

# Buttershaw Business and Enterprise College



## Biology Paper 1 Key recall facts

### Cell Biology, Organisation, Infection and Response and Bioenergetics

*“If I have seen further it is by standing on the shoulders of Giants,”  
Sir Isaac Newton\*, 1675.*

Name.....

Group.....

Teacher.....

\*Sir Isaac Newton developed the Universal Law of Gravitation, that states that gravity affects everything in the Universe, and the three Laws of Motion.

## Cell Biology Recall Facts

1. Give 3 examples of eukaryotic cells	Animal, plant and yeast
2. Give one example of prokaryotic cells	Bacteria
3. In a cell, what is the role of the: a. Nucleus b. Cell membrane c. Cytoplasm d. Mitochondria e. Ribosomes	<ul style="list-style-type: none"> <li>• Nucleus - Contains DNA, Controls the cell</li> <li>• Cell membrane - controls which substances move in and out of the cell</li> <li>• Cytoplasm - Where chemical reactions take place</li> <li>• Mitochondria - Where aerobic respiration takes place</li> <li>• Ribosomes – Where protein synthesis takes place</li> </ul>
4. In a cell, what is the role of the: a. Chloroplasts (plants) b. Cell wall (plants, yeast and bacteria only) c. Permanent vacuole (plants only)	<ul style="list-style-type: none"> <li>• Chloroplasts – absorbs light for photosynthesis</li> <li>• Cell Wall – strengthens/supports plant cell</li> <li>• Vacuole – contains cell sap</li> </ul>
5. What are the main similarities between a eukaryotic and a prokaryotic cell?	Both have <ul style="list-style-type: none"> <li>• Ribosomes</li> <li>• Cell membrane</li> <li>• Cytoplasm</li> <li>• DNA</li> </ul>
6. What are the main differences between a eukaryotic and a prokaryotic cell?	<ul style="list-style-type: none"> <li>• Eukaryotic cells have a nucleus, prokaryotic cells do not.</li> <li>• Eukaryotic cells have mitochondria and chloroplasts, prokaryotic cells do not.</li> <li>• Eukaryotic cells are bigger.</li> <li>• Eukaryotic cells have bigger ribosomes.</li> <li>• Prokaryotic cells have plasmids, eukaryotic cells do not.</li> </ul>
7. What is the equation that links magnification, image size and real size?	<div style="background-color: #800040; color: white; padding: 10px; display: inline-block;"> <math display="block">\text{magnification} = \frac{\text{image size}}{\text{real size}}</math> </div> 1.
8. How many micrometres in a millimetre?	1000
9. What is the function of a muscle cell?	Contract to allow movement
10. What is the function of a sperm cell?	To fertilise an ovum (egg)

11. How is the structure of a sperm cell related to its function?	<ul style="list-style-type: none"> <li>• It has a tail to swim to the ovum to fertilise it</li> <li>• It has enzymes in its head to help penetrate the cell membrane of the ovum.</li> <li>• Contains lots of mitochondria to release energy from respiration for sperm to swim.</li> </ul>
12. What is the function of a root hair cell?	Absorbs water and minerals from the soil.
13. Give 2 adaptations of a root hair cell	<ul style="list-style-type: none"> <li>• Long and thin to increase surface area.</li> <li>• Thin cell wall for short diffusion distance</li> </ul>
14. Define unspecialised cells.	C Cells that are not differentiated
15. What is a stem cell?	Undifferentiated cells of an organism that can differentiate into many cell types.
16. What are adult stem cells?	Can differentiate into only certain types of cells found in body tissues such as bone marrow
17. What are embryonic stem cells?	Can differentiate into any type of cell and found in the very early embryo
18. State 2 advantages and 2 disadvantages of using embryonic stem cells	<p><b><u>Advantages</u></b></p> <ul style="list-style-type: none"> <li>• Can differentiate into any cell – more flexible.</li> <li>• Cure diseases</li> <li>• Potential source of organ transplants</li> </ul> <p><b><u>Disadvantages</u></b></p> <ul style="list-style-type: none"> <li>• Ethical issues – life being killed, cannot get consent.</li> <li>• Viral infections can be passed on.</li> </ul>
19. State 2 advantages and 2 disadvantages of using adult stem cells	<p><b><u>Advantages</u></b></p> <ul style="list-style-type: none"> <li>• Fewer ethical issues – life not killed, can get consent.</li> <li>• Treat diseases such as leukaemia</li> </ul> <p><b><u>Disadvantages</u></b></p> <ul style="list-style-type: none"> <li>• Can only turn into some types of cells.</li> <li>• Can be painful to extract adult stem cells</li> </ul>
20. What are plant meristems?	A region of a plant (tip of shoot/root) that contains cells that can differentiate into all types of cells throughout their life. (advantage)
21. What is a plant clone?	Genetically identical copy of the original plant.
22. What is a chromosome?	1. A long tightly coiled molecule of DNA
23. How many chromosomes in a human body cell?	2. 46 chromosomes or 23 pairs (so there are 2 copies of each gene in these cells). These are known as diploid cells.
24. How many chromosomes are present in sperm and ovum (gametes)?	3. 23 chromosomes (so there is 1 copy of each gene in these cells). These are known as haploid cells.
25. What are genes?	Short section of chromosomes that carry instructions for making a protein.

