

Features of organisms

Revision notes · The features used to place organisms in the animal and plant kingdoms, the vertebrate and arthropod groups, the five kingdoms and viruses.

For Cambridge IGCSE Biology 0610 (and 0970, which has the same content). **Supplement** is Extended content, only examined on Papers 2 and 4.

Features of organisms Spec 1.3

Features of the animal and plant kingdoms Spec 1.3.1

The two kingdoms you meet most often are the **animal kingdom** and the **plant kingdom**. Each kingdom has main features that are used to place an organism in it.

Main features of animals and plants		
Feature	Animals	Plants
Number of cells	Multicellular	Multicellular
Cell walls	No cell walls	Cell walls made of cellulose
Chloroplasts	No chloroplasts	Contain chloroplasts, so they can carry out photosynthesis
Nutrition	Feed on other organisms (they take in organic substances)	Make their own food by photosynthesis
Carbohydrate store	Glycogen	Starch
Coordination	Usually have a nervous system	No nervous system
Movement	Most can move from place to place	Cannot move from place to place

Use these features to place an unknown organism. An organism that is multicellular, has cellulose cell walls and has chloroplasts is a plant. A multicellular organism with no cell walls that eats other organisms is an animal.

Exam tip: Mention at least two features and always compare the same feature in both kingdoms. 'Plants have chloroplasts' scores better as 'plants have chloroplasts; animals do not'.

Vertebrate and arthropod groups Spec 1.3.2, 1.3.3

The animal kingdom is split into smaller groups. You need the five groups of **vertebrates** (animals with a backbone) and four groups of **arthropods** (animals with jointed legs).

