

Grade 3 checklist

92 skills. Tick each one when you can do it. For grade 3 you need the skills for the grades below it too.

Cell biology

- ☐ **Name eukaryotic and prokaryotic cells** Animal and plant cells are eukaryotic; bacterial cells are prokaryotic. (Eukaryotes and prokaryotes)
- ☐ **Name the parts of an animal cell** Nucleus, cytoplasm, cell membrane, mitochondria and ribosomes. (Animal and plant cells)
- ☐ **Name the extra structures in plant cells** Chloroplasts, a permanent vacuole filled with cell sap, and a cell wall made of cellulose. (Animal and plant cells)
- ☐ **Name specialised animal and plant cells** Sperm, nerve and muscle cells in animals; root hair, xylem and phloem cells in plants. (Cell specialisation)
- ☐ **State what cell differentiation is** Differentiation is the process by which a cell becomes specialised for a particular function. (Cell differentiation)
- ☐ **State what magnification means** How many times bigger the image is than the real object. (Microscopy)
- ☐ **State how bacteria reproduce** Bacteria multiply by simple cell division called binary fission. (Culturing microorganisms)
- ☐ **State where chromosomes are found** In the nucleus of a cell. (Chromosomes)
- ☐ **State what mitosis produces** Two genetically identical cells. (Mitosis and the cell cycle)
- ☐ **State what a stem cell is** An undifferentiated cell that can make more cells of the same type and can differentiate into other types of cell. (Stem cells)
- ☐ **Define diffusion** The net movement of particles from an area of higher concentration to an area of lower concentration. (Diffusion)
- ☐ **Define osmosis** The diffusion of water from a dilute solution to a concentrated solution through a partially permeable membrane. (Osmosis)
- ☐ **State what active transport is** The movement of substances from a more dilute solution to a more concentrated solution, against a concentration gradient. (Active transport)

Organisation

- ☐ **Put the levels of organisation in order** From smallest to largest: cell → tissue → organ → organ system → organism. (Principles of organisation)
- ☐ **Name the organs of the digestive system** Mouth and salivary glands, oesophagus, stomach, liver, gall bladder, pancreas, small intestine and large intestine. (The human digestive system)
- ☐ **Name the three types of blood vessel** Arteries carry blood away from the heart, veins carry blood back to the heart, and capillaries link them inside tissues. (The heart and blood vessels)
- ☐ **Name the four components of blood** Plasma, red blood cells, white blood cells and platelets. (Blood)

- ☐ **Name the vessels that supply heart muscle** The coronary arteries supply the heart muscle with oxygenated blood. (Coronary heart disease)
- ☐ **Define health** Health is the state of physical and mental well-being. (Health issues)
- ☐ **Define a risk factor** A factor linked to an increased rate of a disease, such as part of a person's lifestyle or a substance in their body or environment. (Lifestyle and non-communicable diseases)
- ☐ **Define cancer** Cancer is the result of changes in cells that lead to uncontrolled growth and division. (Cancer)
- ☐ **Name the tissues in a leaf** Upper and lower epidermis, palisade mesophyll, spongy mesophyll, xylem and phloem, with guard cells around the stomata. (Plant tissues)
- ☐ **Name the parts of the plant transport system** The roots, stem and leaves form an organ system; xylem carries water and phloem carries sugars. (Plant organ system)

Infection and response

- ☐ **Define a pathogen** A pathogen is a microorganism that causes infectious (communicable) disease. (Communicable (infectious) diseases)
- ☐ **Name the four types of pathogen** Viruses, bacteria, fungi and protists; they can infect both animals and plants. (Communicable (infectious) diseases)
- ☐ **Name viral diseases of humans and plants** Measles and HIV in humans; tobacco mosaic virus (TMV) in plants. (Viral diseases)
- ☐ **Name two bacterial diseases** *Salmonella* food poisoning and gonorrhoea, a sexually transmitted disease. (Bacterial diseases)
- ☐ **Name a fungal disease of plants** Rose black spot is a fungal disease of roses. (Fungal diseases)
- ☐ **Name a disease caused by a protist** Malaria is caused by a single-celled protist. (Protist diseases)
- ☐ **Name the body's non-specific defences** The skin, the nose, the trachea and bronchi, and the stomach. (Human defence systems)
- ☐ **State what a vaccine contains** Small quantities of a dead or inactive form of a pathogen. (Vaccination)
- ☐ **State what antibiotics do** Antibiotics, such as penicillin, kill infective bacteria inside the body, curing bacterial diseases. (Antibiotics and painkillers)
- ☐ **State what painkillers do** Painkillers treat the symptoms of a disease but do not kill pathogens. (Antibiotics and painkillers)
- ☐ **Match drugs to their original sources** Digitalis from foxgloves, aspirin from willow, and penicillin from *Penicillium* mould (discovered by Alexander Fleming). (Discovery and development of drugs)
- ☐ **Name physical defences of plants** Cellulose cell walls, a tough waxy cuticle on leaves, and layers of dead cells on stems (e.g. bark) that fall off. (Plant defence responses)