<p>26. Describe the 3 stages of the cell cycle</p>	<p><b><u>Cell Growth</u></b></p> <ul style="list-style-type: none"> <li>• Chromosomes are copied</li> <li>• Increase in number of cell organelles (mitochondria etc.)</li> </ul> <p><b><u>Mitosis</u></b></p> <ul style="list-style-type: none"> <li>• Chromosomes line up in middle of cell and get pulled to opposite ends of cell</li> <li>• Nucleus divides</li> </ul> <p><b><u>Cytokinesis</u></b> Cell membrane and cytoplasm divide</p>
<p>27. What are the uses of mitosis?</p>	<ul style="list-style-type: none"> <li>• Growth and repair of cells</li> <li>• Some species use it for asexual reproduction</li> </ul>
<p>28. What is diffusion?</p>	<p>Movement of particles from an area of high concentration to low concentration. It is a passive process – it does not require energy.</p>
<p>29. Give 3 examples of diffusion in animals.</p>	<ul style="list-style-type: none"> <li>• O<sub>2</sub> diffusing into animal cell and CO<sub>2</sub> diffusing out</li> <li>• O<sub>2</sub> diffusing from alveoli into blood and CO<sub>2</sub> diffusing from blood into alveoli</li> <li>• Food molecules, such as glucose, fatty acids, glycerol, amino acids diffusing from the lumen of the small intestine into the blood.</li> <li>• Urea moving from cells into blood plasma to be excreted by kidneys</li> </ul>
<p>30. Give one example of diffusion in a plant.</p>	<p>CO<sub>2</sub> diffusing into leaf and O<sub>2</sub> diffusing out of leaf a)</p>
<p>31. Give 3 factors that affect diffusion in a living organism</p>	<ul style="list-style-type: none"> <li>• Surface area to volume ratio</li> <li>• Diffusion distance</li> <li>• Concentration gradient</li> </ul>
<p>32. How are villi adapted for rapid diffusion?</p>	<ul style="list-style-type: none"> <li>• Lots of villi to increase surface area.</li> <li>• Villi are long and thin to increase surface area.</li> <li>• Have lots of microvilli to increase surface area.</li> <li>• Villi wall is one cell thick for short diffusion distance.</li> <li>• Good blood supply to maintain concentration gradient.</li> </ul>
<p>33. How are alveoli adapted for gas exchange?</p>	<ul style="list-style-type: none"> <li>• Lots of alveoli to increase surface area.</li> <li>• Alveoli wall is one cell thick for short diffusion distance.</li> <li>• Good blood supply to maintain concentration gradient.</li> </ul>

34. What is osmosis?	1. Diffusion of water molecules from a dilute solution to a concentrated solution across a partially permeable membrane
35. Describe and explain what happens to animal and plant cells in pure water	<ul style="list-style-type: none"> <li>• Water moves into cell.</li> <li>• By osmosis.</li> <li>• From a more dilute solution outside cell to a more concentrated solution inside cell across a partially permeable membrane.</li> <li>• Animal cell would swell and burst.</li> <li>• Plant cell would swell and become turgid (has cell wall).</li> </ul>
36. Describe and explain what happens to animal and plant cells in concentrated solution	<ul style="list-style-type: none"> <li>• Water moves out of cell.</li> <li>• By osmosis.</li> <li>• From a more dilute solution inside cell to a more concentrated solution outside cell across a partially permeable membrane.</li> <li>• Both cells shrink.</li> </ul>
37. Describe and explain what happens to animal and plant cells in isotonic solutions	<ul style="list-style-type: none"> <li>• As the solutions inside and outside cell have the same concentration, there is no net movement of water.</li> <li>• Cells stay the same size.</li> </ul>
38. What is active transport?	2. Movement of particles from a low concentration to a high concentration using energy from respiration
39. Give 2 examples of active transport	<p>Movement of minerals (e.g., nitrates) from the soil into a plant root</p> <p>3. Movement of glucose/amino acids from the small intestine to the blood</p>
40. Give 2 differences between diffusion and active transport	<ul style="list-style-type: none"> <li>• Diffusion is from high to low concentration whilst active transport is from low to high concentration.</li> <li>• Diffusion is a passive process and does not need energy but active transport needs energy.</li> </ul>

