Combined Higher Knowledge quizzes

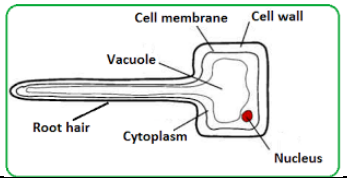
Tips:

- 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.

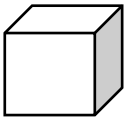
Cell structures and microscopy

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.

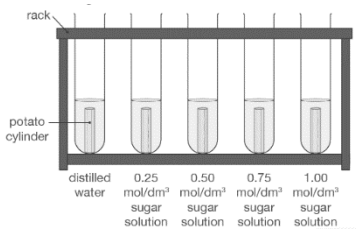
Cell specialisation and division

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

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:



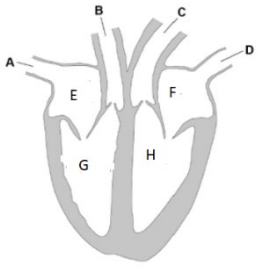
The potato pieces were weighed
They were then placed in tubes containing different concentrations of solution
After 24 hours, they were removed, blotted with a paper towel and reweighed
The change in mass was calculated, then a percentage change calculated

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

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 carbodydrates, 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……..

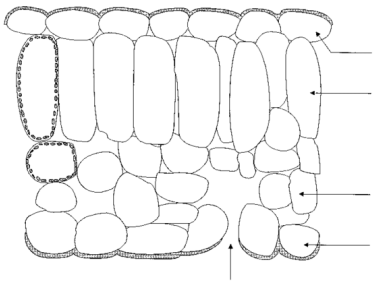
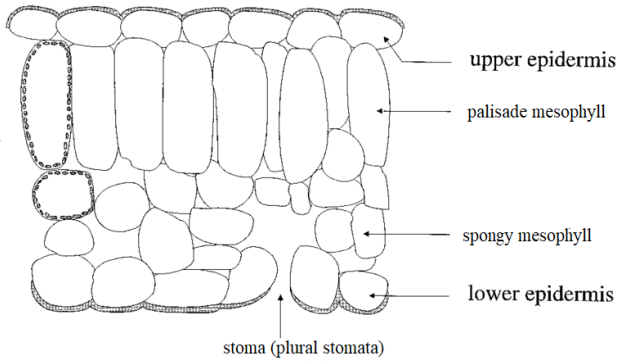
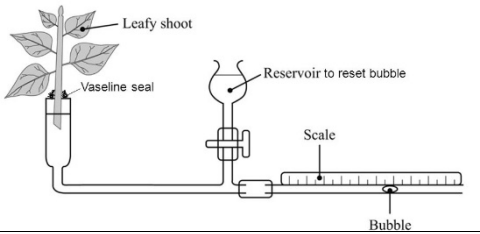
E ……Right atrium……

F ……left atrium……..

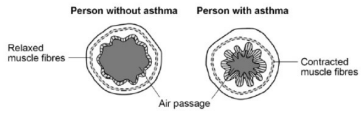
G ……right ventricle……

H ……left ventricle……..

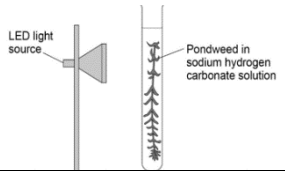
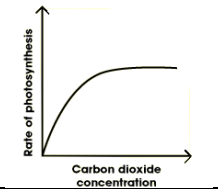
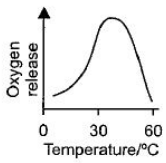
Plant tissues, organs and organ systems

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

Health and 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?	Build up of fatty tissue in the coronary arteries
22. What is a heart attack?	When the coronary arteries are blocked meaning blood cannot get to the heart so it is deprived of oxygen for respiration
23. How do stents reduce the risk of another heart attack?	They open up the artery and restore blood flow
24. What do statins do?	They reduce cholesterol levels in the blood
25. What is the problem caused by faulty heart valves?	Blood may flow the wrong way in the heart – ie back into the atria

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

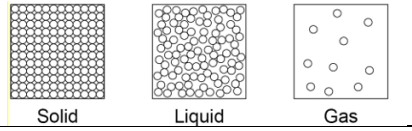
Question	Answer
1. Where does respiration take place?	Mitochondria
2. What is respiration?	An exothermic reaction that releases energy needed for all living processes
3. What does 'aerobic' mean?	With oxygen
4. What is the equation for aerobic respiration?	Glucose + oxygen → carbon dioxide + water
5. 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