Bioenergetics

- ☐ **Write the word equation for photosynthesis** carbon dioxide + water → glucose + oxygen, with light written above the arrow. (Photosynthetic reaction)

- ☐ **State where photosynthesis takes place** In the chloroplasts of plant and algal cells, where chlorophyll absorbs light. (Photosynthetic reaction)
- ☐ **Name the factors affecting photosynthesis rate** Temperature, light intensity, carbon dioxide concentration and the amount of chlorophyll. (Rate of photosynthesis)
- ☐ **List the five uses of glucose** Respiration, starch for storage, fats or oils for storage, cellulose for cell walls, and amino acids for proteins. (Uses of glucose from photosynthesis)
- ☐ **State why organisms need energy** For chemical reactions that build larger molecules, for movement and for keeping warm. (Aerobic and anaerobic respiration)
- ☐ **Write the word equation for aerobic respiration** glucose + oxygen → carbon dioxide + water. (Aerobic and anaerobic respiration)
- ☐ **State how exercise changes heart and breathing** Heart rate, breathing rate and breath volume all increase. (Response to exercise)
- ☐ **Define metabolism** Metabolism is the sum of all the reactions in a cell or the body. (Metabolism)

Homeostasis and response

- ☐ **Define homeostasis** Regulating the internal conditions of a cell or organism to keep them at the optimum, in response to internal and external changes. (Homeostasis)
- ☐ **Name conditions controlled by homeostasis** In humans: blood glucose concentration, body temperature and water levels. (Homeostasis)
- ☐ **State what the nervous system does** It lets you react to your surroundings and coordinates your behaviour. (Structure and function)
- ☐ **Label the three main brain regions** Identify the cerebral cortex, cerebellum and medulla on a diagram of the brain. (The brain)
- ☐ **Label the main parts of the eye** Cornea, iris, pupil, lens, ciliary muscles, suspensory ligaments, retina, optic nerve and sclera. (The eye)
- ☐ **State normal core body temperature** About 37 °C, the optimum for the body's enzymes. (Control of body temperature)
- ☐ **Define a hormone** A chemical secreted by a gland directly into the bloodstream, which carries it to a target organ. (Human endocrine system)
- ☐ **Name the organ that controls blood glucose** The pancreas monitors and controls blood glucose concentration. (Control of blood glucose concentration)
- ☐ **List ways water leaves the body** From the lungs when you breathe out, from the skin in sweat, and from the kidneys in urine. (Maintaining water and nitrogen balance)
- ☐ **Name the main male and female hormones** Testosterone from the testes; oestrogen from the ovaries. (Hormones in human reproduction)
- ☐ **Name hormonal and non-hormonal contraceptive methods** E.g. the pill, implant, condom, diaphragm, IUD, spermicide, abstinence and sterilisation. (Contraception)
- ☐ **Define phototropism and gravitropism** Phototropism is a growth response to light; gravitropism (geotropism) is a growth response to gravity. (Control and coordination)