## Organisation

1. What are cells?	Simple building blocks of life
2. What is a tissue?	Lots of similar cells working together to perform a particular function
3. What is an organ?	Different tissues working together to perform a particular function
4. What is organ system?	Group of different organs working together to perform a particular function
5. Describe the function of the following organs of the digestive system. a) Mouth b) Salivary Glands c) Oesophagus d) Stomach e) Liver f) Gall bladder g) Pancreas h) Small Intestine i) Large Intestine	b) Mouth – teeth to mechanically break down food. c) Salivary glands – makes saliva to moisten food and amylase to break down starch. d) Oesophagus – carries food down to stomach. e) Stomach – mechanically breaks down food using muscles and protease breaks down proteins. f) Liver – makes bile. g) Gall bladder – stores bile. h) Pancreas – makes all digestive enzymes. i) Small intestine – digestion finishes here, and food absorbed into blood. j) Large intestine – water absorbed into blood.
6. Why is the pH of the stomach 2?	Releases hydrochloric acid to kill pathogens in food
7. What is the function of bile?	<b>Emulsifies fats</b> – breaks large fat droplets into smaller ones, this increases surface area, so enzymes (lipases) can break down fats faster. <b>Neutralises stomach acid</b> – optimum pH for enzymes
8. What are enzymes?	Enzymes are protein molecules that act as biological catalysts and speed up reactions.
9. Describe the lock and key model for enzyme activity	An enzyme has a specific active site (lock) that has a shape that is complimentary (matches) with the substrate (key). Once the substrate binds, a reaction happens turning the substrate into products, which then leave the active site
10. What is the function of the enzyme amylase?	Breaks down starch into simple sugars. Made in salivary glands, pancreas, and small intestine.
11. What is the function of the enzyme lipase?	Breaks down fats (lipids) into fatty acids and glycerol. Made in pancreas and small intestine.
12. What is the function of the enzyme protease?	Breaks down proteins into amino acids. Made in stomach, pancreas, and small intestine.
13. What is meant by the term 'optimum'?	Temperature or pH where enzymes work best

14. Describe and explain what happens to the enzyme activity at very high temperatures or if the pH gets too high/low from the optimum	<ul style="list-style-type: none"> <li>• Enzyme activity decreases.</li> <li>• Enzyme denatures.</li> <li>• Active site changes shape.</li> <li>• Substrate cannot fit into active site</li> </ul>
15. Describe the test for starch	<ul style="list-style-type: none"> <li>• Add iodine solution.</li> <li>• If starch present, turns iodine from orange-brown to blue-black.</li> </ul>
16. Describe the test for sugars (glucose)	<ul style="list-style-type: none"> <li>• Add benedicts solution.</li> <li>• Heat in a water bath to 75°C.</li> <li>• If sugar present, turns from blue to green/yellow/orange/red.</li> </ul>
17. Describe the test for protein	<ul style="list-style-type: none"> <li>• Add Biuret solution.</li> <li>• If protein present, turns from blue to purple.</li> </ul>
18. Describe the test for fats	<ul style="list-style-type: none"> <li>• Add ethanol and then water.</li> <li>• If fats present, turns from colourless to cloudy.</li> </ul>
19. Name the 4 chambers of the heart.	<p>Top 2 chambers – right and left atrium.  Bottom 2 chambers – right and left ventricle.</p>
20. Why is the heart known as a double pump?	<p>The right-hand side pumps deoxygenated blood to the lungs, and the left-hand side pumps oxygenated blood to the rest of the body. So, blood goes through the heart twice in one cycle</p>
21. What is a pacemaker? Where is it found within the heart?	<p>Cells that control the heart rate.  Found in the right atrium.</p>
22. What is a coronary artery?	<p>Artery that supplies blood to the heart muscle</p>
23. How does a heart attack occur?	<ul style="list-style-type: none"> <li>• Blood clot (and fatty deposits) in a coronary artery.</li> <li>• No blood flows.</li> <li>• No oxygen.</li> <li>• No respiration and no energy released.</li> <li>• No muscle contraction.</li> </ul>
24. Name the 3 blood vessels in the body and state their function	<ul style="list-style-type: none"> <li>• Arteries – carry oxygenated blood away from the heart at high pressure.</li> <li>• Veins – carry deoxygenated blood back to the heart at low pressure.</li> <li>• Capillaries – found within organs and where exchange of substances takes place.</li> </ul>
25. Describe and explain the difference in the structure of arteries and veins	<ul style="list-style-type: none"> <li>• Arteries have thicker walls to withstand the higher pressure.</li> <li>• Arteries have thicker layer of elastic tissue so it can stretch and recoil back.</li> <li>• Veins have a larger lumen to allow more blood flow.</li> <li>• Veins have valves to prevent backflow of blood.</li> </ul>

