1	2											3	4	5	6	7	0
							1 **H** hydrogen 1										4 **He** helium 2
7 **Li** lithium 3	9 **Be** beryllium 4											11 **B** boron 5	12 **C** carbon 6	14 **N** nitrogen 7	16 **O** oxygen 8	19 **F** fluorine 9	20 **Ne** neon 10
23 **Na** sodium 11	24 **Mg** magnesium 12											27 **Al** aluminium 13	28 **Si** silicon 14	31 **P** phosphorus 15	32 **S** sulfur 16	35.5 **Cl** chlorine 17	40 **Ar** argon 18
39 **K** potassium 19	40 **Ca** calcium 20	45 **Sc** scandium 21	48 **Ti** titanium 22	51 **V** vanadium 23	52 **Cr** chromium 24	55 **Mn** manganese 25	56 **Fe** iron 26	59 **Co** cobalt 27	59 **Ni** nickel 28	63.5 **Cu** copper 29	65 **Zn** zinc 30	70 **Ga** gallium 31	73 **Ge** germanium 32	75 **As** arsenic 33	79 **Se** selenium 34	80 **Br** bromine 35	84 **Kr** krypton 36
85 **Rb** rubidium 37	88 **Sr** strontium 38	89 **Y** yttrium 39	91 **Zr** zirconium 40	93 **Nb** niobium 41	96 **Mo** molybdenum 42	[98] **Tc** technetium 43	101 **Ru** ruthenium 44	103 **Rh** rhodium 45	106 **Pd** palladium 46	108 **Ag** silver 47	112 **Cd** cadmium 48	115 **In** indium 49	119 **Sn** tin 50	122 **Sb** antimony 51	128 **Te** tellurium 52	127 **I** iodine 53	131 **Xe** xenon 54
133 **Cs** caesium 55	137 **Ba** barium 56	139 **La*** lanthanum 57	178 **Hf** hafnium 72	181 **Ta** tantalum 73	184 **W** tungsten 74	186 **Re** rhenium 75	190 **Os** osmium 76	192 **Ir** iridium 77	195 **Pt** platinum 78	197 **Au** gold 79	201 **Hg** mercury 80	204 **Tl** thallium 81	207 **Pb** lead 82	209 **Bi** bismuth 83	[209] **Po** polonium 84	[210] **At** astatine 85	[222] **Rn** radon 86
[223] **Fr** francium 87	[226] **Ra** radium 88	[227] **Ac*** actinium 89	[261] **Rf** rutherfordium 104	[262] **Db** dubnium 105	[266] **Sg** seaborgium 106	[264] **Bh** bohrium 107	[277] **Hs** hassium 108	[268] **Mt** meitnerium 109	[271] **Ds** darmstadtium 110	[272] **Rg** roentgenium 111	Elements with atomic numbers 112 – 116 have been reported but not fully authenticated						

Key

relative atomic mass
atomic symbol
name
atomic (proton) number

* The Lanthanides (atomic numbers 58 – 71) and the Actinides (atomic numbers 90 – 103) have been omitted.

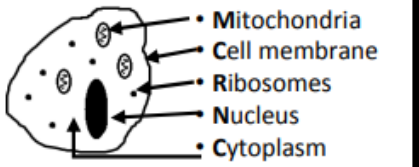
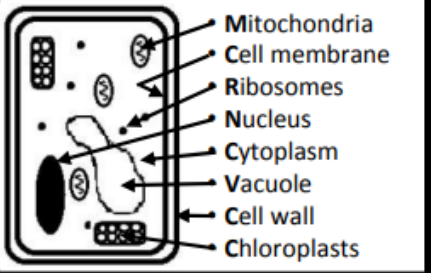
Relative atomic masses for **Cu** and **Cl** have not been rounded to the nearest whole number.

