

### Making a wet mount slide

Place a very thin piece of specimen, flat on a microscope slide. Specimen could be onion skin (epidermis), leaf cells, cheek cells etc.

Add a drop of water or a drop of stain. (Stain helps certain features in the cells to show more clearly). Use IODINE for onion cells & METHYLENE BLUE for animal cells.

Gently lower a cover slip using air bubbles.



### Levels of Organisation

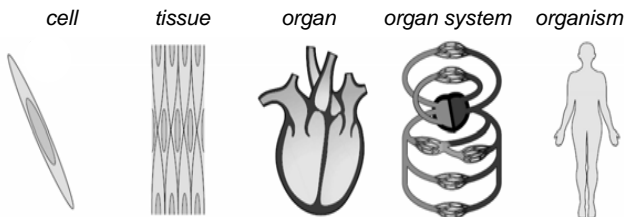
**Cell** – smallest building block of living things

**Tissue** – group of cells that all do the same job

**Organ** – group of tissues carrying out specific job

**Organ system** – set of organs doing one of the main jobs of the body

**Organism** – the whole living thing



Animal cell	Plant cell
irregular shape	regular shape
x	cell wall
cell membrane	cell membrane
cytoplasm	cytoplasm
nucleus	nucleus
very small vacuoles	big central vacuole
x	chloroplasts

x = absent

### Cell parts

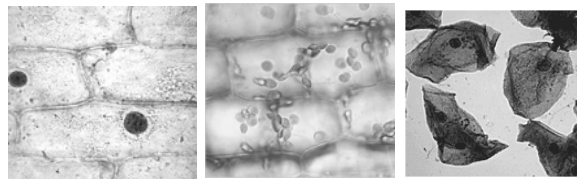
**Cell membrane** – thin covering of cell, controls movement of substances in and out of the cell.

**Nucleus** – controls all the activities of the cell.

**Cytoplasm** – jelly like substance where many of the cells chemical reactions take place.

**Cell wall** – thick, tough, protective outer layer that gives PLANT cells shape and support.

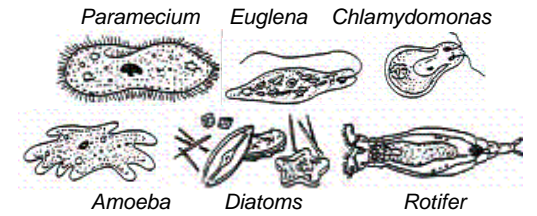
**Chloroplasts** – where photosynthesis takes place in green parts of plants (mainly in leaves).



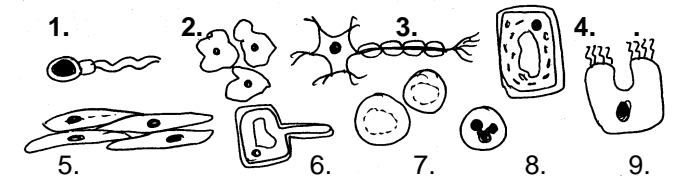
### Rules for drawing cells

- use pencil
- draw 3-4 cells
- don't shade/colour cells
- don't draw air bubbles or field of view circle
- label visible structures
- title
- magnification if you know it).

### Pond Life View using a cavity slide.



**Specialised cells** All cells are designed to do a particular job in an organism. This is called cell specialism.



1. sperm 2. cheek cells 3. nerve cell 4. leaf cell 5. muscle cells 6. root hair cell 7. red blood cells 8. white blood cell 9. cell lining windpipe

**Examples** sperm cell (1) designed to fertilise eggs, it is very small and has a little tail which provides movement so it can swim to fertilise an egg. Cilia cell (9) designed to stop lung damage. Cells line all the air passages in your lungs & make mucus; hairs sweep mucus with trapped dust and bacteria up to the back of the throat where it is swallowed. The root hair cell (6) is designed for absorbing, and increases the surface area of the root, which helps the absorption of water and minerals.

### SOME WORDS TO KNOW

**Eukaryotic cell** – cell with a nucleus

**Multicellular** – many celled

**Prokaryotic cell** – cell without a nucleus.

**Unicellular** – single celled

**Vertebrate** – animal with a backbone

**Invertebrate** – animal with no backbone



**Classification Keys** A dichotomous key is used to identify items. Keys consist of a series of choices that lead to the correct name of a given item. "Di" means "divided into 2". Dichotomous keys always give two choices in each step.

**Classification System** The organization of living things has 7 major levels. Kingdom Phylum Class Order Family Genus Species

Broadest group-----> narrowest

Example: domestic cat is *Felis catus*. Lion is *Panthera leo*. Members of the same species can interbreed and produce fertile offspring.

**The 6 Kingdoms** Plants, Animals, Protists, Fungi, Archaeobacteria, Eubacteria. Organisms are placed into kingdoms depending upon: Cell type, complex or simple; Ability to make food; Number of cells in their body.

