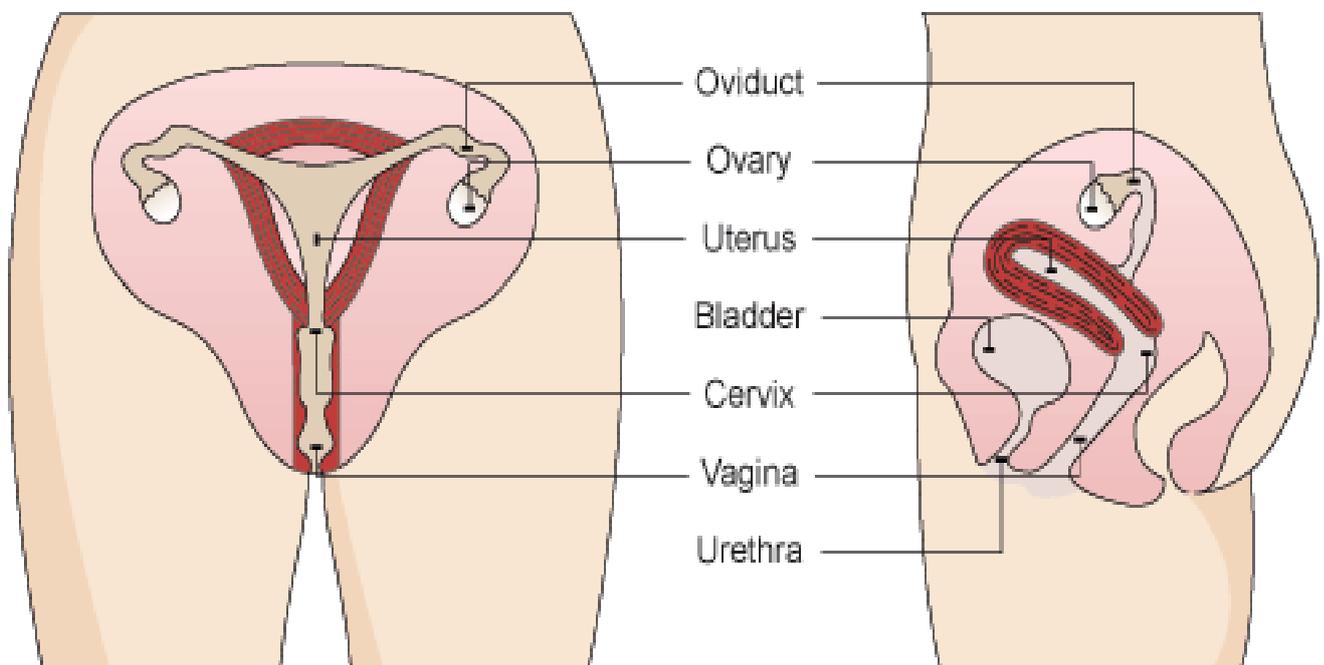
Human Reproduction

- Sex cells are required for reproduction
- Sperm cells are the male sex cells
- Egg cells (ova) are the female sex cells



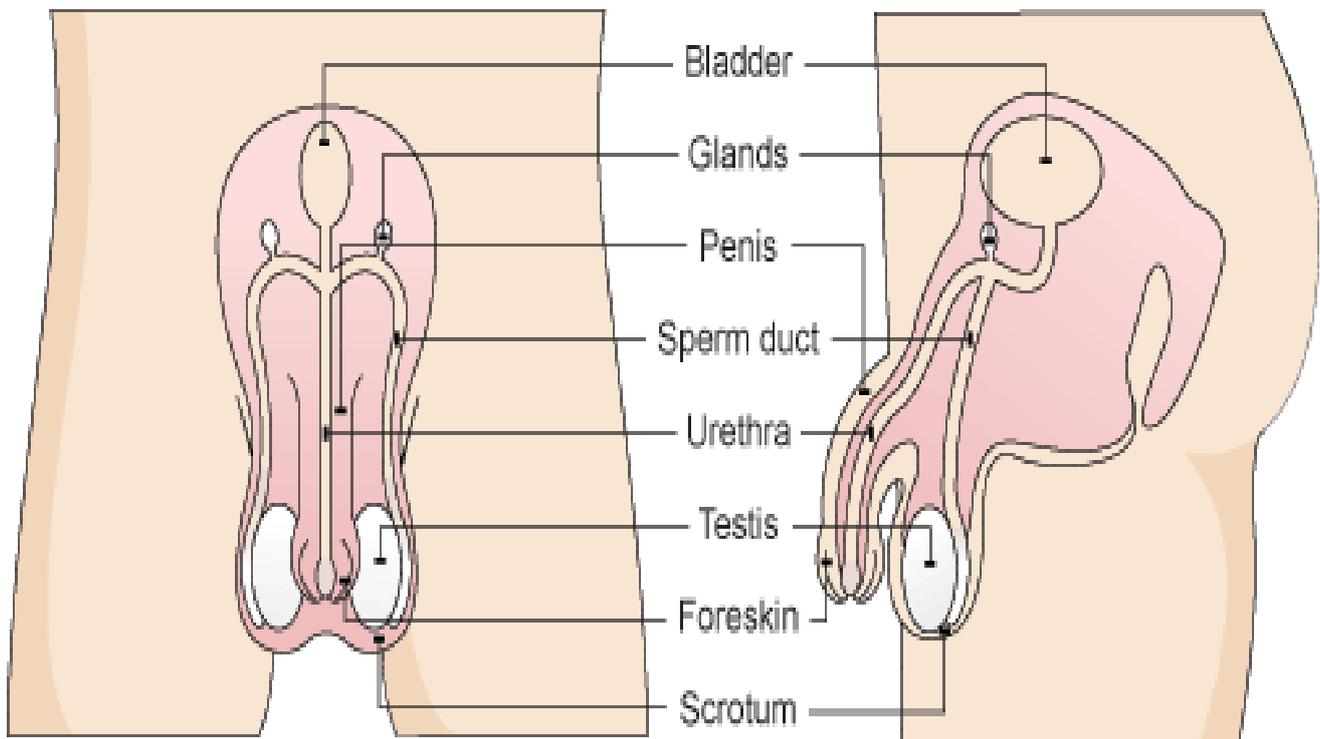
Female Reproduction System

- **Ovary** - Produces eggs
- **Oviduct** - Where the egg travels from the ovary to the womb (fertilisation takes place in the oviduct)
- **Womb** - Where the fertilised egg will grow
- **Vagina** - Where the penis enters to deposit sperm



Male Reproduction System

- **Testes** - Produce sperm
- **Sperm tube** - Where sperm travels along from the testes into the penis (sperm then goes into the urethra to be ejaculated)
- **Penis** - Enters the vagina to deposit sperm