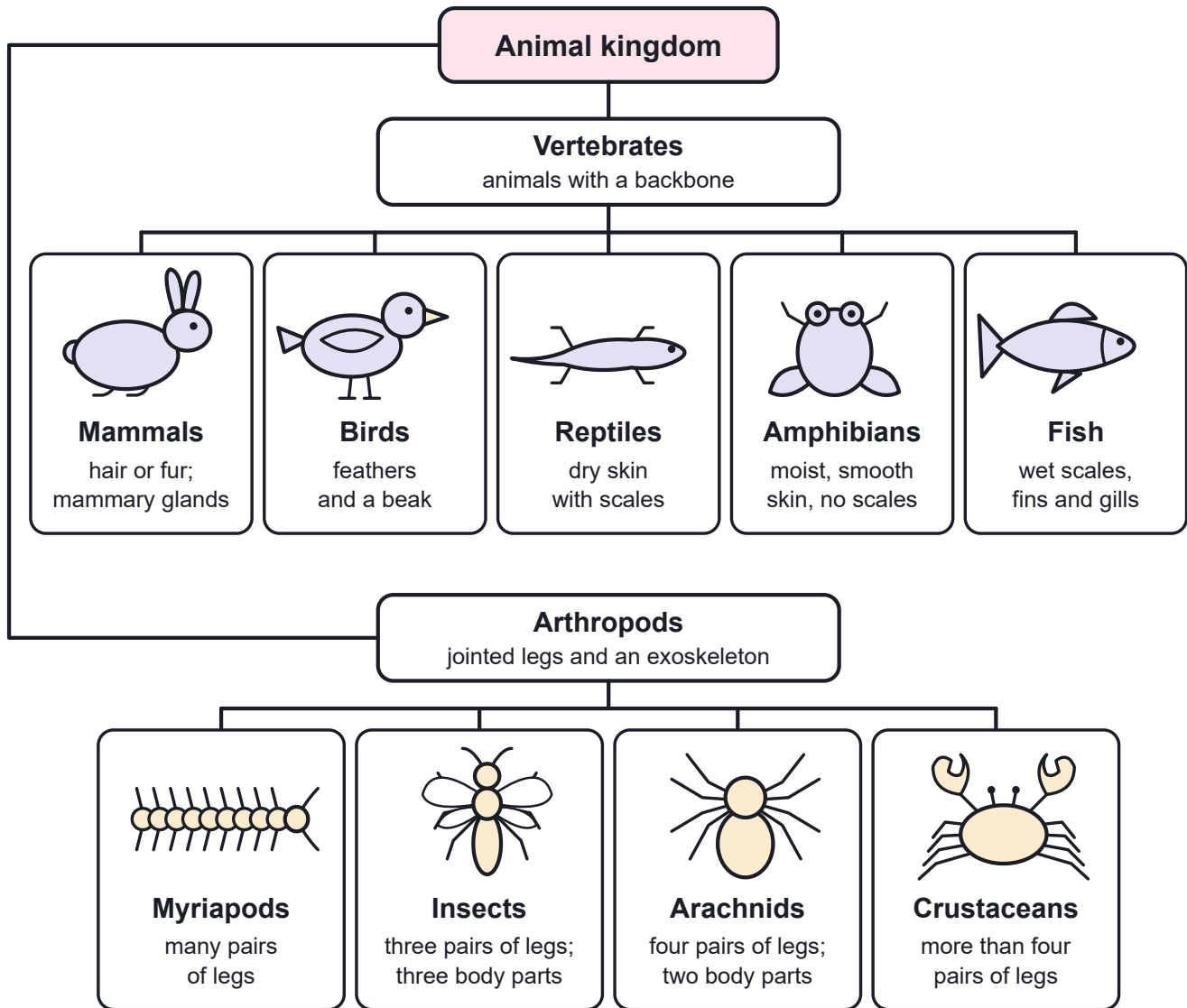
Vertebrates

Main features of the vertebrate groups	
Group	Main features
Mammals	Body covered with hair or fur; young develop in the mother and are fed on milk from mammary glands; external ears (pinnae)
Birds	Body covered with feathers; two wings and two scaly legs; a beak; lay eggs with hard shells
Reptiles	Dry skin covered with scales; lay eggs with soft, leathery shells; most live on land
Amphibians	Moist, smooth skin without scales; lay jelly-covered eggs in water; larvae (tadpoles) live in water; adults often live on land
Fish	Body covered with wet scales; fins; gills for gas exchange; lay soft eggs in water

Arthropods

All arthropods have a hard **exoskeleton**, a body made of segments, and **jointed legs**. They are split into four groups by the number of legs and body parts.

Main features of the arthropod groups		
Group	Main features	Example
Myriapods	Long body made of many similar segments; many pairs of legs, one or two pairs on each segment; one pair of antennae	Centipede
Insects	Body in three parts (head, thorax, abdomen); three pairs of legs; one pair of antennae; usually two pairs of wings	Housefly
Arachnids	Body in two parts (cephalothorax and abdomen); four pairs of legs; no antennae and no wings	Spider
Crustaceans	More than four pairs of legs; two pairs of antennae; breathe using gills; most live in water	Crab



The five vertebrate groups and four arthropod groups, with a key feature of each.

Classifying an organism

To classify an organism, first decide its kingdom using the animal and plant features. Then match its features to the group descriptions. An animal with a backbone, feathers and a beak is a bird. An animal with a hard exoskeleton, eight legs and two body parts is an arachnid.

Exam tip: Do not name a group from one feature alone. Many groups lay eggs, but only birds have feathers and only mammals have fur and mammary glands.

The five kingdoms Spec 1.3.4, 1.3.6 Supplement

Supplement

All organisms can be placed in one of **five kingdoms**: animal, plant, fungus, prokaryote and protocist. The animal and plant features are in the table in the previous section. The other three kingdoms have these main features.

Supplement

Main features of fungi, prokaryotes and protocists

Kingdom	Main features	Example
Fungus	Cell walls made of chitin; no chloroplasts, so they cannot photosynthesise; feed by absorbing nutrients from dead or living organisms; body usually made of threads called hyphae (yeast is single-celled); store glycogen; reproduce with spores	<i>Mucor</i> , yeast
Prokaryote	Single-celled; no nucleus (a circular DNA molecule lies free in the cytoplasm, and there may be plasmids); cell wall that is not made of cellulose	Bacteria
Protocist	Mostly single-celled microscopic organisms with a nucleus; some have chloroplasts like plants, others feed like animals	<i>Amoeba</i> , <i>Chlorella</i>

	Animal	Plant	Fungus	Prokaryote	Protocist
Cells	Multicellular	Multicellular	Usually multicellular (yeast is single-celled)	Single-celled	Mostly single-celled
Nucleus	Present	Present	Present	Absent (DNA free in the cytoplasm)	Present
Cell wall	None	Cellulose	Chitin	Present, not cellulose	Some have one
Chloroplasts	Absent	Present	Absent	Absent	Some have chloroplasts
How it feeds	Feeds on other organisms	Makes its own food by photosynthesis	Absorbs nutrients from dead or living organisms	Most absorb nutrients	Some photosynthesise; others feed like animals

The five kingdoms compared. Check **nucleus** and **cell wall** first.