Trilogy: B1 Cell structure and transport

Collins Revision Guide: Cell Biology

Knowledge Organiser

Key points to learn

1. Early light microscopes	Use light and lenses. Have magnifications of 100 to 2 000
2. Electron microscope	Modern. Use a beam of electrons. Magnifications of up to 2 000 000
3. Magnification	How much bigger an image appears than the real object eg Magnification of 100, image looks 100 times bigger than object $magnification = \frac{size\ of\ image}{size\ of\ object}$
4. Resolving power	Smallest size microscope can show
5. Typical Animal cell	
6. Typical Plant cell	
7. Photo-synthesis	Reaction plants use to make glucose from light, H_2O and CO_2
8. Specialised animal cells	1. Sperm – tail to swim 2. Nerve – carry electrical impulses 3. Muscle – contract and relax
9. Specialised plant cells	1. Root hair - absorb water and ions 2. Xylem – carry water and minerals 3. Phloem – carry glucose to cells

Key points to learn

10. Mitochondria	Perform respiration to release energy
11Cell membrane	Controls movement in/out of cell
12 Ribosomes	Makes proteins by protein synthesis
13Nucleus	Controls activities of cell. Contains genes to build new cells
14 Cytoplasm	Liquid where most reactions happen
15 Vacuole	Sack filled with sap. Keeps cell rigid
16 Cell wall	Made of cellulose. Supports cell
17 Chloroplasts	Green and full of chlorophyll
18 Chlorophyll	Absorbs light for photosynthesis
19 Eukaryotic cells	Animal cells and plant cells. Have cell membrane, cytoplasm and nucleus
20 Prokaryotic cells	Bacteria. Do not have a nucleus. Genetic material is looped
21 Diffusion	Particles spreading out in gas/liquid Move from high→low concentration Dissolved substances like O_2 and CO_2 move in/out of cells by diffusion
22 Factors affecting diffusion	1. Difference in concentration (concentration gradient) 2. Temperature 3. Surface area to diffuse through
23 Osmosis	Diffusion of water through partially permeable membrane (surface that only lets small particles through). Moves from dilute solution → more concentrated solution
24 Active transport	Moves substances from low→high concentration. Needs energy

Big picture (Biology Paper 1)

- Cells and organisation
  - Cell structure and transport
  - Cell division
  - Organisation and the digestive system
  - Organising animals and plants
- Disease and bioenergetics
  - Communicable diseases
  - Preventing and treating disease
  - Non-communicable diseases
  - Photosynthesis
  - Respiration

Background

Big or small, all organisms are made of cells. Normally too small to see without a microscope, they are the building blocks of all life: animals, plants, insects, microbes and us.

Maths skills

Prefix	Meaning	Standard form
Mega (M)	x 1000000	$x\ 10^6$
kilo (k)	x 1 000	$x\ 10^3$
milli (m)	÷ 1 000	$x\ 10^{-3}$
nano (n)	÷ 1 000 000 000	$x\ 10^{-9}$

Key points to learn

1. Cell cycle	Process by which body cells divide. Three stages: 1. Copy: Two copies of chromosomes and internal cell structures 2. Mitosis: Copies of chromosomes move and form two nuclei 3. Split: cytoplasm and cell membranes split to make two identical cells
2. Mitotic cell division	Makes two identical copies of cells. Used in growth and repair
3. Asexual reproduction	Form of reproduction using mitotic cell division to make clone cells
4. Chromosome	Contains large number of genes. Made of DNA molecules
	Human body cells contain 23 pairs of chromosomes
5. Genes	Instructions for a characteristic
6. DNA	Molecules that make genes
7. Cell differentiation	Stem cells can form different types of specialised cells
	Most animal stem cells differentiate early
	Many plant stem cells can differentiate at any time
8. Clone	Genetically identical copy of a cell or organism