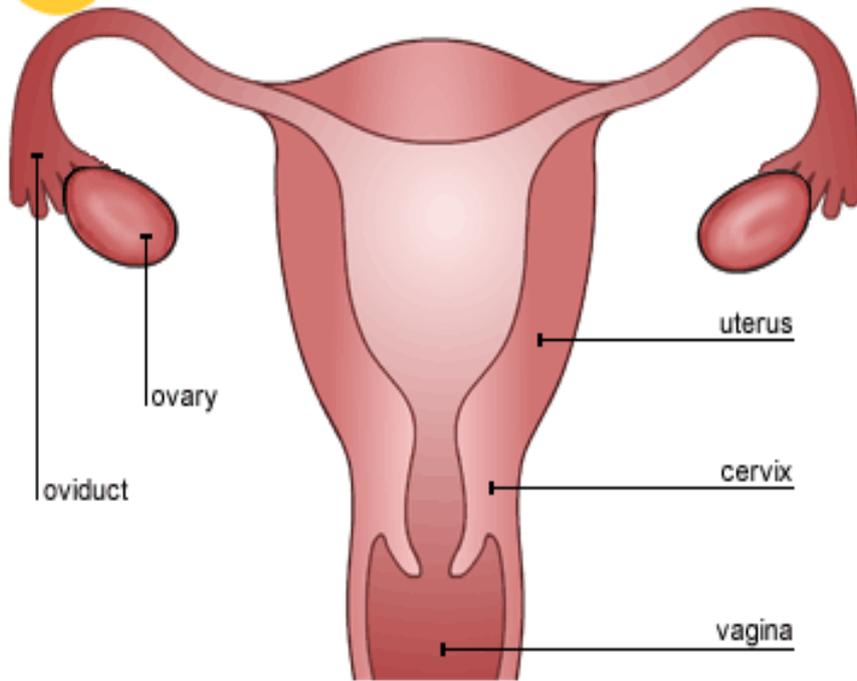
Fertilisation

- Fertilisation is when the nucleus of a sperm and the nucleus of an egg fuse together to form a fertilised egg called a **zygote**
- Fertilisation occurs in the oviduct

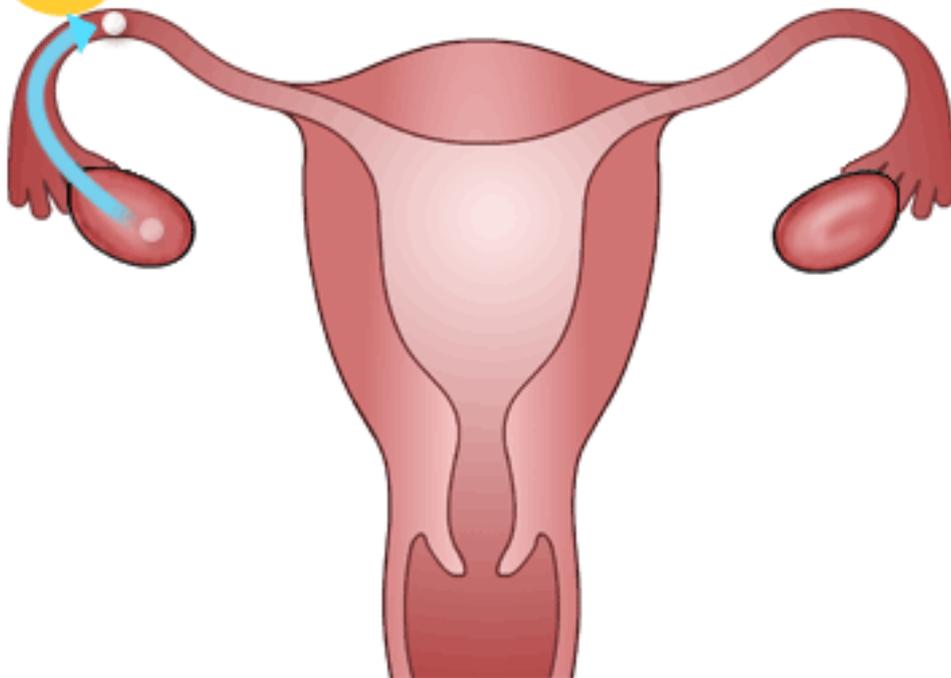
Stages of Fertilisation

- An egg is released once a month from the ovary and travels along the oviduct
- Sperm is deposited in the vagina by the penis
- Sperm cells swim up the uterus into the oviduct
- Sperm fertilises the egg cell in the oviduct
- The fertilised egg undergoes cell division until a ball of cells is formed
- The fertilised egg then travels down and implants in the uterus lining where it grows and develops for 40 weeks or until birth