26. Name the 4 components of the blood and state their function	<ul style="list-style-type: none"> <li>• Red blood cells to carry oxygen.</li> <li>• White blood cells to fight infections.</li> <li>• Platelets to form blood clots/scabs/prevent bleeding.</li> <li>• Plasma to carry substances within blood such as carbon dioxide, urea, proteins, antibodies etc.</li> </ul>
27. Describe and explain 3 adaptations of a red blood cell	<ul style="list-style-type: none"> <li>• No nucleus to carry more oxygen.</li> <li>• Haemoglobin to bind oxygen.</li> <li>• Biconcave shape to increase surface area for diffusion.</li> <li>• Dip in the middle means shorter diffusion distance.</li> </ul>
28. What happens if valves in the heart are leaky?	<ul style="list-style-type: none"> <li>• Blood flows backwards, so less blood pumped by the heart around the body, so less oxygen reaches body cells and less respiration. Person would feel tired and chest pain.</li> </ul>
29. What is a stent? Give advantages and disadvantages of a stent	<p>A stent is used to widen coronary arteries to increase blood flow.</p> <p><b>Advantages</b> – immediate effect, permanent</p> <ul style="list-style-type: none"> <li>• <b>Disadvantages</b> – surgery, so chance of infections, bleeding, blood clots and another heart attack</li> </ul>
30. What are statins? Give advantages and disadvantages of using statins	<p>Statins reduce the amount of cholesterol in the blood.</p> <p><b>Advantages</b> – no surgery, no risk of infection etc.</p> <p><b>Disadvantages</b> – have to take everyday for rest of life, not an immediate effect and can have side-effects.</p>
31. What is the definition of cancer?	<p>Changes in cells (usually caused by mutations in DNA) that cause uncontrolled growth and division.</p>
32. What is the difference between benign and malignant cancers?	<ul style="list-style-type: none"> <li>• Benign – tumours contained in one area, and do not spread to other parts of the body.</li> <li>• Malignant – tumours that can spread to other parts of the body via the <b>BLOOD</b> to form secondary tumours.</li> </ul>
33. What kinds of chemicals cause cancer?	<p>Carcinogens, e.g. U.V. radiation from the sun has been shown to cause skin cancer.</p>
34. What is the definition of health?	<p>The state of physical and mental well-being.</p>
35. What is a non-communicable disease?	<p>Non-communicable – cannot be transmitted between people. Examples include cancer and coronary heart disease.</p>
36. Name 4 plant organs	<p>Roots, leaves, flower and stem</p>



<p>37.State the function of the following tissues/part in a plant leaf</p> <ul style="list-style-type: none"> <li>a) Cuticle</li> <li>b) Palisade mesophyll</li> <li>c) Spongy mesophyll</li> <li>d) Stomata</li> <li>e) Guard cells</li> <li>f) Xylem</li> <li>g) Phloem</li> </ul>	<ul style="list-style-type: none"> <li>a) Waxy to prevent water loss but transparent to allow light through.</li> <li>b) Where photosynthesis happens.</li> <li>c) Gases diffuse in/out quicker.</li> <li>d) Allows gas exchange from leaf to outside but can close to prevent water loss.</li> <li>e) Control the opening and closing of stomata.</li> <li>f) Carries water and minerals up the plant.</li> <li>g) Carries dissolved sugars up and down the plant.</li> </ul>
<p>38.Why does the uppermost part of the leaf have fewer stomata?</p>	<p>The upper surface has fewer stomata, as this would lead to lots of water loss. This is because it is warmer on the upper surface and more light hits the upper surface.</p>
<p>39.Describe the structure of the xylem.</p>	<p>Dead cells are joined end to end with no end walls in between – they form a hollow tube. The xylem is strengthened with lignin.</p>
<p>40.Describe the structure of the phloem tissue?</p>	<p>Composed of tubes of elongated cells, so cell sap can move from one phloem cell to the next through pores in the end walls. Has mitochondria to load sugars.</p>
<p>41.What is transpiration?</p>	<p>Evaporation of water from the leaves through the stomata.</p>
<p>42.What is the transpiration stream?</p>	<p>Movement of water from the roots, through the xylem and out of the leaves.</p>
<p>43.How do the following factors affect transpiration:</p> <ul style="list-style-type: none"> <li>a. Increased light intensity.</li> <li>b. Increased temperature</li> <li>c. Wind</li> <li>d. Increased humidity</li> <li>e. Decrease surface area</li> </ul>	<ul style="list-style-type: none"> <li>a) <b>Light intensity</b> – Greater light intensity, means higher rate of transpiration.</li> <li>b) <b>Temperature</b> – Increase temperature means faster rate of transpiration.</li> <li>c) <b>Wind</b> – Increase wind, means faster rate of transpiration.</li> <li>d) <b>Humidity</b> – More humidity, means slower rate of transpiration.</li> <li>e) <b>Surface area of leaves</b> – smaller surface area (rolled up leaves) means slower rate of transpiration.</li> </ul>
<p>44. What is translocation?</p>	<p>Movement of dissolved sugars up and down the plant in the phloem</p>
<p>45. Why do sugars have to be moved around the plant?</p>	<p>Other organs in the plant receive sugars (glucose) to use immediately in respiration or store it as starch.</p>