Supplement

Classify an organism by working through the features. Single-celled with no nucleus means prokaryote. Chitin cell walls and no chloroplasts means **fungus**, even when single-celled like yeast. Single-celled with a nucleus but without chitin walls means protocist.

Supplement

Common mistake: Fungi are not plants. They have chitin walls, no chloroplasts, and they absorb nutrients from their surroundings instead of making food by photosynthesis.

Ferns, monocots and dicots Spec 1.3.5 Supplement

Supplement

The plant kingdom contains two groups that you need to know: **ferns** and **flowering plants**. Flowering plants are split again into **monocotyledons** (monocots) and **dicotyledons** (dicots).

Supplement

Main features of the plant groups

Group	Main features
Ferns	Leaves called fronds; have roots, stems and leaves; no flowers; reproduce using spores, made on the underside of the fronds, not seeds
Flowering plants	Produce flowers; reproduce using seeds, which form inside the ovary of the flower

Supplement

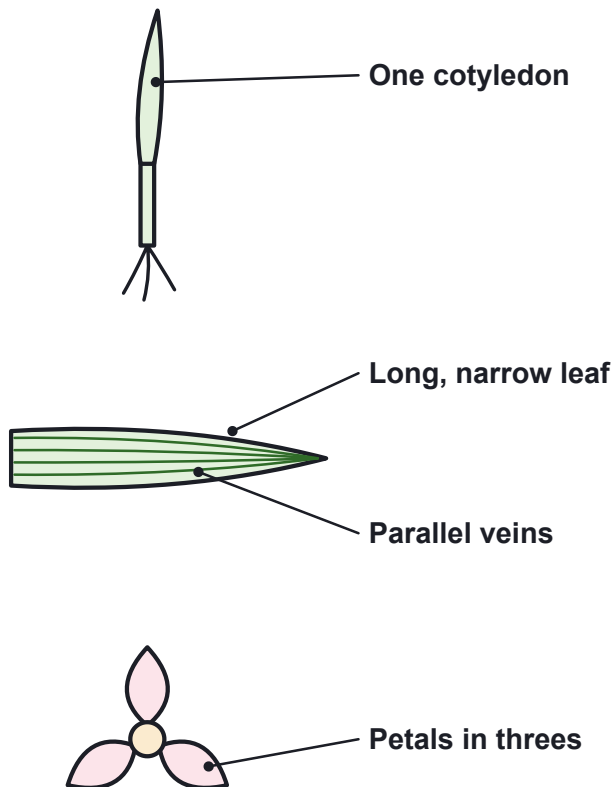
Monocotyledons and dicotyledons

Supplement

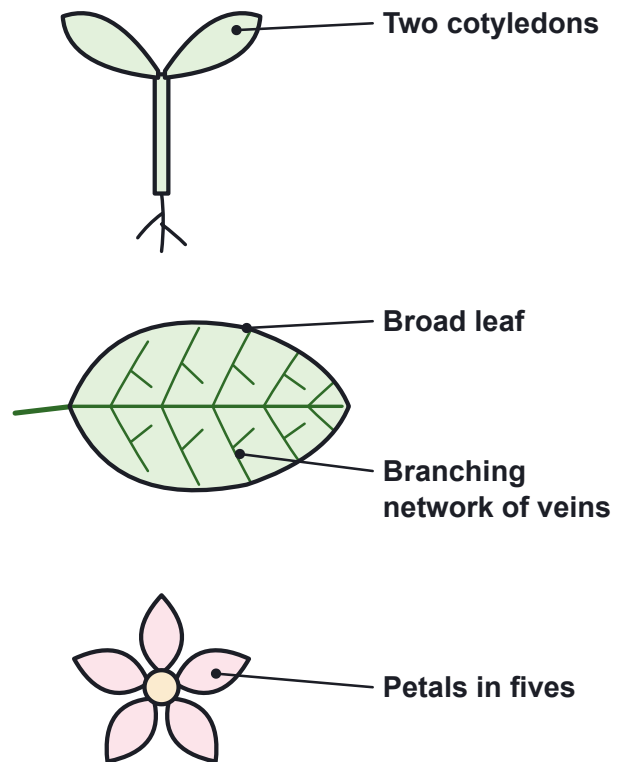
Comparing monocots and dicots

Feature	Monocotyledons	Dicotyledons
Cotyledons (seed leaves)	One	Two
Leaf veins	Parallel	Branching network
Leaf shape	Usually long and narrow	Usually broad
Flower parts	In threes or multiples of three	In fours or fives, or multiples of four or five
Examples	Grasses, wheat, maize	Beans, sunflower, oak

Monocotyledons



Dicotyledons