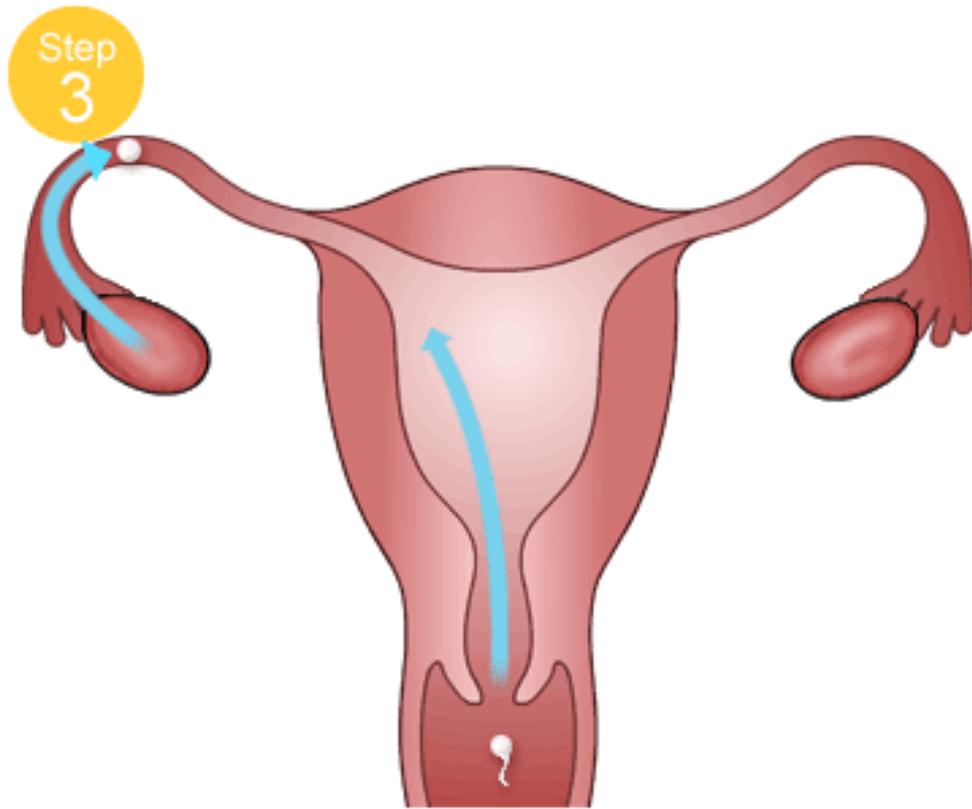
Step
1



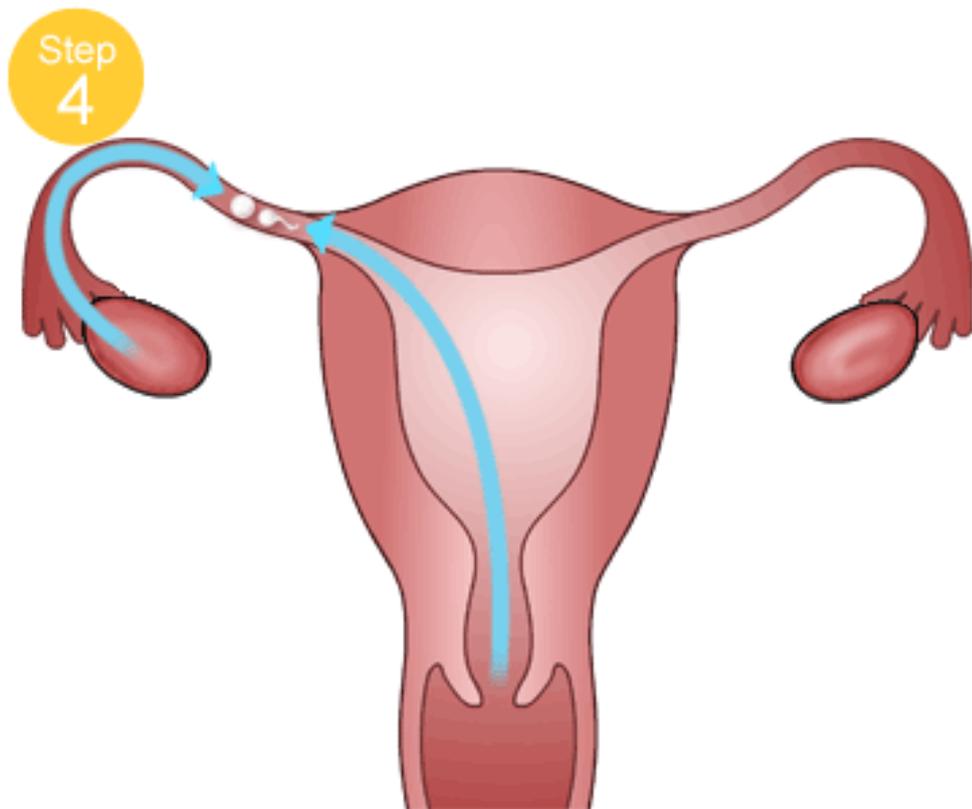
Step
2



Once a month an egg cell is released from the ovary and moves into the oviduct



Sperm are deposited into the vagina, move through the cervix and uterus, then along the oviduct



Fertilisation takes place in the oviduct

Stages in embryonic development

Pregnancy Stages



- Start of the first trimester.
- Ovulation and conception
- During week 4 some home pregnancy tests will detect that you have conceived.
- The embryo is just two cells.

Month 1



- Signs of Pregnancy: Extreme fatigue, frequent urination, morning sickness, and hormonal fluctuations.
- The baby's heart is beating.
- The baby's brain is formed.

Month 2



- Embryo officially becomes a fetus.
- Decreased morning sickness.
- Fetus is about the size of a plum.

Month 3



- Start of the second trimester.
- The baby's bones are hardening and will now show up on an x-ray.
- The baby is about 5 inches long and weighs about 5 ounces.

Month 4



- You begin to feel the baby start to kick.
- The baby's hearing starts developing.
- Common discomforts during this month: backaches, indigestion, heartburn, headaches, water retention, dizziness, constipation.

Month 5



- This month marks the halfway mark in your pregnancy.
- At the end of this month the baby is almost fully formed.

Month 6



- Possible occurrences of Braxton Hicks contractions.
- The baby's brain is beginning to process sights and sounds.
- The baby is about 13 inches long.

Month 7



- The baby is fully formed and putting on weight.
- The baby's lungs are almost fully developed.

Month 8



- Common discomforts: Braxton Hicks contractions, pelvic pressure, difficulty sleeping.