## Infection and Response

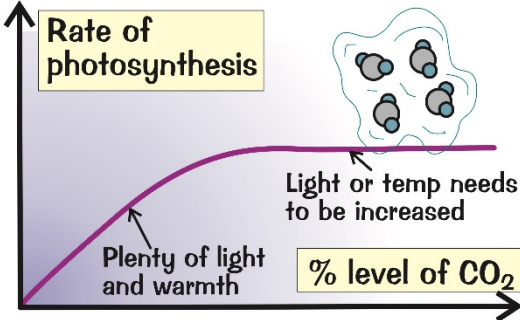
1. What is a communicable disease?	Disease that is spread from person to person by a pathogen
2. What is the definition of a pathogen? What are the 4 types of pathogens?	A microorganism that causes disease. Virus, bacteria, fungi, protist
3. How do pathogens cause disease?	<ul style="list-style-type: none"> <li>• Produce toxins (bacteria)</li> <li>• Replicate inside cells and damage/burst them on way out (viruses)</li> </ul>
4. State 3 ways diseases can be spread.	1) By eating contaminated food or drinking contaminated water; 2) through the air in water droplets and 3) through indirect or direct contact (including sexual) with the infected person/object.
5. For HIV, state the type of pathogen that causes it, how it spreads, its symptoms and how it can be treated/prevented	<ul style="list-style-type: none"> <li>• Pathogen – virus</li> <li>• Spreads – through exchange of fluids (sex, needles, mother to baby)</li> <li>• Symptoms – flu-like</li> <li>• Treated – antiretroviral drugs.</li> <li>• Prevention – condoms/clean needles</li> </ul>
6. Why are people with HIV more likely to get infections?	HIV kills white blood cells leading to AIDs as white blood cells fight infections
7. For salmonella, state the type of pathogen that causes it, how it spreads, its symptoms and how it can be treated/prevented	<ul style="list-style-type: none"> <li>• Pathogen – bacteria.</li> <li>• Spreads – uncooked food (poultry/eggs).</li> <li>• Symptoms – fever, vomiting, diarrhoea, stomach cramps.</li> <li>• Treated – hydration, treating symptoms.</li> <li>• Prevention – cook food properly, good food hygiene, vaccinating poultry.</li> </ul>
8. For TMV, state the type of pathogen that causes it, how it spreads, its symptoms and how it can be treated/prevented	<ul style="list-style-type: none"> <li>• Pathogen – virus.</li> <li>• Spreads – contact.</li> <li>• Symptoms – discolouration of leaves.</li> <li>• Treated – none.</li> <li>• Prevention – burn infected plants.</li> </ul>
9. For Rose Black Spot, state the type of pathogen that causes it, how it spreads, its symptoms and how it can be treated/prevented	<ul style="list-style-type: none"> <li>• Pathogen – fungus</li> <li>• Spreads – through wind and water</li> <li>• Symptoms – black spots. discolouration of leaves</li> <li>• Treated – fungicides.</li> <li>• Prevention – isolate/burn infected plants</li> </ul>
10. Why do plants with TMV and Rose Black Spot have stunted growth?	<ul style="list-style-type: none"> <li>• Less chlorophyll.</li> <li>• Less light absorbed.</li> <li>• Less photosynthesis.</li> <li>• Less glucose made.</li> </ul>

