Biology Higher Knowledge quizzes

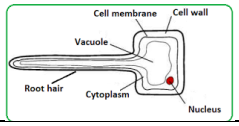
Tips:

- Learn one quiz at a time. Cover the right hand side and go through each question, checking the answers as you go.
- Get a friend or family member to quiz you – in random order
- When you are feeling confident, cover the right side and write the answers to all the ones you can, then check.

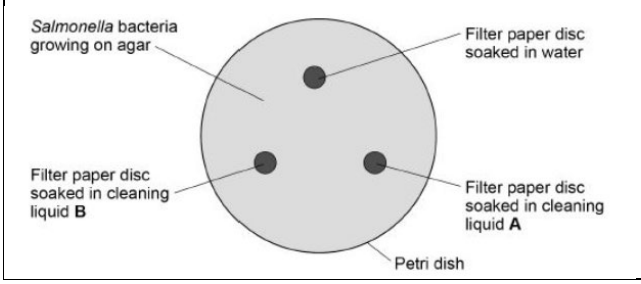
Cell structures and microscopy

Question	Answer
1. What are the typical features of a eukaryotic cell?	Cell membranes, organelles, DNA in a nucleus
2. Give an example of a eukaryotic cell	Plant or animal cell
3. Give an example of a prokaryotic cell	Bacteria
4. How do prokaryotic cells compare with eukaryotic cells in terms of size?	Prokaryotic cells are smaller
5. What is different about the genetic material of bacteria?	It is not contained in a nucleus – it is free floating in the cytoplasm
6. What are the additional loops of DNA in bacteria called?	Plasmids
7. Name three cell parts often found in plant cells but not in animal cells	Cell wall, vacuole, chloroplasts
8. What is the function of the chloroplast?	Photosynthesis takes place here
9. What is contained in the vacuole?	Sap
10. What is the function of the cell wall?	Strength and support
11. What is the cell wall made of?	Cellulose
12 What is the function of the cell membrane?	Control what enters and leaves the cell
13. Where in a cell does respiration take place?	Mitochondria
14. What is the function of the ribosomes?	Making proteins
15. Name 3 structures found in a plant cell but not in an animal cell	Vacuole, chloroplast, cell wall
16. Which part of the microscope does the slide sit on?	Stage
17. Which magnification do you always start with?	Lowest
18. Why is it necessary to start with the lowest magnification?	To give the widest field of view
19. What is the name of the lens you look down?	Eyepiece lens
20. What do you do if the cells are blurry?	Turn the focusing wheel
21. How do you see more detail in the cells once you've found them?	Increase the magnification
22. What is the name of the lens near the stage?	Objective lens
23. How do you calculate total magnification of the microscope?	Eyepiece x objective lens
24. Name two differences between an electron microscope and a light microscope	Electron microscope has much greater magnification Electron microscope has much better resolution
25. What does 'resolution' mean in microscopy?	The ability to distinguish between 2 objects
26. How have electron microscopes developed the understanding of cells?	Able to see the organelles – e.g ribosomes, mitochondria – with an electron microscope and see how they function.

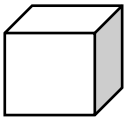
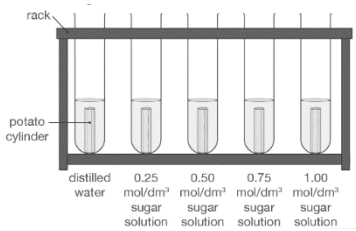
Cell specialisation and division