Monocots have **one cotyledon** and parallel veins; dicots have **two cotyledons** and a branching network of veins.

Supplement

Exam tip: Count the cotyledons first, because that gives the group its name. Leaf vein pattern is the quickest feature to use when you are shown a leaf.

Viruses Spec 1.3.7 Supplement

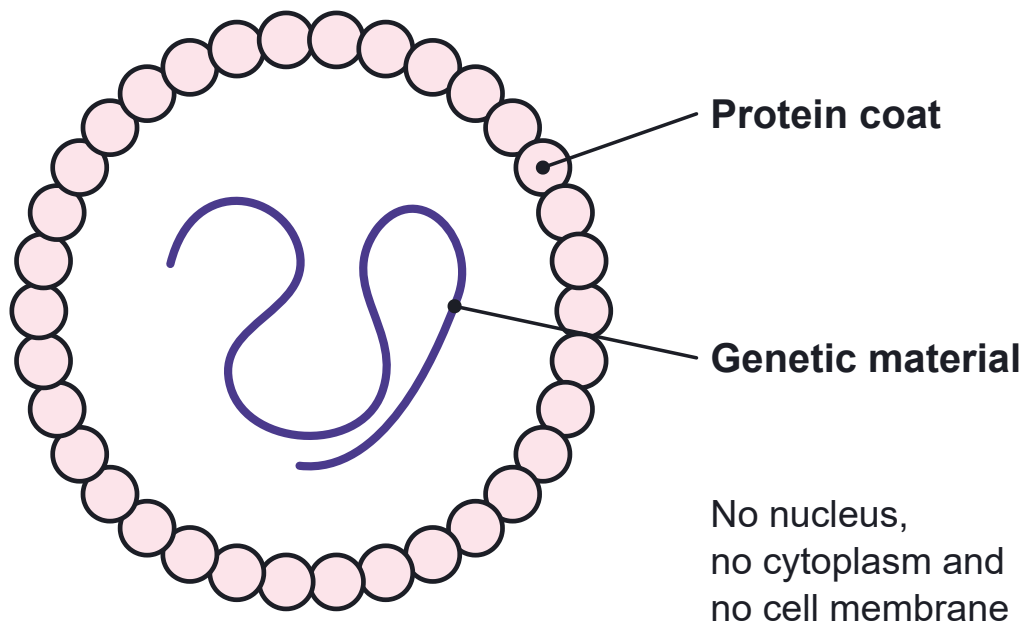
Supplement

A **virus** is much smaller than a bacterium. Viruses are not made of cells, so they do not fit into the five kingdoms. The features of a virus are limited to two: a **protein coat** and **genetic material**.

Supplement

Features of a virus

Part	Description
Protein coat	Surrounds and protects the genetic material
Genetic material	Carries the instructions for making new viruses; inside the protein coat



A virus has only a **protein coat** and **genetic material**.

Supplement

Exam tip: Do not describe a virus as having a nucleus, cytoplasm or cell membrane. State protein coat and genetic material, and nothing else.

Quick check

1. State two features of plants that animals do not have.
2. Name the four groups of arthropods.
3. Name the five groups of vertebrates.
4. **Supplement** Name the five kingdoms.
5. **Supplement** State the two features of a virus.

Quick check answers

Features of organisms

1. Cell walls made of cellulose; chloroplasts (so they photosynthesise).
2. Myriapods, insects, arachnids and crustaceans.
3. Mammals, birds, reptiles, amphibians and fish.
4. Animal, plant, fungus, prokaryote and protocist.
5. A protein coat and genetic material.