Question	Answer
1. What is an element?	A substance that contains only one type of atom
2. What is a compound?	A substance that contains 2 or more elements chemically bonded together
3. What is a mixture?	A substance containing 2 or more elements or compounds that are not joined together
4. What method would you use to separate a mixture of 2 or more dissolved substances?	Chromatography
5. What method would you use to separate a mixture of a liquid and an insoluble solid?	Filtering
6. Ethanol and water mix together to form a solution – what method could be used to separate the two liquids?	Distillation
7. What was the 'plum pudding' model of the atom?	The atom consisted of a cloud of positive charge with electrons randomly scattered within it
8. Which atomic particle was discovered first?	Electron
9. What was the major change to the atomic model that came from the 'alpha scattering' experiment?	The positive charge was contained in a very small nucleus
10. Which particle did Chadwick discover?	Neutron
11. What is needed in order to change a scientific model and replace it with a new one?	New evidence
12. What is the charge on a proton?	+1
13. What is the charge on an electron?	-1
14. Why are atoms neutral overall?	They contain the same number of protons and electrons
15. What makes one element different from another?	They have different protons
16. What is the size of an atom?	1×10^{-10}m
17. How much smaller than the atom is the nucleus?	10 000 X
18. What is an isotope?	An atom with the same number of protons but different numbers of neutrons
19. How do you use the numbers on the periodic table to calculate the number of neutrons in an atom?	Subtract the atomic number from the mass number
20. What are the differences between the plum pudding model and the nuclear model?	Plum pudding had positive charge throughout the atom, nuclear has it within a small nucleus Plum pudding has randomly scattered electrons, nuclear model has them orbiting in shells
21. What is the mass of a proton?	1
22. What is the mass of a neutron?	1

Periodic table

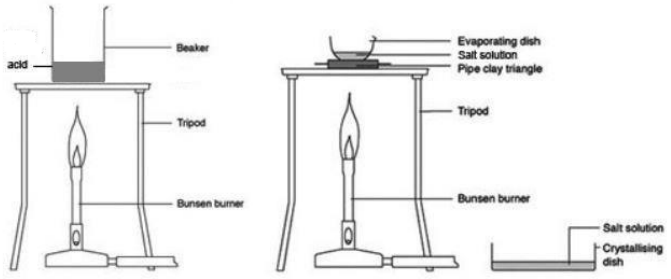
Question	Answer
1. What is used to order the elements in the modern periodic table?	Atomic number / proton number
2. What was used in early versions of the periodic table?	Atomic weight
3. What do all elements in the same group have in common?	Same number of electrons in the outer shell
4. What did Mendeleev do in his periodic table?	Left gaps for undiscovered elements
5. What do we call atoms with the same number of protons but different numbers of neutrons?	Isotopes
6. What do we call the elements that react to form positive ions?	Metals
7. What type of elements form negative ions?	Non-metals
8. Give 3 properties of metals	Conduct electricity, conduct heat, shiny when fresh cut
9. Give 3 properties of non-metals	Don't conduct electricity, low melting and boiling points, dull
10. Why are group 0 elements unreactive?	They have full outer shells so do not need to gain or lose any electrons
11. What happens to their melting and boiling points as you come down the group?	The melting and boiling points increase down the group
12. What are the group 1 metals called?	Alkali metals
13. What happens to reactivity coming down group 1?	Reactivity increases down the group
14. Why does this happen?	The outer shell electron is further away from the nucleus and more shielded, so is more easily lost
15. What are the two products when a group 1 metal reacts with water?	An alkali and hydrogen gas
16. What can be added to the solution to prove an alkali has formed?	Universal indicator
17. What are the group 7 elements called?	Halogens
18. How many electrons are in their outer shells?	7
19. What happens to melting and boiling point coming down group 7?	It increases
20. Why does this happen?	The molecules get bigger, so the intermolecular forces are stronger and so it takes more energy to overcome the forces
21. What happens to reactivity coming down group 7?	Reactivity decreases down the group
22. Why does this happen?	The outer shell is more shielded and further away, so it gets harder to attract an electron into the outer shell
23. When a more reactive halogen is added to a solution of a compound of a less reactive halogen, what happens?	The more reactive halogen displaces the less reactive one
24. What sort of compounds do group 7 elements form with metals?	Ionic
25. Describe 2 properties of these compounds	White crystalline solids, high melting points