Inheritance, variation and evolution

- ☐ **Name the gametes in animals and plants** Animals: sperm and egg cells. Flowering plants: pollen and egg cells. (Sexual and asexual reproduction)
- ☐ **State how many parents each type needs** Sexual reproduction needs two parents; asexual reproduction needs only one. (Sexual and asexual reproduction)
- ☐ **State where and why meiosis happens** Cells in the reproductive organs divide by meiosis to form gametes. (Meiosis)
- ☐ **State where DNA is found** The genetic material in the nucleus is a chemical called DNA, contained in chromosomes. (DNA and the genome)
- ☐ **Define dominant and recessive alleles** A dominant allele is expressed even with one copy; a recessive allele is expressed only with two copies. (Genetic inheritance)
- ☐ **Describe polydactyly and cystic fibrosis** Polydactyly is having extra fingers or toes; cystic fibrosis is a disorder of cell membranes. (Inherited disorders)
- ☐ **State the number of chromosome pairs** Ordinary human body cells contain 23 pairs of chromosomes. (Sex determination)
- ☐ **Define variation** Differences in the characteristics of individuals in a population. (Variation)
- ☐ **Define evolution** A change in the inherited characteristics of a population over time through natural selection. (Evolution)
- ☐ **Define selective breeding** Humans breeding plants and animals for particular genetic characteristics. (Selective breeding)
- ☐ **Define a clone** An organism that is genetically identical to another. (Cloning)
- ☐ **Name the scientist behind natural selection** Charles Darwin developed the theory of evolution by natural selection. (Theory of evolution)
- ☐ **State what Wallace independently proposed** Wallace independently proposed the theory of evolution by natural selection. (Speciation)
- ☐ **Name Mendel and the plants he used** Gregor Mendel carried out breeding experiments on pea plants in the mid-19th century. (The understanding of genetics)
- ☐ **State that evolution is widely accepted** The theory of evolution by natural selection is now widely accepted. (Evidence for evolution)
- ☐ **Define a fossil** The remains of organisms from millions of years ago, which are found in rocks. (Fossils)
- ☐ **Define extinction** A species is extinct when there are no remaining individuals of that species still alive. (Extinction)
- ☐ **Name an antibiotic-resistant bacterium** MRSA is resistant to antibiotics. (Resistant bacteria)
- ☐ **List the Linnaean groups in order** Kingdom, phylum, class, order, family, genus, species. (Classification of living organisms)

Ecology

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- ☐ **Define population, community, habitat and ecosystem** A population is one species in a habitat, a community is all the populations there, and an ecosystem is the community interacting with the non-living environment. (Communities)
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- ☐ **Define an abiotic factor** A non-living factor in the environment that can affect a community. (Abiotic factors)
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- ☐ **Define a biotic factor** A living factor, such as another organism, that can affect a community. (Biotic factors)
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- ☐ **Define an adaptation** A feature that helps an organism survive in the conditions where it normally lives. (Adaptations)
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- ☐ **Name producers and consumers in a food chain** The producer comes first, then the primary, secondary and tertiary consumers. (Levels of organisation)
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- ☐ **State that materials are recycled in ecosystems** Materials cycle through the living and non-living parts of an ecosystem, providing the building blocks for new organisms. (How materials are cycled)
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- ☐ **State what decomposers do** Microorganisms such as bacteria and fungi break down dead organisms and waste. (Decomposition)
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- ☐ **Define biodiversity** The variety of all the different species of organisms on Earth, or within an ecosystem. (Biodiversity)
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- ☐ **Name sources of water, air and land pollution** Water: sewage, fertiliser, toxic chemicals. Air: smoke, acidic gases. Land: landfill, toxic chemicals. (Waste management)
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- ☐ **Name ways humans use land** Building, quarrying, farming and dumping waste. (Land use)
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- ☐ **Define deforestation** Cutting down large areas of forest so the land can be used for something else. (Deforestation)
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- ☐ **Name two gases that contribute to global warming** Carbon dioxide and methane. (Global warming)
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- ☐ **Name programmes that protect biodiversity** Breeding programmes, protecting rare habitats, hedgerows and field margins, reducing deforestation and carbon dioxide emissions, and recycling. (Maintaining biodiversity)
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- ☐ **Number the trophic levels in a food chain** Level 1 is the producer, level 2 the primary consumer, and so on along the chain. (Trophic levels)
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- ☐ **Define biomass** The mass of living material, often given per unit area, e.g. in g/m². (Pyramids of biomass)
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- ☐ **Define food security** Having enough food to feed a population. (Factors affecting food security)
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- ☐ **State that fish stocks are declining** Fish are being caught faster than they can reproduce (overfishing), so numbers in the oceans are falling. (Sustainable fisheries)
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- ☐ **Name a food made from a fungus** Mycoprotein, a protein-rich food made from the fungus *Fusarium*. (Role of biotechnology)
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