Month 9



Risks to Embryo during Pregnancy

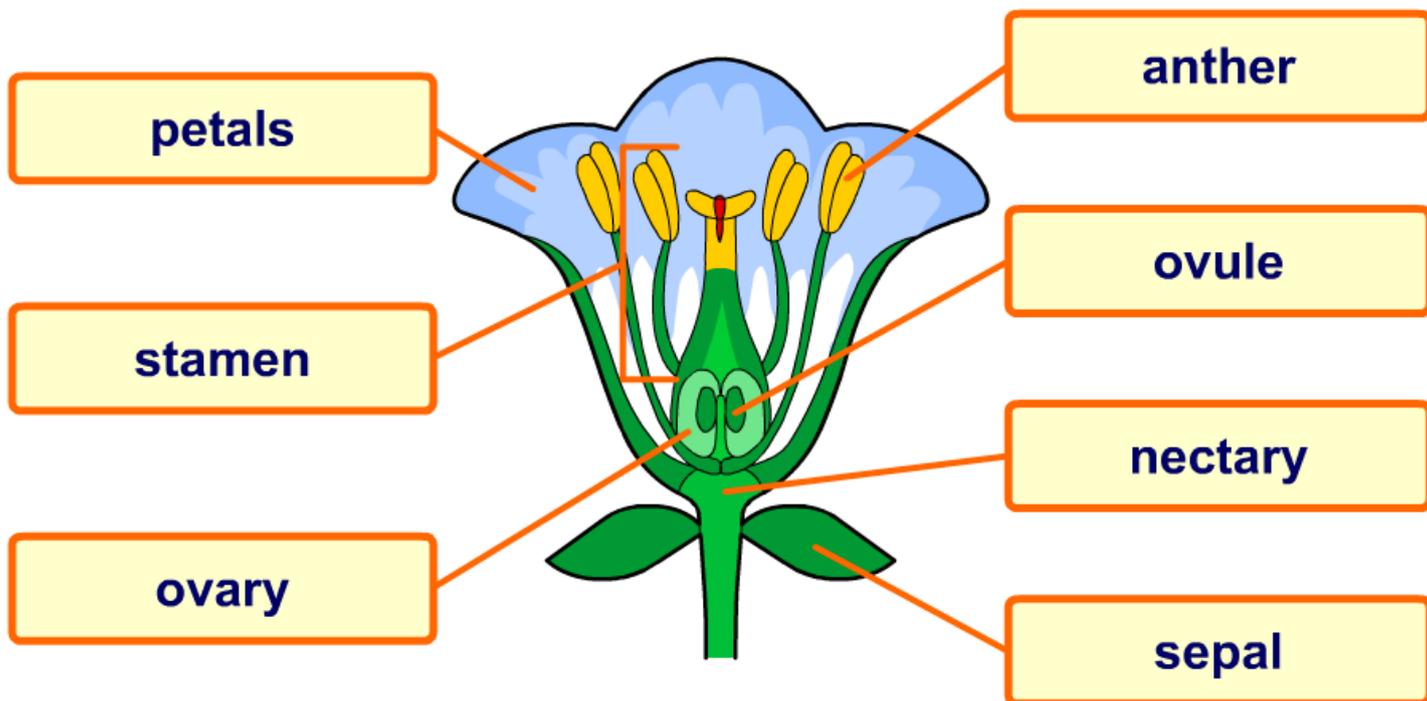
- Smoking
- Alcohol
- Drugs

Risks Reduction

The embryo develops in the womb within an **amniotic sac** which is filled with **fluid** to protect it from knocks and bumps.

Plant Reproduction

- The anther is the male part of the flower which produces the male sex cell called pollen
- The ovary is the female part of the flower which produces the female sex cells called ovules
- Pollen lands on the stigma (this is pollination) and a pollen tube grows down into the ovary
- **Fertilisation occurs** when the nucleus of the pollen **fuses** with the nucleus of the ovule to produce a **zygote**.



Stages in Plant Reproduction

What happens during plant fertilization?

Stage 1

A pollen grain becomes stuck to the stigma.

It is transferred there by either an insect or the wind.

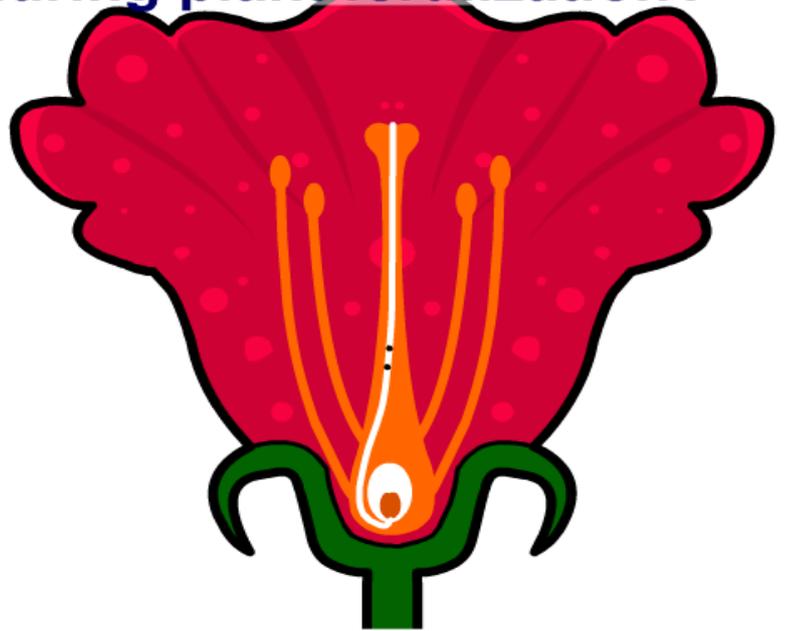


What happens during plant fertilization?

Stage 2

A **tube** grows out of the pollen grain, down the style, and through a tiny gap into the **ovule**.

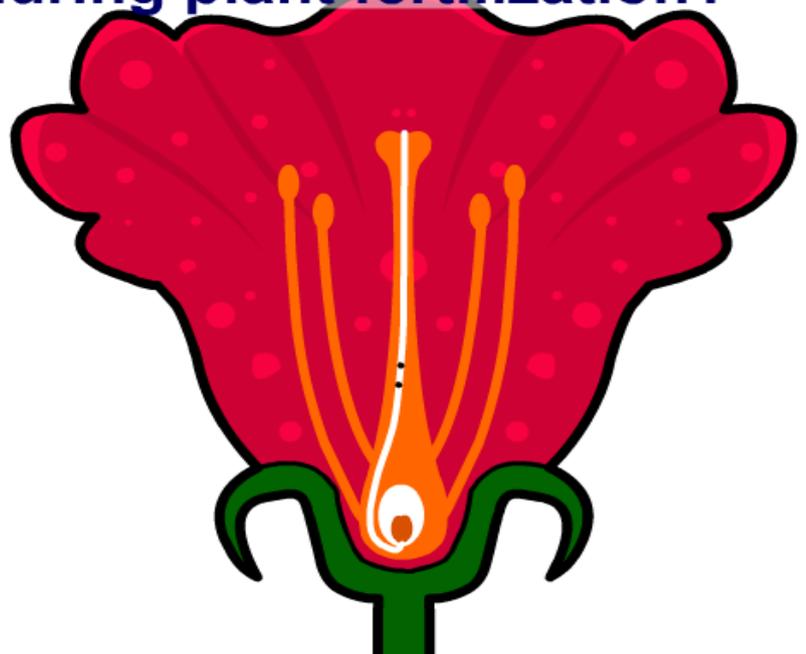
As the pollen tube grows, it carries the nucleus from the male sex cell with it.



What happens during plant fertilization?