Bonding and properties

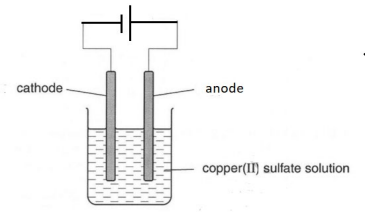
Question	Answer
1. What does an (s) in an equation mean?	Solid (insoluble)
2. What state of matter is represented by (l)?	Liquid
3. How would a gas be represented in an equation?	(g)
4. What two changes of state can happen at the melting point?	Melting and freezing
5. What two changes of state can happen at the boiling point?	Boiling and condensing
6. What does (aq) mean?	Aqueous solution – dissolved in water
7. What forces of attraction are found in ionic compounds?	Electrostatic
8. Why are the melting and boiling points of ionic compounds so high?	The electrostatic forces are strong so it takes lots of energy to overcome all of them in the ionic lattice
9. Name a limitation with using the particle model shown below: 	• There are no forces shown between the particles • No movement is shown • Particles are represented as solid spheres
10. Why are carbon dioxide and oxygen gases at room temperature?	Because their boiling point is lower than room temperature (they are simple covalent molecules)
11. Why do small molecules have low melting and boiling points?	The forces between the molecules are weak and don't need much energy to overcome
12. What happens to melting and boiling points as molecules get bigger and why is this?	They increase
13. Why do simple covalent molecules not conduct electricity?	The molecules have no overall charge
14. What sort of bonding is found in polymers?	Covalent
15. Why are polymers normally solids at room temperature?	Because they are large molecules so the forces of attraction are fairly strong
16. What sort of structures are diamond, graphite and silica examples of?	Giant covalent structures
17. Why do they have high melting and boiling points?	Lots of energy is needed to break all the strong covalent bonds
18. What sort of bonding is found in metals like gold and silver?	Metallic
19. Why do metals conduct electricity?	Because they have delocalized electrons that are able to move through the metal
20. Why are pure metals easily bent and shaped?	The layers of atoms are able to slide over each other easily
21. What is an alloy?	A mixture of metals
22. Why are alloys stronger than pure metals?	Because the layers are disrupted so they cannot slide
23. How many other carbon atoms is each carbon bonded to in diamond?	4
24. Why is diamond hard?	Giant structure of very strong covalent bonds
25. How many covalent bonds does each carbon make in graphite?	3
26. Why does graphite conduct electricity?	It has delocalized electrons that can move through the graphite
27. Why is graphite slippery?	Graphite is in layers and they are able to move over each other
28. What is graphene?	A single layer of graphite
29. What type of molecules are based on hexagonal rings of carbon atoms?	Fullerenes
30. What type of structure is shown in the diagram: 	nanotube

Question	Answer
1. What is oxidation?	Combining with oxygen OR loss of electrons
2. What is reduction?	Loss of oxygen OR gain of electrons
3. What makes one metal more reactive than another?	How easily it forms an ion
4. Which element is used to extract less reactive metals from their ores?	Carbon
5. What are the products when metals react with acids?	Salt and hydrogen gas
6. What is produced when acids react with bases?	Salt and water
7. What is an alkali?	A soluble base – contains OH^- ions
8. What type of salt is formed if hydrochloric acid is neutralized?	Chloride
9. What type of salt is formed if sulfuric acid is neutralized?	Sulfate
10. What type of salt is formed if nitric acid is neutralized?	Nitrate
11. How can soluble salts be obtained from solutions?	Crystallization / evaporation
12. Which particle makes a solution acidic?	H^+
13. Which particle makes a solution alkaline?	OH^-
14. Write the ionic equation for neutralization	$H^+ + OH^- \rightarrow H_2O$
15. What is the range of pH in the pH scale?	0-14
16. How can pH be measured?	Using universal indicator or a pH probe
17. What is the pH of a neutral solution?	7
18. What is the pH of an acid?	0-6.9
19. What is the pH of an alkali?	7.1-14
20. What is a strong acid?	One that fully ionizes/dissociates in solution
21. Why do weak acids have higher pH than strong ones?	They do not fully dissociate in solution and weaker acids have a pH closer to 7
22. When the pH changes by 1, what is the change in H^+ ion concentration?	X 10

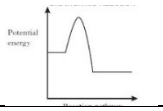
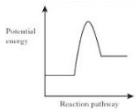
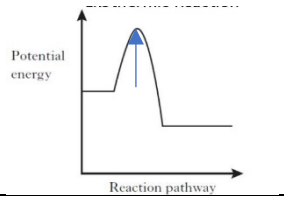
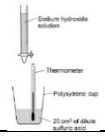
Q 23 –31 relate the equipment below which can be used to make copper chloride