Question	Answer
1. Put the following into size order, smallest first: Tissue, nucleus, organ, cell, organ system	Nucleus, cell, tissue, organ, organ system
2. As an organism develops, stem cells form different types of cell. What name is given to this process?	Differentiation
3. Name one way in which a sperm cell is specialized for its function	Streamlined Contains many mitochondria Contains only half genetic information
4. What are the special features of the plant root cell that allow them to take up water efficiently? 	Many root hairs given them increased surface area
5. What is the function of the nucleus?	Contains the DNA
6. What are chromosomes made of?	DNA
7. In body cells, the chromosomes are found in…..	Pairs
8. What are the 3 stages of the cell cycle?	Interphase, mitosis, cytokinesis
9. What happens during interphase?	All the DNA is copied and so are all cell organelles like mitochondria, ribosomes etc
10. What happens during mitosis?	The chromosomes move to opposite sides, the nucleus divides
11. What happens during cytokinesis?	The cytoplasm and cell membranes divide
12. Why is mitosis important?	Growth and repair
13. Why does mitosis still take place in fully grown organisms?	Replace damaged cells or repair tissues
14. What is a stem cell?	An unspecialized cell capable of becoming any type of cell
15. What is the name of the source of stem cells in plants?	Meristem
16. What type of cells can be obtained from stem cells in bone marrow?	Blood cells
17. Name two diseases that could be treated using stem cells	Paralysis and diabetes
18. What is the main source of stem cells from which all other cells can be made?	Embryos
19. What is a ‘cloned’ cell?	A cell that is identical to the parent cell
20. What is therapeutic cloning?	When the patients DNA is inserted into an egg cell to create embryonic stem cells that match the patients DNA
21. What is the advantage of being treated with cloned cells?	Less chance of rejection
22. Name one risk associated with cloned cells	Transfer of viral infections
23. Name 2 benefits of cloning plants	Producing crop plants with better yields, protecting plants from extinction

Culturing microorganisms

Question	Answer
What is the term for cell division in bacteria?	Binary fission
What can bacteria be grown on or in?	Nutrient broth or agar
What does nutrient broth or agar provide for bacteria in order to grow?	Carbohydrates (for respiration) and other nutrients
Why do we need to culture bacteria?	To be ale to investigate the effectiveness of disinfectants or antibiotics
What is the name of the equipment used to transfer bacteria from a solution to agar?	Inoculating loop
When growing bacterial cultures, why is it necessary to: Sterilise the agar and petri dish Pass the inoculating loop through a Bunsen flame Secure the lid of the petri dish with tape Only tape 3-4 points of the dish, not all the way round	 To kill any bacteria in the agar or petri dish and avoid growing other bacteria Kill any bacteria on the loop Stop airborne bacteria getting into the petri dish Allows oxygen in and prevents the growth of anaerobic bacteria
How can the area of the colony be calculated?	Using the formula πr^2
What term is given to the clear zone around an antibiotic disc where bacterial growth has been prevented?	Zone of inhibition
How is the number of bacteria in a colony calculated?	$2^{\text{number of divisions}}$
In the set up below, what is the point of the filter paper with water on?  	It is an experimental control – it proves that the paper does not affect bacterial growth and any effect is due only to the solutions/antibiotics/antiseptic being tested