Stage 3

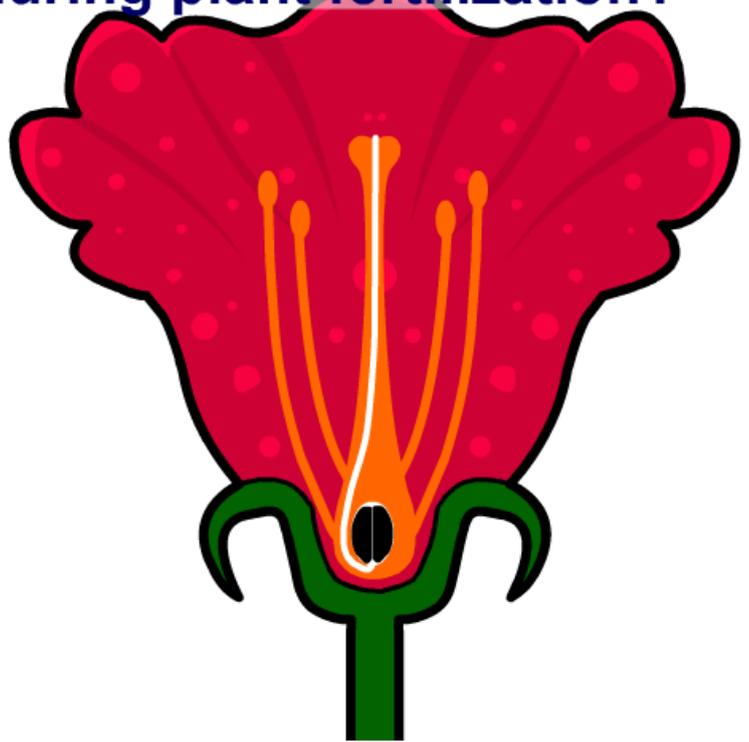
When the pollen tube reaches the ovule, the end bursts and the male and female **nuclei fuse** together.



What happens during plant fertilization?

Stage 4

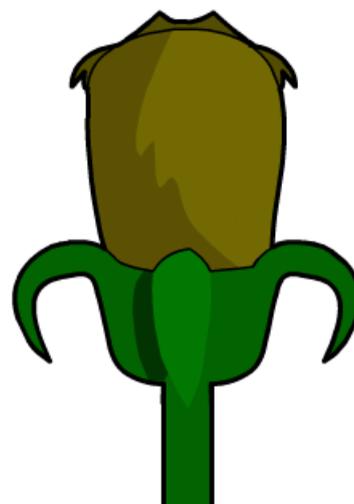
The fertilized ovule undergoes cell division, and grows into an **embryo**. As the embryo develops, the ovule becomes the **seed** and the ovary forms the **fruit** around it.



What happens during plant fertilization?

Stage 5

Once the embryo is sufficiently developed, the petals begin to fall off the flower, leaving the fruit exposed and ready to be **dispersed**.

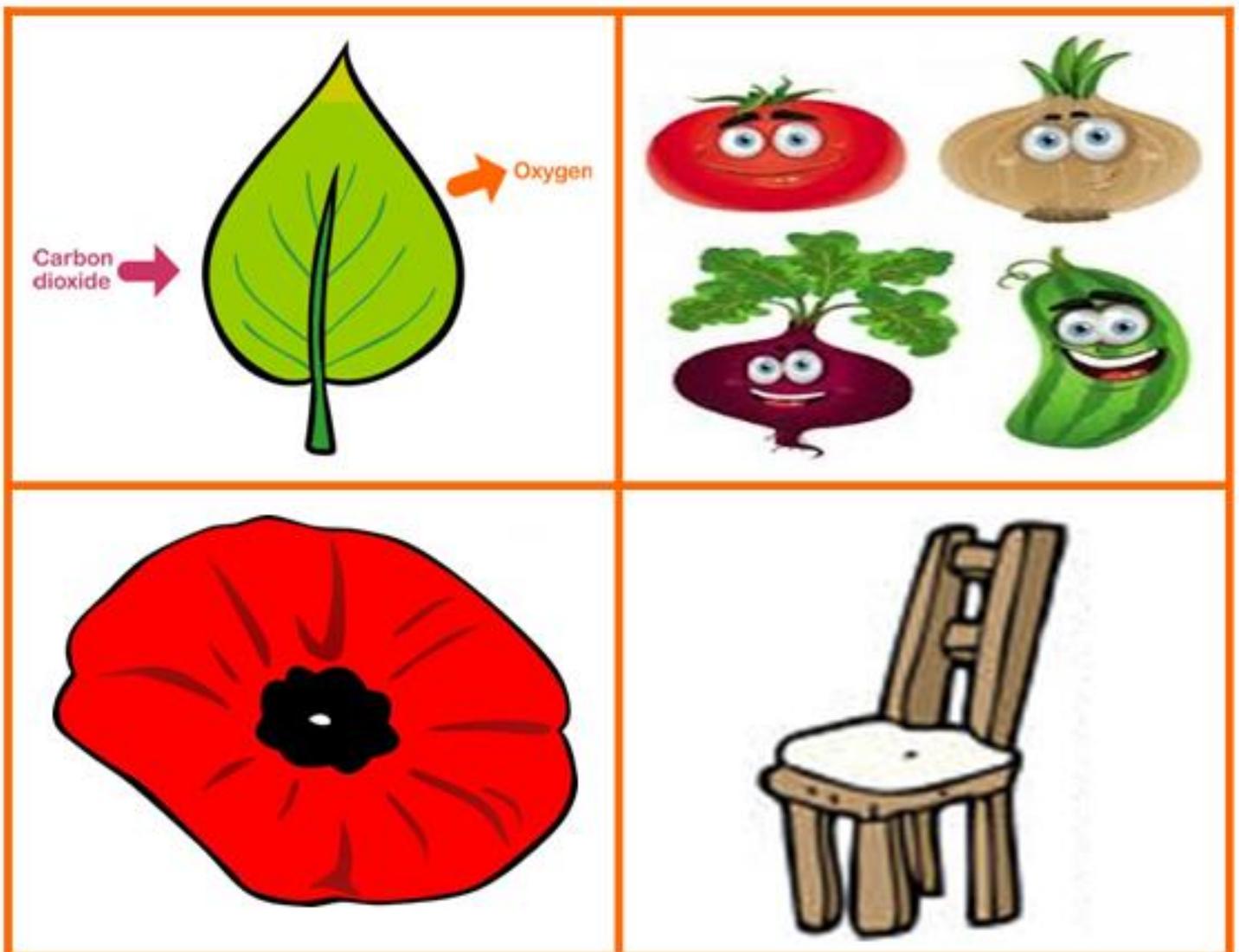


I have collaborated on investigations into the process of photosynthesis and I can demonstrate my understanding of why plants are vital to sustaining life on Earth.