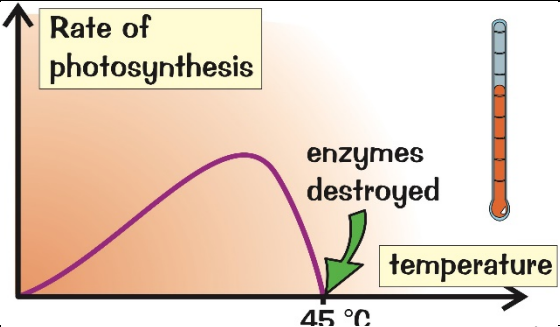
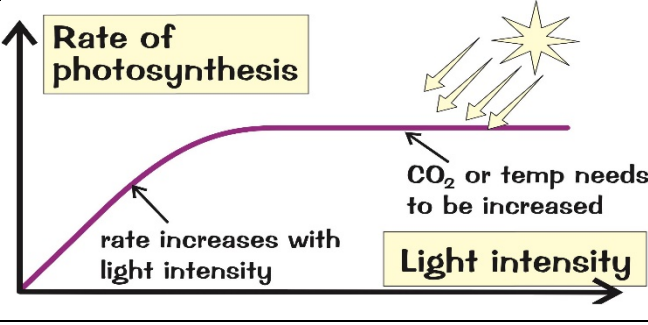
<p>11. For measles, state the type of pathogen that causes it, how it spreads, its symptoms and how it can be treated/prevented</p>	<ul style="list-style-type: none"> <li>● Pathogen – virus</li> <li>● Spreads – through air (sneezing/coughing)</li> <li>● Symptoms – fever, red skin rash</li> <li>● Treated – none.</li> <li>● Prevention – vaccinations</li> </ul>
<p>12. For gonorrhoea, state the type of pathogen that causes it, how it spreads, its symptoms and how it can be treated/prevented</p>	<ul style="list-style-type: none"> <li>● Pathogen – bacteria.</li> <li>● Spreads – through sex.</li> <li>● Symptoms – yellow/green discharge from penis/vagina.</li> <li>● Treated – antibiotics, although bacteria has become resistant to antibiotics.</li> <li>● Prevention – condoms.</li> </ul>
<p>13. For Malaria, state the type of pathogen that causes it, how it spreads, its symptoms and how it can be treated/prevented</p>	<ul style="list-style-type: none"> <li>● Pathogen – protist.</li> <li>● Spreads – mosquitoes (vector that carries pathogen)</li> <li>● Symptoms – fever, headache, tiredness.</li> <li>● Treated – anti-malarial drugs.</li> <li>● Prevention – mosquito net, insect repellents, insecticides, anti-malarial drugs, vaccinations, removing swamps/wet areas. Some of these prevent the mosquitoes from breeding, and some prevent person being bitten.</li> </ul>
<p>14. Describe 4 non-specific ways pathogens are prevented from entering the body</p>	<ul style="list-style-type: none"> <li>● Skin/scabs act as a physical barrier. Skin also releases antimicrobial chemicals.</li> <li>● Cilia and mucus in the trachea – mucus traps pathogens, cilia sweeps mucus and this is swallowed into stomach.</li> <li>● Stomach acid – destroys pathogens.</li> <li>● Eyelashes – prevents particles from entering eye.</li> <li>● Tears – salty to dry out pathogens.</li> </ul>
<p>15. Describe 2 ways by which white blood cells look different to red blood cells.</p>	<ul style="list-style-type: none"> <li>● Much larger in size.</li> <li>● Have a large nucleus.</li> <li>● Has digestive enzymes to kill pathogens.</li> </ul>
<p>16. Describe 3 ways by which white blood cells fight infections</p>	<ul style="list-style-type: none"> <li>● <b><u>Phagocytosis</u></b> – engulf, surround, and digest pathogens.</li> <li>● <b><u>Produce antibodies</u></b> – stick to antigens on surface of pathogens, clumping them together. This prevents the pathogen from spreading and makes it easier for phagocytosis.</li> <li>● <b><u>Produce antitoxins</u></b> – neutralises toxins.</li> </ul>