Transport

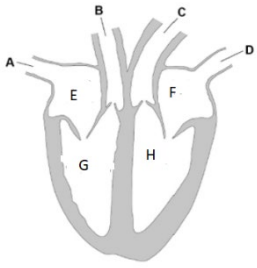
Question	Answer
1. Which part of the cell controls what moves in and out of the cell?	Cell membrane
2. What is diffusion?	Spreading out of particles of a gas or in solution, from an area of high concentration to an area of lower concentration
3. Name 3 substances that diffuse into and out of cells	Oxygen, glucose, carbon dioxide, urea (waste product)
4. Name 3 factors that affect the rate of diffusion	Difference in concentration, temperature, surface area of the membrane
5. For the shape below:  i) How is the surface area calculated? ii) How is the volume calculated?	i) Find the area of each face and add them together. If it's a cube, then find the area of one face and multiply by 6 ii) volume = length x breadth x height
6. Why do multicellular organisms need specific exchange surfaces and a system of transport like the blood?	Their surface area to volume ratio is too low without folded internal surfaces
7. What features are usually present in an exchange surface?	Large surface area, thin membranes, good blood supply (in animals)
7. What feature of the lungs gives them a large surface area?	Alveoli
8. What feature of the small intestine gives them a large surface area?	Villi
9. What is osmosis?	Movement of water from a solution with a high concentration of water (a dilute solution) to an area of lower water concentration (a more concentrated solution)
Questions 10 – 15 relate to the investigation on osmosis shown below:  The potato pieces were weighed They were then placed in tubes containing different concentrations of solution After 24 hours, they were removed, blotted with a paper towel and reweighed The change in mass was calculated, then a percentage change calculated	
10. What is the independent variable?	Concentration of the solution
11. What is the dependent variable?	Change in mass
12. Why were the potato pieces blotted dry?	To remove water from the surface as this would affect mass
13. Why do some pieces of potato lose mass?	They were surrounded by a more concentrated solution than their cell contents, so water moved out by osmosis
14. Why do some pieces gain mass?	They were surrounded by a more dilute solution than their cell contents, so water moved in by osmosis
15. What can be concluded if a potato piece does not lose or gain mass?	That the solution surrounding the potato is the same concentration as the cell contents (no water has been gained or lost)
16. What is active transport?	The movement of particles from a low concentration to a higher one using energy
17. Where does the energy for active transport come from?	Respiration
18. Give an example of a substance that is taken up by active transport in plants	Mineral ions by the root hair cells
19. Give an example of a substance that is taken up by active transport in animals	Glucose – from the intestines to the blood

Food & digestion

Question	Answer
1. What are the 7 components of food?	Carbohydrates, proteins, fats, water, vitamins, minerals and fibre
2. Which food component provides us with most of our energy?	Carbohydrates
3. What is protein needed for in the diet?	Growth and repair
4. In which organ does digestion begin?	Mouth
5. What is an enzyme?	A protein that acts as a catalyst
6. Why does food need to be digested?	So that small soluble molecules can get across the membrane of the small intestine into the blood
7. Which enzyme is produced in the mouth?	Amylase
8. Which is the only enzyme found in the stomach?	Protease
9. Name two organs that produce and release all 3 digestive enzymes	Pancreas and small intestine
10. When amylase acts on starch, what is produced?	Glucose
11. What is produced when proteins are broken down?	Amino acids
12. Which enzyme digests proteins?	Protease
13. Which enzyme digests fats?	Lipase
14. What are the two products when fats are broken down?	Fatty acids and glycerol
15. Where is bile made?	Liver
16. Where is bile stored?	Gall bladder
17. What are the 2 functions of bile?	Neutralize stomach acid to produce the right conditions for the enzymes in the small intestine Emulsify fats (provide a larger surface area)
18. What is the function of stomach acid?	Kill bacteria in food
19. What chemical is used to test for starch?	Iodine
20. What is the colour change in the chemical named in Q19 if starch is present?	Brown to blue black
21. Which chemical is used to test for protein?	Biuret
22. Describe what you would see in a positive test for protein	Colour change from blue to purple/lilac
23. What colour is Benedicts solution?	Blue
24. What is Benedicts used to test for?	Glucose
25. What is the colour change in Benedicts if the test is positive?	Blue to brick red
26. What are the small molecules produced in digestion used for?	To build new carbohydrates, fats or proteins in the body. Glucose is used in respiration
27. How can the Benedicts test be heated safely?	Using a water bath
28. How can foods be tested for the presence of fat?	Add equal volumes of ethanol and water – if the water goes cloudy, fats are present
29. Name a food that is a good source of carbohydrate	Potatoes, rice, pasta, bread
30. What type of foods are good sources of protein?	Meat, fish, cheese, pulses