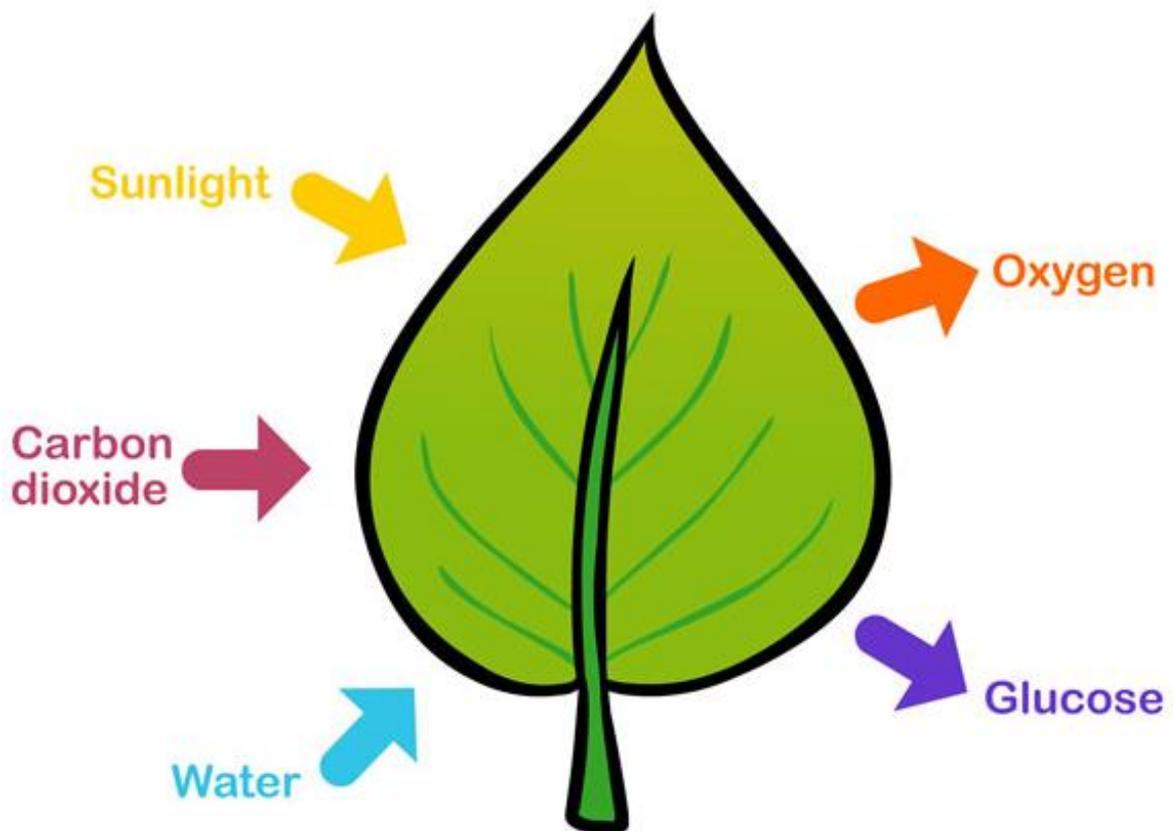
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Photosynthesis

- Plants are vital for life on Earth and are used mainly for:
 - Balance of gases
 - World food production
 - Medicines (e.g. Poppies are used to make morphine)
 - Raw Materials



- **Photosynthesis** is the process by which green plants make their own food
- Green plants are green because they contain a green pigment called **chlorophyll**
- Chlorophyll traps light energy which is essential for photosynthesis
- Photosynthesis uses **Carbon Dioxide** and **Water**
- Photosynthesis produces **Glucose** (sugar) and **Oxygen**



- The word equation for photosynthesis is:



Fates of Glucose

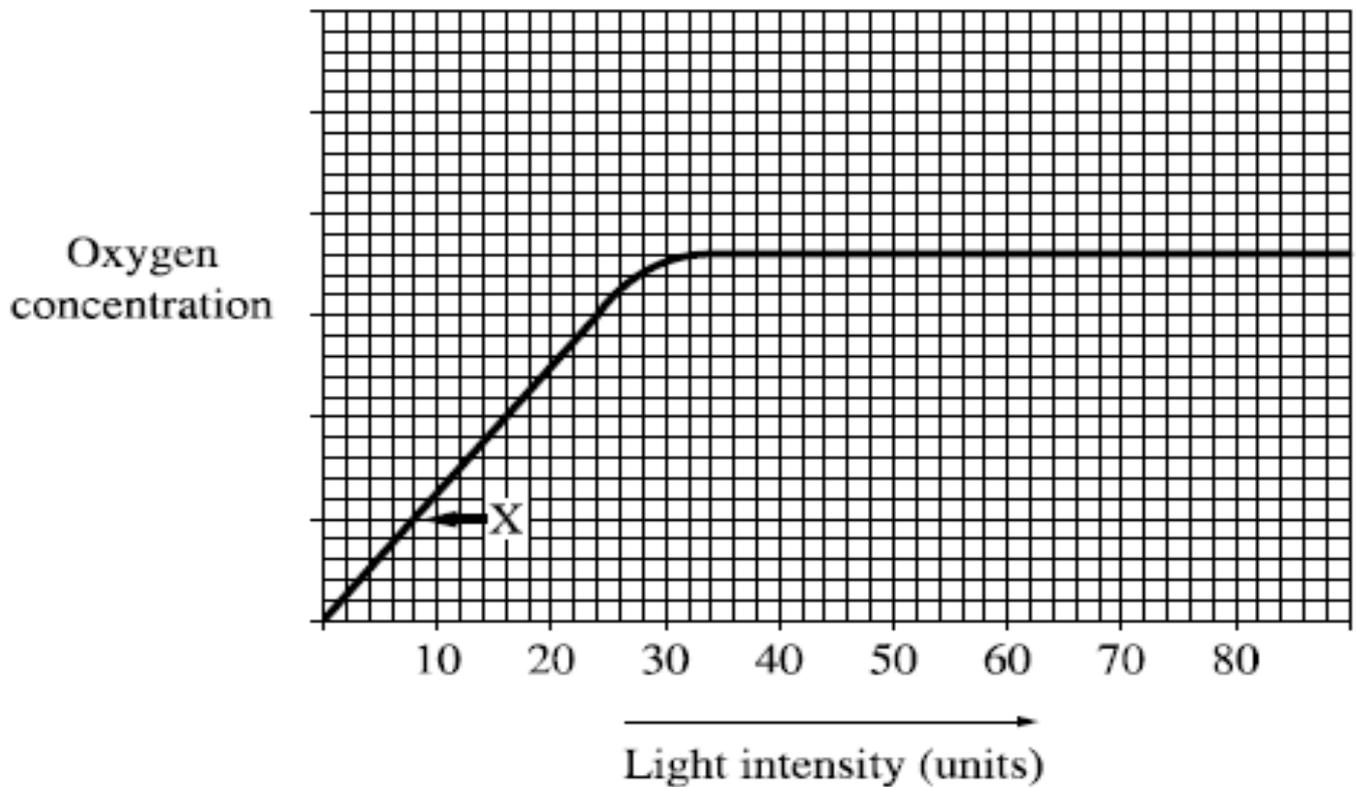
There are 3 different things that can happen with the glucose that is produced in photosynthesis

- It can be built up into **starch** for storage
- It can be built up into **cellulose** to make cellulose cell walls
- It can be used for **energy** for growth and reproduction

Limiting Factors

- The **rate of photosynthesis** can be **limited** by the following factors:
 - Light intensity
 - Carbon dioxide concentration
 - Temperature
- Horticulturists (people that grow plants for a living) can use these limiting factors to increase the growth of their plants by:
 - Adding extra lighting
 - Adding extra carbon dioxide
 - Using heaters
- If a factor is in short supply that will limit the rate of Photosynthesis.