Key points to learn

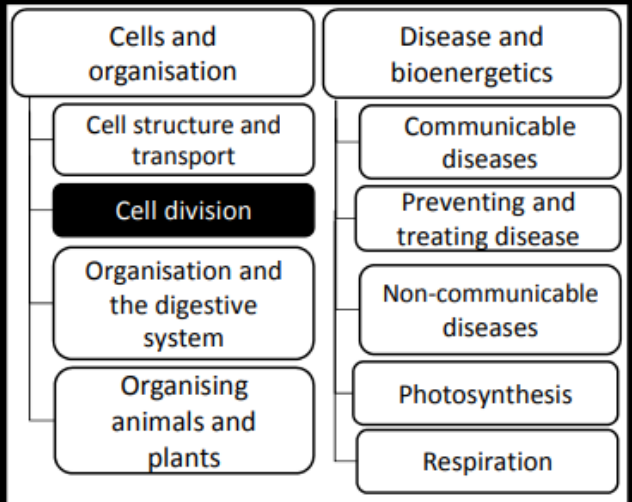
9. Stem cells	Not differentiated. Can become any type of cell that is needed
10. Human stem cells	1. From embryos can become most types of human cell 2. From adult bone marrow can form many cells like red blood cells
	May be able to help conditions like diabetes and paralysis
	Issues with use: • Potential spread of virus or immune response • Some people have ethical or religious objections
11. Meristem cells	Plant stem cells. Can become any type of plant cell at any time
	Used to clone: • rare plants from extinction • crops with desirable features
12. Specialised animal cells	1. Sperm – tail to swim 2. Nerve – carry electrical impulses 3. Muscle – contract and relax
13. Specialised plant cells	1. Root hair - absorb water and ions from soil 2. Xylem – carry water and minerals from roots 3. Phloem – carry glucose to cells
14. Ethical objections	Related to what a person thinks is morally good or ok

Trilogy B2: Cell Division

Collins Revision Guide: Cell Biology

Knowledge Organiser

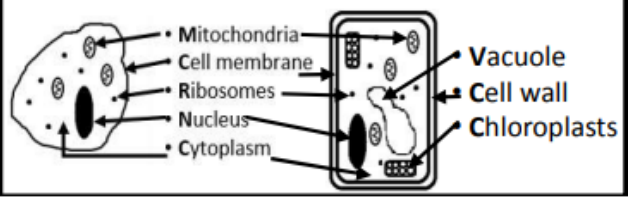
Big picture (Biology Paper 1)



Background

Taste buds are replaced approximately every 10days, skin cells every 14 days and your lungs every 6 weeks. How can this happen and how old are we really?

Additional information

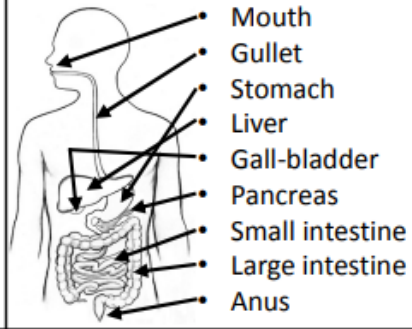


Trilogy B3: Organisation and the digestive system

Collins Revision Guide: Organisation

Knowledge Organiser

Key points to learn

1. Specialised animal cells	1. Sperm – tail to swim 2. Nerve – carry electrical impulses 3. Muscle – contract and relax
2. Tissue	Group of similar cells
3. Organ	Group of tissues working together
4. Organ systems	Group of organs which work together in organism
5. Digestive system	A group of organs that digest and absorb food
6. Digestion	Breaking large food molecules into small soluble ones
7. Human digestive system	
8. Carbohydrate	Types of sugars: glucose, starch, cellulose. Used for energy
	Test: Starch turns iodine bluey black
9. Proteins	Used to make enzymes, tissues and cells. Found in meat, fish, pulses, milk
	Test: Biuret reagent turns from blue to purple
10. Lipids	Fats and oils made of fatty acids and glycerol

Key points to learn

11. Mouth	Chews food, releases saliva
12. Stomach	Churns food. Partial digestion here
13. Liver	Makes bile to be stored in gall bladder
14 Pancreas	Releases enzymes in small intestine
15. Small intestine	Majority of digestion happens here. Makes lots of enzymes
16. Large intestine	Absorbs water
17. Bile	Alkaline to neutralise stomach acid. Added at start of small intestine. Emulsifies fat into small droplets
18. Catalyst	Chemical which speeds up a reaction without being used itself
19. Enzyme	Biological catalysts Like a specific temperature and pH
20. Lock and key theory	Model showing how enzymes work. Substrates fit the enzyme active site, then react, turning into products 
21 Metabolism	The sum of all the reactions in a cell or the body of an organism
22 Protease	Enzyme breaks down protein. Made in stomach, pancreas, small intestine
23 Lipase	Enzyme breaks down lipids. Made in pancreas, small intestine
24 Amylase	Type of carbohydrase enzyme. Breaks down glucose. Made in salivary glands, pancreas, small intestine