Cardiovascular system

Question	Answer
1. What is the name of the top chambers of the heart?	Left and right atrium
2. What are the two bottom chambers called?	Left and right ventricles
3. Which blood vessels carry blood away from the heart?	Arteries
4. Why is the heart known as a 'double pump'?	Because the left side pumps to the body and the right side pumps to the heart
5. What is the name of the artery leaving the left ventricle to take blood to the whole body?	Aorta
6. Why are the valves in the heart?	To keep blood flowing one way and stop backflow
7. Where is the pacemaker located?	Right atrium
8. What is the name of the arteries that supply the heart itself with blood?	Coronary arteries
9. What is the name of the artery leaving the right ventricle to take blood to the lungs?	Pulmonary artery
10. What is the name of the blood vessel that brings blood to the heart from the body?	Vena cava
11. What is the name of the blood vessel that brings blood back from the lungs to the heart?	Pulmonary vein
12. What is the name of the main airway from the mouth to the lungs?	Trachea
13. The two airways that lead into the lungs are called….	Bronchi
14. Where in the lungs does gas exchange take place?	Alveoli
15. What are the 4 components of blood?	Plasma, platelets, red blood cells, white blood cells
16. Which part of the blood carries dissolved substances?	Plasma
17. What is the function of the red blood cells?	Carry oxygen
18. How are the red blood cells adapted for their function?	They have no nucleus and lots of haemoglobin
19. What is the function of the white blood cells?	Detect and destroy pathogens
20. What are the platelets for?	Clotting blood
21. Which blood vessels contain valves?	Veins
22. Which blood vessels have a strong elastic wall and thick layer of muscle to ensure blood is under high pressure?	Arteries
23. Which blood vessels have walls that are only one cell thick?	Capillaries
24. Which blood vessels carry blood under low pressure back to the heart?	Veins
25. How is the blood on the left side of the heart different from the blood on the right?	The blood on the left is higher in oxygen and lower in carbon dioxide



A ……Vena Cava

B ……pulmonary artery…….

C ……Aorta…….

D ……Pulmonary vein……..

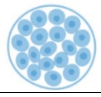
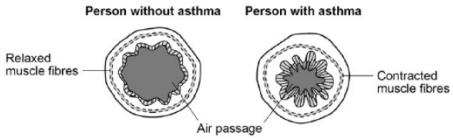
E ……Right atrium……

F ……left atrium……..

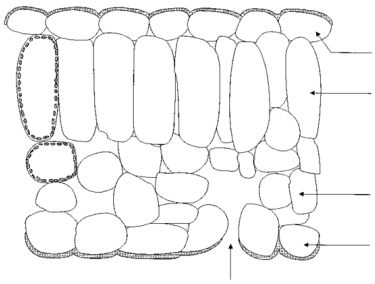
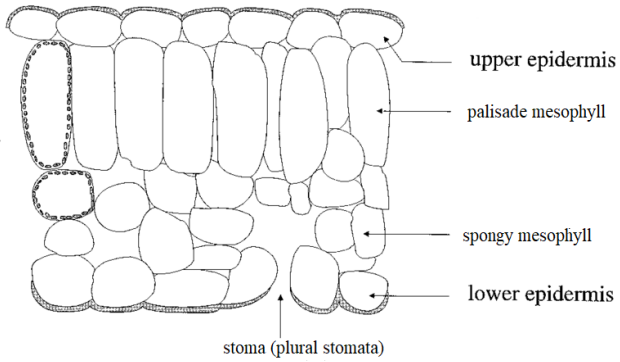
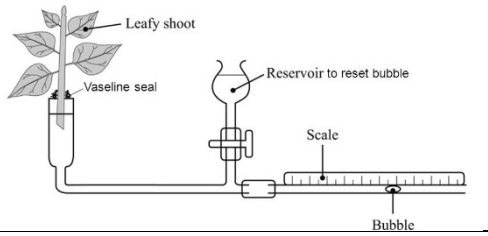
G ……right ventricle……

H ……left ventricle……..