17.How do vaccines work?	<ul style="list-style-type: none"> <li>• Vaccines contain dead, weak or inactive version of pathogen (may only contain antigens)</li> <li>• This triggers white blood cells to produce antibodies against pathogen.</li> <li>• Memory cells remain in blood that recognize pathogen/antigen much quicker if infected with real live pathogen.</li> <li>• Produces a larger number of antibodies much quicker, so pathogen killed before any symptoms.</li> </ul>
18.What is the difference between an antibiotic and a painkiller?	An antibiotic kills bacteria whereas a painkiller relieves pain. Painkillers do not kill pathogens; they can just reduce the symptoms of a disease.
19.State the name of one common antibiotic and one common painkiller.	Antibiotic – penicillin (from the mould penicillium) Painkiller - paracetamol
20.Why can antibiotics not kill viruses?	Viruses replicate inside cells, and antibiotics cannot get into human cells.
21.How do bacteria become resistant to antibiotics?	<ul style="list-style-type: none"> <li>• Bacteria can randomly mutate and become resistant to antibiotics.</li> <li>• When the antibiotic is taken, only non-resistant bacteria cells die, leaving the resistant cells.</li> <li>• These resistant cells have more food and space to survive and reproduce. The number of resistant bacteria cells will increase. This is an example of natural selection.</li> </ul>
22.State 2 ways antibiotic resistance can be prevented.	<ul style="list-style-type: none"> <li>• When taking antibiotics, the whole course of treatment should be completed and not stopped just because you feel better.</li> <li>• Doctors need to stop over-prescribing antibiotics and should only prescribe them for bacterial infections.</li> <li>• No using antibiotics in agriculture.</li> </ul>
23.What plant does aspirin come from and what is it used to treat?	Aspirin comes from the bark of a willow tree and is used as a painkiller to reduce fever.
24.What drug is extracted from foxgloves and what is it used to treat?	Digitalis is used to treat heart conditions.
25.What is the definition of the efficacy, toxicity and dosage of a drug?	<ul style="list-style-type: none"> <li>• Efficacy – does the drug work and produce the desired effects.</li> <li>• Toxicity – how harmful is the drug (side-effects)</li> <li>• Dosage – how often and at what concentration should the drug be given.</li> </ul>

<p>26. What are the 2 stages of pre-clinical testing? State their purpose.</p>	<ul style="list-style-type: none"> <li>• Testing on human cells in lab for toxicity.</li> <li>• Testing on animals for toxicity (sometimes for efficacy)</li> </ul>
<p>27. What are the 3 stages of pre-clinical testing? State their purpose.</p>	<ul style="list-style-type: none"> <li>• Testing on human volunteers for toxicity (cannot test for efficacy as they do not have disease).</li> <li>• Testing on small number of patients for efficacy and toxicity.</li> <li>• Testing on large number of patients for efficacy, toxicity and optimum dosage. Start with lower dosage and increase.</li> </ul>
<p>28. Why test on healthy volunteers first?</p>	<ul style="list-style-type: none"> <li>• Easier to see side-effects as they are not masked by patients symptoms from disease.</li> <li>• Less likely to become even more ill.</li> </ul>
<p>29. What is a placebo?</p>	<p>A fake drug that looks like the real drug but has no effect</p>
<p>30. Why is it important that drugs are tested in either a blind or a double-blind trial?</p>	<p>Blind trial – patient doesn't know but doctor knows who has taken placebo or real drug. This avoids the placebo effect where patient feels better because they are being treated, not because of the drug.</p> <p>Double-blind trial – both patient and doctor don't know who has taken placebo or real drug. This removes bias from doctor.</p>

## Bioenergetics

1. What is the word equation for photosynthesis?	Carbon Dioxide + water → Glucose + oxygen
2. Name 2 more things needed by the plant to photosynthesise. Explain their function.	Sunlight – plants take in light energy and convert to chemical energy (glucose) Chlorophyll – absorbs light energy
3. What type of chemical reaction is photosynthesis?	Endothermic
4. Where does photosynthesis take place inside a plant cell?	Chloroplasts
5. How does the plant get carbon dioxide and water into the plant?	Carbon dioxide – absorbed from the air through the stomata into the leaf. Water – absorbed by the roots from the soil by osmosis
6. State 5 uses of glucose by the plant.	1) To be used in respiration to release energy. 2) It can be stored as insoluble starch. 3) To make cellulose for cell walls. 4) It can be stored as fats and oils in the seeds. 5) Glucose converted to amino acids using nitrates and then amino acids joined together to make proteins.
7. What is a limiting factor?	A factor that prevents photosynthesis from occurring faster.
8. State 4 limiting factors that affect the rate of photosynthesis.	1) Light intensity 2) Temperature 3) Carbon dioxide concentration 4) Amount of chlorophyll in the leaf
9. How does a greenhouse increase the efficiency of growing plants?	1) Artificial lighting can be given to increase light intensity. 2) Paraffin heaters can be used to increase carbon dioxide concentration and temperature. 3) These would cost money but may lead to increased growth and more profits.
10. Sketch an annotated graph that shows the rate of photosynthesis (y- axis) vs concentration of carbon dioxide (x-axis)	 <p>The graph plots the rate of photosynthesis against the percentage level of CO<sub>2</sub>. The curve shows an initial rapid increase in the rate of photosynthesis as CO<sub>2</sub> concentration increases, followed by a plateau. The rising portion is labeled 'Plenty of light and warmth', and the plateau is labeled 'Light or temp needs to be increased'. A diagram of a plant cell with chloroplasts is shown above the plateau.</p>