Big picture (Biology Paper 1)

- Cells and organisation
  - Cell structure and transport
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  - **Organisation and the digestive system**
  - Organising animals and plants
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  - Communicable diseases
  - Preventing and treating disease
  - Non-communicable diseases
  - Photosynthesis
  - Respiration

Background

Have you ever wondered why the human body temperature is 37°C or why the male testes are outside the body? The answer is enzymes. They are also crucial for digestion…

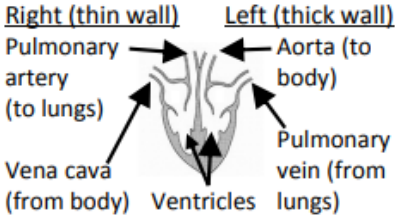
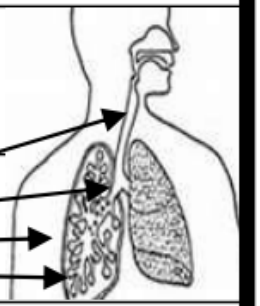
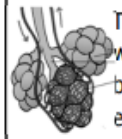
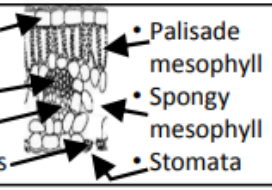
Key points to learn

25. Why you can't kill an enzyme	They are not alive so can't die.
	But they will change shape and 'denature' at the wrong temperature or acidity (pH) Each one has an ideal temperature and pH they work best at.

Key points to learn

1. Blood	A tissue of plasma, red blood cells, white blood cells and platelets
2. Plasma	Yellow liquid that transports: • Red and White Blood cells • Waste carbon dioxide to lungs • Urea from liver to kidneys • Digested nutrients to cells
3. Red blood cells	Biconcave discs with no nucleus. Packed with red haemoglobin that carries oxygen to body cells
4. White blood cells	Part of the body's defence against microorganisms
5. Platelets	Small pieces form scabs over cuts
5. Circulatory system	Transports substances to/from body cells. Made up of: • Blood • Blood vessels (arteries, veins and capillaries) • The Heart
6. Arteries	Carry blood away from your heart at high pressure
7. Veins	Carry blood back to your heart. Use valves to stop reverse blood flow
8. Capillaries	Network of tiny, thin vessels connecting to every individual cell. Substances diffuse in/out of blood
9. Coronary arteries	Blood vessels that supply heart with oxygen
10. (Aerobic) Respiration	Process by which all living things get energy from glucose and oxygen
	Glucose + Oxygen → Carbon + Water dioxide

Key points to learn

11. The Heart	Organ made of muscle that pumps blood in two loops around body
	
12. The Lungs	Organs for gas exchange. Take in O_2 release CO_2 
13. Alveoli	 Thin sac-like structures within the lungs. Covered in blood vessels to help gas exchange
14. Plant organs	Leaf – carries out photosynthesis Stem – supports Roots – take in water and minerals
15. Leaf structure cross-section	
16. Transport within plant	• Phloem – moves sugars • Xylem – moves water and ions
17. Transpiration	Evaporation from leaf pulls water through plant xylem. Affected by temperature, humidity, wind, light

Trilogy B4: Organising animals and plants

Collins Revision Guide: Organisation

Knowledge Organiser

Big picture (Biology Paper 1)

- Cells and organisation
  - Cell structure and transport
  - Cell division
  - Organisation and the digestive system
  - Organising animals and plants
- Disease and bioenergetics
  - Communicable diseases
  - Preventing and treating disease
  - Non-communicable diseases
  - Photosynthesis
  - Respiration

Background

All living cells need glucose and oxygen for respiration. Getting these ingredients to the organism is only part of the struggle. How do you get them to the cells, keep them and get rid of waste products? This topic finds out

Additional information

The heart was first labelled from behind. This means the left and right sides are reversed.