Non-communicable disease

Question	Answer
1. What is health?	The state of physical and mental well-being
2. What is a non-communicable diseases?	A disease NOT caused by a pathogen and therefore cannot be passed from person to person
3. Name 3 lifestyle factors that are linked with cardiovascular disease	Smoking, diet, exercise
4. Which two organs are affected by alcohol?	Liver and brain
5. Name a risk factor for Type 2 diabetes	Obesity
6. What is a carcinogen?	Something capable of causing cancer
7. What is cancer?	Uncontrolled cell division
8. What is a benign tumour? 	One that will not spread around the body
9. Why do benign tumours not spread around the body?	Because they are contained within a membrane
10. What is a malignant tumour? 	One that is capable of spreading around the body
11. How do bits of malignant tumours spread around the body?	In the bloodstream
12. Name some risk factors for cancer	Genetics, diet, smoking, ionizing radiation
13. What happens during an asthma attack?	The airways (bronchi and bronchioles) constrict
14. Which virus is linked with cervical cancer?	HPV
15. Name 2 diseases linked to obesity	Heart disease and type 2 diabetes
16. Which parts of the body are affected by asthma?	Airways (trachea, bronchi, bronchioles)
17. Why do people with asthma often struggle to breathe? Use the diagram below to help explain. 	Less air can flow in and out of the lungs
18. Name two lifestyle factors that can be a risk to unborn babies	Smoking, alcohol
19. Name a risk factor for skin cancer	Ultraviolet radiation (UV) from the sun
20. Name a risk factor for lung cancer	Smoking
21. What is coronary heart disease?	When coronary arteries become blocked due to fatty deposits
22. What happens during a heart attack?	Coronary artery is completely blocked, restricting blood flow to the heart, resulting in a lack of oxygen to the heart muscle
23. How does a stent help treat CHD?	Opens up the artery, restoring blood flow
24. How do statins help treat coronary heart disease?	Lowers cholesterol levels in the blood

Plant tissues, organs and organ systems

Question	Answer
1. Label the tissues in the leaf section diagram below: Upper epidermis, lower epidermis, palisade mesophyll, spongy mesophyll 	
2. What is the function of the epidermis?	Covers the top and bottom of the leaf
3. Why are their air spaces in the spongy mesophyll?	To allow gases to diffuse
4. In which tissue does most photosynthesis take place?	Palisade mesophyll
5. What is the function of the stomata?	Control gas exchange and water loss
6. Which cells can change shape to open or close the stomata?	Guard cells
7. What is the function of the xylem?	Transport water from the roots to the leaves
8. What is the function of the phloem?	Transport dissolved sugars around the plant
9. What is 'transpiration'?	The evaporation of water through the stomata
10. What is 'translocation'?	The transport of dissolved sugars around the plant in the phloem
11. Which factors can affect the rate of transpiration?	Wind, temperature, light intensity, humidity
12. How could the equipment below be used to measure the rate of transpiration? 	Measure how far the bubble moves in a set amount of time (e.g a minute)
13. By which method do root hair cells take up mineral ions?	Active transport
14. By which method do root hair cells take in water?	Osmosis
15. Describe the structure of the xylem tissue	Hollow tubes
16. Which substance is present in spirals to strengthen the xylem?	Lignin
17. How are root hair cells specialized for uptake of water and mineral ions?	Large surface area, mitochondria (for energy for active transport)
18. Why are the stomata only found on the underside of the leaf?	It is cooler on the underside, so less water is lost by evaporation

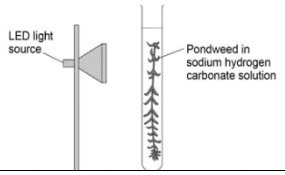
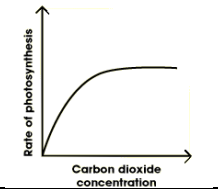
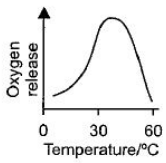
Communicable diseases