<p>11. Sketch an annotated graph that shows the rate of photosynthesis (y-axis) vs temperature (x-axis)</p>	
<p>12. Sketch an annotated graph that shows the rate of photosynthesis (y-axis) vs light intensity (x-axis)</p>	
<p>13. What is the word and symbol equation for aerobic respiration?</p>	<p>Glucose + Oxygen → Carbon Dioxide + Water</p> $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$
<p>14. What is the purpose of respiration?</p>	<p>To release energy from glucose</p>
<p>15. Where does aerobic respiration take place in cells?</p>	<p>To release energy from glucose through respiration</p>
<p>16. Why is respiration exothermic?</p>	<p>Releases heat energy to surroundings.</p>
<p>17. What do organisms require energy for?</p>	<ol style="list-style-type: none"> <li>1) Movement – muscle cells need energy to contract.</li> <li>2) To maintain body temperature</li> <li>3) Active transport</li> <li>4) To build larger biomolecules from smaller molecules such as amino acids (to make proteins) and fatty acids and glycerol (to make lipids)</li> </ol>
<p>18. What is the word equation for anaerobic respiration in muscles of animals?</p>	<p>Glucose → lactic acid</p>
<p>19. Compare aerobic respiration and anaerobic respiration in muscles?</p>	<p><b>Similarities</b></p> <ul style="list-style-type: none"> <li>• Both use glucose</li> <li>• Both release energy</li> </ul> <p><b>Differences</b></p> <ul style="list-style-type: none"> <li>• Aerobic uses oxygen, but anaerobic doesn't</li> <li>• Aerobic releases more energy due to incomplete oxidation of glucose.</li> <li>• Aerobic produces carbon dioxide, whilst anaerobic produces lactic acid.</li> <li>• Aerobic takes place in mitochondria, whilst anaerobic takes place in cytoplasm.</li> </ul>

20. What changes happen in the body in response to exercise?	Your breathing and heart rate get faster, your body temperature increases, and you start to sweat
21. What is cardiac output?	Total volume of blood pumped by the heart per minute. This can be calculated by... Cardiac output = stroke volume x heart rate
22. Why does cardiac output increase during exercise?	<ul style="list-style-type: none"> <li>• Increased blood flow to muscles.</li> <li>• Increased oxygen and glucose.</li> <li>• Increased aerobic respiration.</li> <li>• Increase energy released for muscle contraction.</li> </ul>
23. What is an oxygen debt?	The amount of oxygen needed to completely breakdown lactic acid into carbon dioxide and water
24. What happens to the lactic acid produced in muscles during anaerobic exercise?	Lactic acid is carried in the blood to the liver. When there is enough oxygen, it is broken down into carbon dioxide and water.
25. What happens to muscles during prolonged periods of vigorous exercise?	They get fatigued (tired) because a lack of oxygen causes them to respire anaerobically. Because anaerobic respiration is less efficient compared to aerobic respiration, less energy is released and so the muscles tire more easily. Build up of lactic acid also causes muscle cramps as the muscles become more acidic (enzymes don't work as effectively)
26. What is metabolism?	The sum of all the reactions that happen in a cell or body.
27. Name 4 reactions that are part of metabolism	<ol style="list-style-type: none"> <li>1) Conversion of glucose to starch, glycogen, and cellulose.</li> <li>2) Formation of lipid molecules from 3 fatty acids and glycerol.</li> <li>3) Use of glucose and nitrate ions to make amino acids, which then makes proteins.</li> <li>4) Breakdown of excess proteins to form urea for excretion.</li> <li>5) Respiration</li> </ol>
28. What is the word equation for anaerobic respiration in yeast and plant cells?	Glucose → Ethanol + carbon dioxide
29. What is fermentation?	Anaerobic respiration in yeast cells
30. Why is fermentation useful?	It produces ethanol (alcohol), which is used in beer and winemaking. Yeast is used in bread-making because the carbon dioxide helps it to rise.