**Vertebrate animals** Vertebrates can be divided into five major groups: fishes, amphibians, reptiles, birds, and mammals.

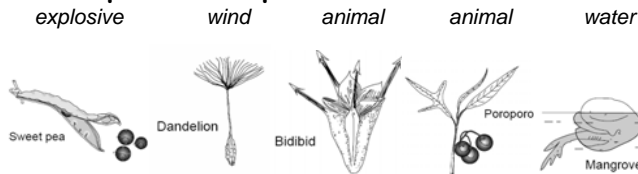
**Invertebrates** Make up 97% of all animals.

Arthropods include insects (3 body parts, head, thorax & abdomen) and arachnids (2 body parts, 8 legs).

**Photosynthesis** Leaves take in CO<sub>2</sub> from air, H<sub>2</sub>O from soil, & energy from sunlight. Plants use chlorophyll found in little green cell structures called chloroplasts. The chloroplasts use light energy to change CO<sub>2</sub> and H<sub>2</sub>O into food (sugar) & O<sub>2</sub> gas. The sugar is turned to starch to be stored by the plant.

**Testing a leaf for starch** Soften leaf in boiling water. Turn out all flames. Put leaf in tube with alcohol. Stand tube in very hot water until the green colour is removed. Dip the leaf in hot water to soften it again. Spread the leaf out and cover with brown iodine solution. If starch is present, the leaf turns blue-black.

**Seed dispersal examples**



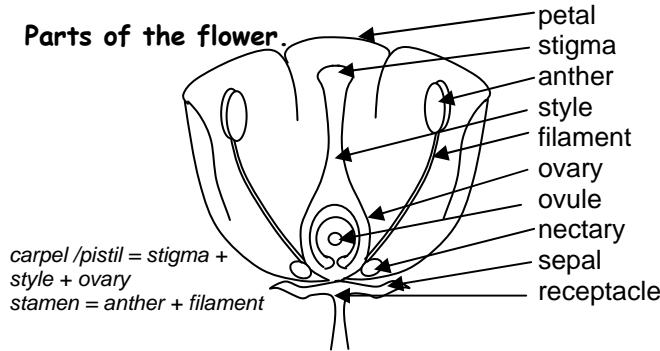
**PLANT STRUCTURE**

**Flowers:** Reproductive parts of a plant. Petals, scent & nectar attract insects and birds to pollinate the flower. Seeds develop in the ovary which becomes the fruit. **Leaves:** site of *photosynthesis*.



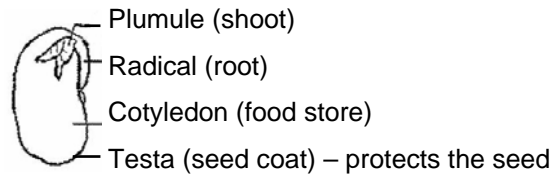
**Stems:** Support upper parts of plants. Water & dissolved nutrients from soil travel up stem in a tube system. Food from leaves travels down stems to roots. **Roots:** Anchor plants in the soil. Water & minerals are taken from the soil through the roots. Many plants (eg carrots) store food in their roots.

**Parts of the flower.**



Pollination – transfer of pollen from anther to stigma  
 Fertilisation – pollen nucleus joins with egg nucleus – to form the seed  
 Seed dispersal – spread of seeds away from parent plant  
 Germination – seed starts to sprout a shoot (plumule) & root (radical). This needs warmth, water and oxygen.  
 Growth – seedling grows, making its food by photosynthesis

**Seed structure.**



**Seed dispersal** Seeds need to be dispersed (spread away) from the parent plant to avoid competition for space, light, water & nutrients. They are spread by: wind; water; animals (eaten & passed out unharmed in the faeces or carried, hooked on fur/feathers); or by explosive fruits.

**CELLS & CLASSIFICATION REVISION**

**MRS GREN** – Characteristics of Living Things:

- Movement - move to/away from things
- Reproduction – make offspring
- Sensitivity – respond to their environment
- Growth - get bigger and repair themselves
- Respiration - break down food to release energy
- Excretion – get rid of wastes
- Nutrition - take in or make food



**PARTS OF THE MICROSCOPE**

- EYEPIECE - to view the image on the stage
- NOSEPIECE - holds the objective lenses and is able to rotate to change magnification.
- OBJECTIVE LENSES – magnify, ranging from low to high power.
- STAGE CLIPS - used to hold a slide on the stage.
- LIGHT SOURCE - projects light up through the specimen.
- ARM (BODY) & BASE side & bottom part of the microscope
- COARSE ADJUSTMENT KNOB - moves the stage up and down to help you get the specimen into view.
- FINE ADJUSTMENT KNOB - helps you sharpen or "fine" tune your view of the specimen.
- DIAPHRAGM - adjusts the amount of light that reaches the specimen
- STAGE - supports the slide being viewed

**To calculate magnification**

Multiply eye piece magnification by the objective lens magnification eg eye piece x10 and objective lens x4: Total magnification x40