Question	Answer
What is a communicable disease?	It is a disease that can be transmitted from one organism to another because its caused by a microorganism
What is a pathogen?	Any microorganism that can cause diseases
Name 4 different pathogens	Bacteria, virus, protist, fungi
How are pathogens spread?	They can be spread by air, water and direct contact
How do bacteria make you unwell?	They produce toxins that can damage tissues
How do viruses make you unwell?	They reproduce in cells, causing damage or death to the host cell
Name two viral diseases in humans	HIV, measles
What is TMV?	Tobacco mosaic virus
What are the symptoms of gonorrhea?	A thick yellow or green discharge from the penis or vagina and pain whilst urinating
What are the symptoms of Salmonella?	Fever, stomach cramps, vomiting and diarrhoea
How is Salmonella spread?	It is spread by eating food (poultry) prepared in unhygienic conditions
What is rose black spot?	A fungal disease that affects rose bushes. Black spots grow on leaves causing them to turn yellow and drop off. It prevents the leaves from photosynthesizing
How can plant diseases be identified?	Use the gardening websites and manuals and monoclonal antibody kits
What pathogen causes malaria?	Protist
What are the symptoms of malaria?	Recurrent episodes of fever, can lead to death
How can the spread of malaria be prevented?	Stop the vector, mosquitos from breeding and by using mosquito nets to avoid being bitten. This stops the protists from entering the host (human)
Name 3 ways to control the spread of communicable diseases	Good hygiene routines, vaccination, control vectors (isolate infected individuals)
Name mechanical defenses that protect plants from communicable diseases	Plants have thorns/ hairs or they have leaves that can droop or curl
How can aphids/ greenflies be controlled by gardeners?	Use pesticides or introduce a natural predator like ladybirds to eat them
What non- specific systems does the human body use to stop pathogens from getting in?	The body had skin, cilia and mucus in the nose, trachea and bronchi and acid in the stomach
What is the function of the white blood cells? (3)	Produces antibodies, produces antitoxins and phagocytosis
What is an antitoxin?	An antitoxin is a substance that neutralises toxins produced by pathogens by binding to them
What happens during phagocytosis?	A phagocyte (type of WBC) goes to the area of infection and engulfs a pathogen. It then releases enzymes to digest the pathogen
What is an antigen?	An antigen is a specific protein found on the surface of a pathogen

Vaccines, plant defences and monoclonal antibodies

Question	Answer
What does a vaccine contain?	It contains a small amount of the dead or weakened form of the pathogen
How does a vaccine work?	A vaccine stimulates the body to produce antibodies against a specific pathogen. If the same pathogen re-enters the body, WBC will quickly produce the correct antibodies to destroy the pathogen
Why are antibodies a specific defence?	Antibodies must be the correct shape for the pathogen's unique antigens, so they target a specific pathogen
What is herd immunity?	This is when most of a population is vaccinated against a disease, meaning the disease is less likely to spread and cause infection
What is a clone of cells?	It is a group of identical cells that have formed from a single cell, which has repeatedly divided
What is a hybridoma?	A hybrid of a lymphocyte and tumour cell, which can divide and grow endlessly to produce antibodies
What is a lymphocyte?	It is a type of white blood cell that makes antibodies
How can monoclonal antibodies be used to target specific chemicals or cells?	Monoclonal antibodies are specific to a single binding site on a specific protein antigen
How are monoclonal antibodies used in research?	The are used to locate and identify specific molecules in cells and tissues
How are monoclonal antibodies used in diagnostic testing?	They are used to measure levels of hormones or chemicals in the urine or blood e.g. HCG in the urine to test for pregnancy
How are monoclonal antibodies used to treat cancer?	They deliver toxic chemicals and drugs directly to cancer cells and not healthy cells, so limiting the harm to them
Why are monoclonal antibodies not used as widely as anticipated?	They have more side effects than expected
What are the signs of disease in plants?	Stunted growth, discolouration of leaves, spots, rot etc
How can diseases be identified by gardeners?	Looking in a manual/website, taking them to a lab or using monoclonal antibody testing kits
What does nitrate deficiency cause?	Stunted growth (nitrate is needed for proteins for growth)
What does magnesium deficiency cause?	Chlorosis (insufficient chlorophyll, so yellowing of leaves)
Describe some of the physical defences a plant has	Cellulose cell walls, tough waxy cuticle, layers of dead cells (eg bark)
What chemical defences do some plants have?	Antibacterial chemicals, poisons to deter herbivores
What sort of mechanical defences do plants have?	Thorns, leaves that droop when touch, mimicry