Graphs can be used to identify limiting factors when monitoring the rate of photosynthesis as shown below.



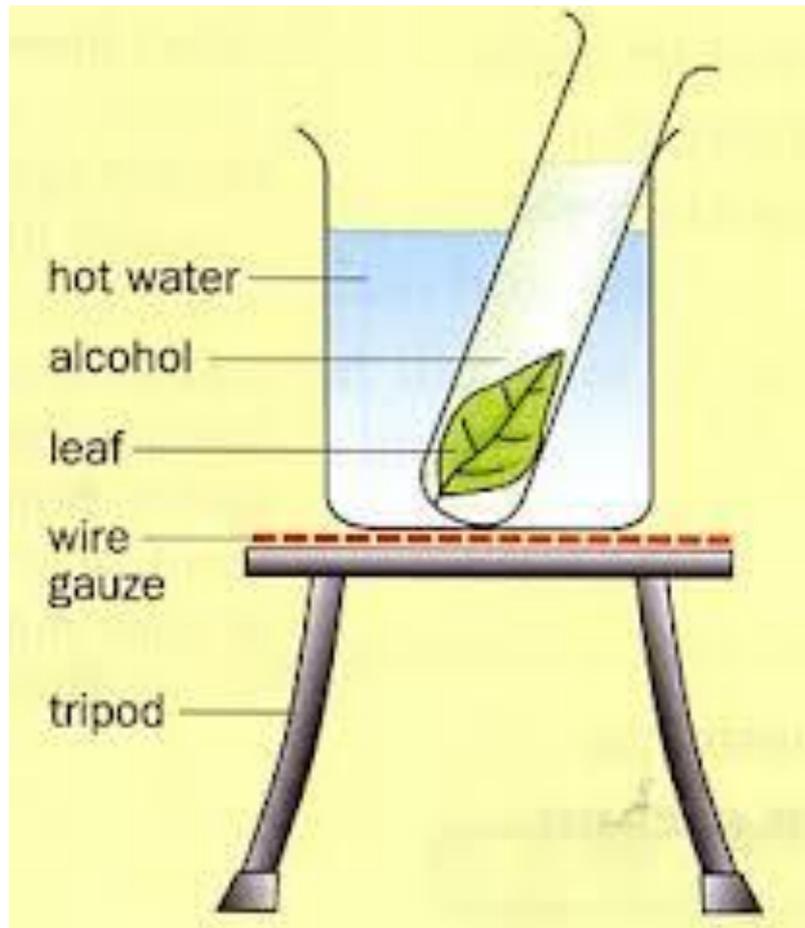
In the above example, at point **X** the limiting factor must be **light intensity**.

As a rule: **at any point up the line before it levels off the limiting factor is whatever is on the x-axis**. In this case, light intensity.

After the line levels off another factor must be limiting. If **carbon dioxide** is being kept **constant** in the question then **temperature** would be the limiting factor.

Testing for Photosynthesis

- Iodine solution turns blue/black in the presence of starch
- This means biologists can test a leaf to see if it is photosynthesising by testing for starch using Iodine solution



Prep for Nationals

Respiration

- **Respiration** is the release of energy from food
- Aerobic respiration is when energy is released from food when oxygen is present
- The word equation for aerobic respiration is

glucose + oxygen → carbon dioxide + water + ENERGY

I can sample and identify living things from different habitats to compare their biodiversity and can suggest reasons for their distribution.

SCN 3-01a

Ecosystem

- An ecosystem is an area which is made up of all the living and non living things
- Sampling an ecosystem is necessary because it is often impossible to count all the organisms in a given area
- Biotic factors are factors that relate to living things and which affect another organism
 - Food availability
 - Number of predators
 - Disease
- Abiotic factors are the non-living factors that may influence the distribution of the organisms in an ecosystem
 - Light intensity
 - Temperature
 - Soil pH
 - Soil moisture
- Abiotic factors can be measured in a number of ways:
 - Light intensity: Measured using a light meter
 - Temperature: Measured using a thermometer
 - Soil pH: Measured using a pH meter
 - Soil moisture: Measured using a moisture meter

Sampling an Ecosystem

There are many different ways in which an ecosystem can be sampled:

Quadrats are used to estimate the numbers of plants or slow moving species in an ecosystem

- **Possible error** - Some plant may be partly inside and partly outside of the quadrat
- **Solution** - A basic rule should be established and followed by everyone involved



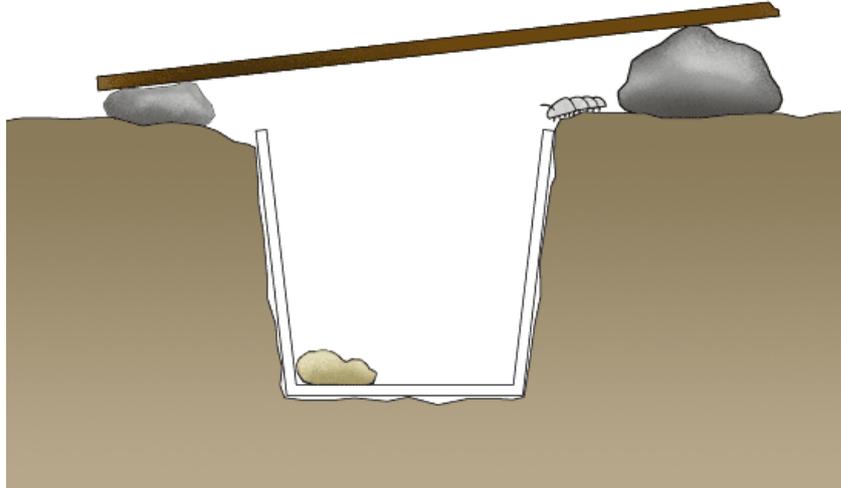
Line transects are used to investigate how abiotic factors e.g. light intensity affects distribution of species

- **Possible error** - Moving cloud coverage can affect light intensity readings
- **Solution** - Carry out technique on a sunny day with few clouds



Pitfall traps are used to sample fast moving animals on the ground

- **Possible error** - Birds may eat trapped animals
- **Solution** - Disguise and cover the opening with a leaf