Photosynthesis

Question	Answer
1. What are the reactants in photosynthesis?	Carbon dioxide and water
2. What are the products in photosynthesis?	Glucose and oxygen
3. Write the symbol equation for photosynthesis	Carbon dioxide + water → glucose + oxygen
4. Why is photosynthesis an endothermic reaction?	Energy is needed (transferred by light)
5. Where in the plant cells does photosynthesis take place?	Chloroplasts
6. Name the factors that affect the rate of photosynthesis	Temperature, light intensity, carbon dioxide concentration, concentration of chlorophyll
7. Which substance found in the chloroplasts is needed for photosynthesis to take place?	Chlorophyll
Questions 8 – relate to this investigation which aims to test the hypothesis 'The rate of photosynthesis depends on the light intensity' 	
8. How can the rate of photosynthesis be measured using the equipment shown?	Counting the number of bubbles per minute
9. How could the light intensity be changed?	Move the lamp further away
10. What factors would need to be controlled to ensure a valid conclusion?	Temperature, plant, carbon dioxide conc
11. How could temperature be controlled?	Using a water bath (DON'T just say 'using a thermometer)
12. Why is an LED light used instead of a normal bulb?	LED lamps don't get hot
13. How many distances should be measured?	Minimum of 5
14. Why is the plant in sodium hydrogen carbonate solution instead of just water?	To provide carbon dioxide
15. Describe the relationship shown: 	As the carbon dioxide concentration increases, so does the rate of photosynthesis, but only up to a point, when even if the concentration is increased the rate remains constant
16. Describe the relationship shown: 	As the temperature increases, the rate of photosynthesis increases, but only up to about 40°C. After that, an increase in temperature causes the rate to decrease
17. What is a limiting factor?	A factor that is in the shortest supply and is therefore limiting the rate of photosynthesis
18. Why might a farmer not use artificial heat or lights above a certain level?	It may cost too much for not enough of an increase in photosynthesis rate
19. How can a distance be converted into 'light intensity' using the inverse square law?	Light intensity = $1/d^2$
20. What is the glucose made in photosynthesis used for?	Converted to starch for storage Made into amino acids Made into fats Used in respiration Used to make cellulose for cell walls

Respiration & metabolism

Question	Answer
1. Where does respiration take place?	Mitochondria
2. What is respiration?	An exothermic reaction that releases energy needed for all living processes
3. What does 'aerobic' mean?	With oxygen
4. What is the equation for aerobic respiration?	Glucose + oxygen → carbon dioxide + water
5. What does 'anaerobic' mean?	Without oxygen
6. What is the equation for anaerobic respiration in animal cells?	Glucose → lactic acid
7. Name 3 possible uses for the energy released during respiration	Movement Keeping warm
8. What is the chemical formula for glucose?	$C_6H_{12}O_6$
9. Give two ways aerobic respiration is different than anaerobic	Aerobic uses oxygen anaerobic doesn't Aerobic produces carbon dioxide and water, anaerobic produces lactic acid Anaerobic releases much less energy
10. What is the equation for anaerobic respiration in plant and yeast cells?	Glucose → alcohol + carbon dioxide
11. What term is used to describe anaerobic respiration in yeast cells?	Fermentation
12. Name 2 useful products made using anaerobic respiration by yeast	Bread and beer/wine
13. What happens to heart rate during exercise?	It increases
14. Why does the heart rate increase during exercise?	To increase the volume of blood delivered to working muscles
15. Give two changes in breathing during exercise	Breathing is faster and deeper
16. Give two reasons breathing changes in this way during exercise	To get more oxygen in and to get rid of more carbon dioxide
17. What is 'metabolism'?	The sum of all the chemical reactions in an organism
18. Name three carbohydrates that can be made from glucose	Starch, glycogen and cellulose
19. What additional substance do plants need from the soil to turn glucose into amino acids?	nitrates
20. What two substances are needed to make lipids?	Fatty acids and glycerol