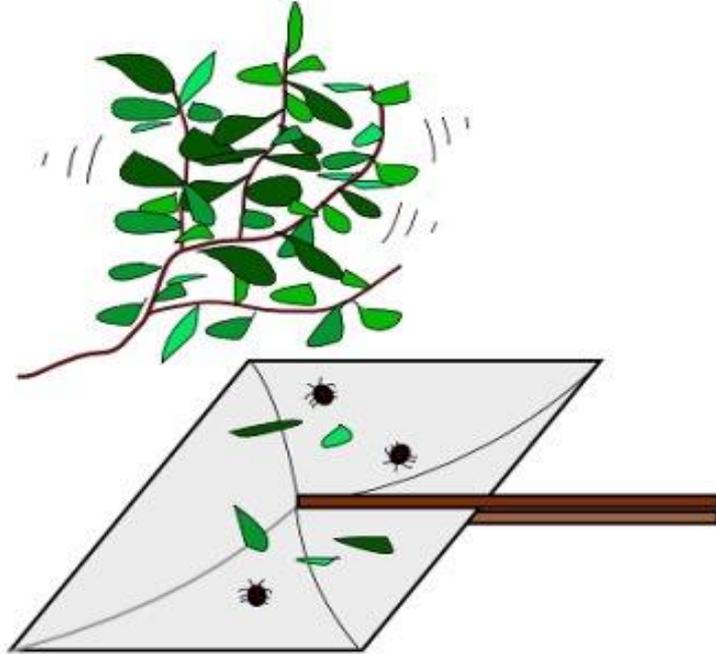


Pooters are used to sample tiny insects

- **Possible error** - Insects could become overcrowded and die
- **Solution** - Check regularly and free the insects as soon as possible

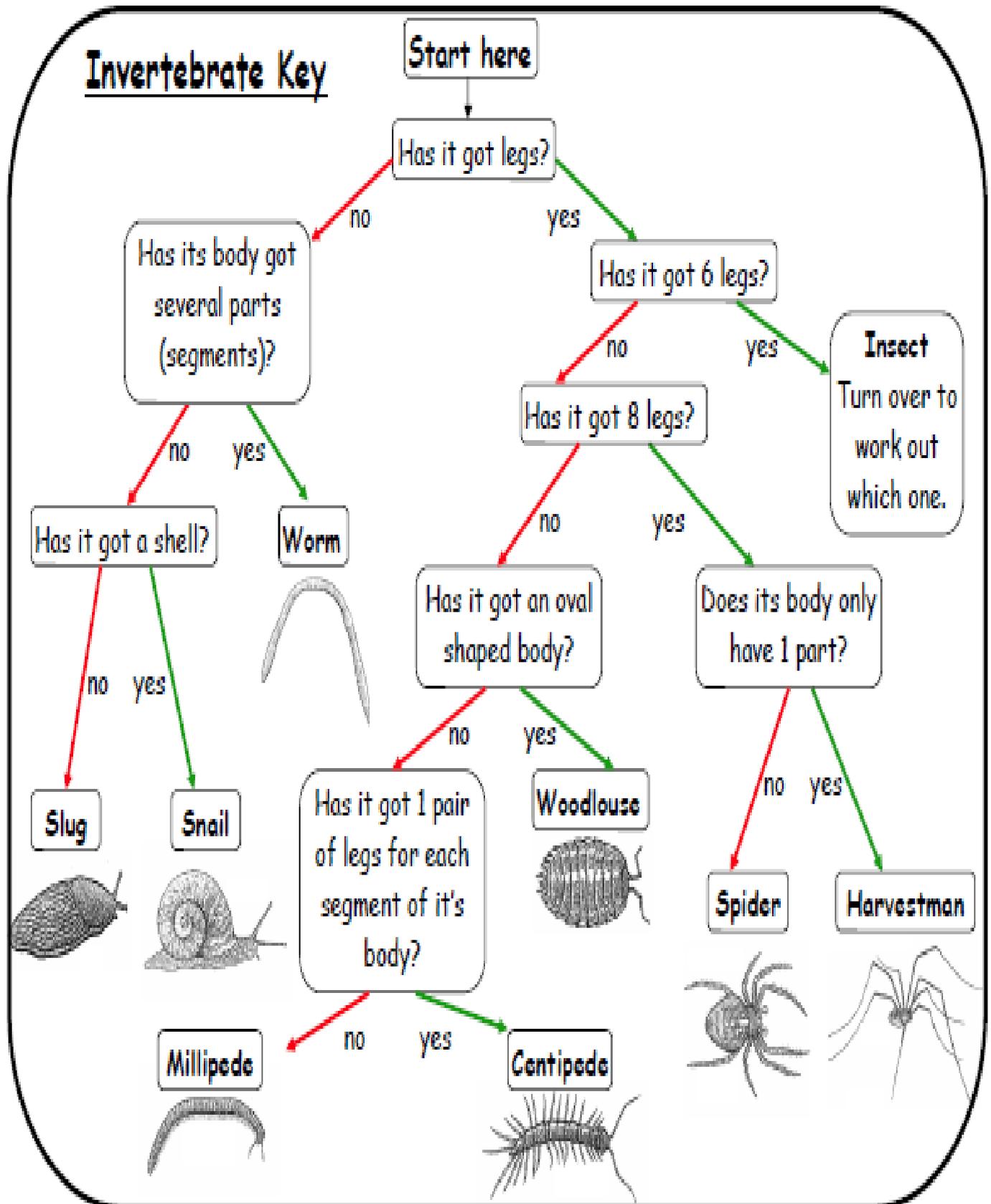


- **Tree beating** is used to sample small animals living on a tree
 - **Possible error** - Some animals may miss the tray
- **Solution** - Use a large tray



Identification Keys

- Identification keys are used to identify plants and animals
- Identification keys are based on the appearance (the main physical characteristics) of living things



Biodiversity

- Biodiversity is that range of living things that is found in a particular place



- Biodiversity is not evenly distributed - it varies across the globe as well as within regions

Factors Affecting Biodiversity

The diversity of all living things depends on a range of factors such as:

- Temperature
 - Light
 - Altitude
 - Presence of other species
- Pollution

The greatest biodiversity exists in the tropical rainforests



Biodiversity is important as all life on Earth depends on it

- We rely on biodiversity for a wide range of medicines that we obtain from plants - the richer the diversity of life, the greater the opportunity for medical discoveries
- A larger number of plant species means a greater variety of crops for food production
- Greater species diversity ensure natural sustainability for all life forms
- Stable ecosystems (lots of different species all linking together) can better withstand and recover from a variety of disasters