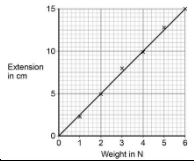
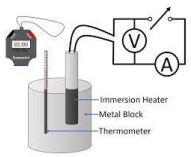
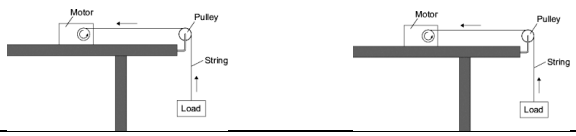
23. Which acid should be used?	Hydrochloric (to give a chloride)
24. Why is the acid heated?	To speed up the reaction
25. Name a suitable base to neutralize the acid	Copper oxide or copper carbonate
26. Why can copper metal not be used?	Copper does not react with acids
27. Why is the base added in excess?	To make sure the acid is fully neutralized
28. How would you know when the base is in excess?	Solid collects at the bottom of the beaker
29. How could the excess base be removed?	Filter
30. How would the salt be obtained from the solution?	Crystallization / evaporation
31. Name a piece of equipment that the dish could be placed in to crystallise the solution safely	Drying oven

Question	Answer
1. Why can ionic compounds conduct electricity when molten or in solution?	The IONS can move
2. Why can ionic compounds NOT conduct electricity when they are solids?	The ions are unable to move as they are stuck in the lattice
3. What is an electrolyte?	A solution or liquid that is able to conduct electricity
4. What is electrolysis?	Splitting (NOT separating) a compound using electricity
5. What is the name of the negative electrode?	Cathode
6. What is the name of the positive electrode?	Anode
7. What happens to positive ions at the cathode?	They gain electrons (reduced) to become atoms
8. What happens to negative ions at the anode?	They lose electrons (oxidized) to become atoms
9. What is the gain of electrons called?	reduction
10. Which metals are extracted by electrolysis?	Metals that are too reactive to be reduced using carbon
11. Why does electrolysis use a lot of energy?	Lots of energy is needed to melt ionic compounds and then the production of the electric current
12. Why is graphite used in the electrodes?	Because it has delocalized electrons that can move and so it conducts electricity
13. Why is cryolite added to aluminium oxide before electrolysis?	To lower the melting point
14. What is formed at the cathode in the electrolysis of aluminium oxide?	Aluminium
15. What is the product at the anode in the electrolysis of aluminium oxide?	Oxygen
16. Why do the anodes need to be continually replaced?	The oxygen produced reacts with the carbon electrodes to make carbon dioxide
17. What does (aq) mean?	Dissolved in water – an aqueous solution
18. Which ions are also present if an ionic compound is dissolved in water and then electrolysed?	H^+ and OH^- ions
19. Why does hydrogen form at the cathode when solutions are electrolysed?	If the metal in the solution is more reactive than hydrogen, then hydrogen will be released
20. What is formed at the anode if solutions are electrolysed?	Oxygen or, if a halogen is present, the halogen (group 7 element)
21. What is the ionic equation for the formation of oxygen at the anode?	$4OH^- - 4e^- \rightarrow O_2 + 2H_2O$
Questions 22-27 are about the following equipment, used to electrolyse a solution of copper sulphate 	
22. Complete the diagram to label the other electrode and to complete the supply of electricity	
23. Which ions are present in the solution?	Cu^{2+} H^+ SO_4^{2-} OH^-
24. What will be formed at the cathode and why?	Copper – as it less reactive than hydrogen
25. What will be formed at the anode and why?	Oxygen – there is no halogen present
26. Name a solution that could be used instead of copper sulphate to produce hydrogen at the cathode	Potassium sulphate (substitute any metal that is more reactive than copper)
27. Name a solution that could be used instead of copper sulphate to produce chlorine at the anode	Copper chloride

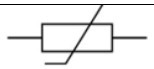
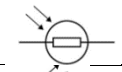
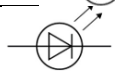
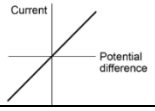
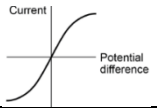
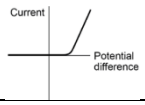
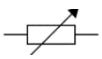
Energy in reactions

Question	Answer
1. What is activation energy?	The minimum amount of energy needed to get a reaction started
2. What is an exothermic reaction?	One in which energy is transferred to the surroundings
3. Give 3 examples of exothermic reactions	Combustion, neutralization, oxidation reactions
4. Give an everyday use of exothermic reactions	Self heating cans and hand warmers
5. What is an endothermic reaction?	One in which energy is transferred from the surroundings to the reaction
6. Give 2 examples of endothermic reactions	Photosynthesis, thermal decomposition
7. What is energy needed for in a reaction?	In order to break bonds in the reactants
8. When is energy released during a reaction?	When new bonds are made in the products
9. When is a reaction exothermic overall?	If more energy is released when bonds are made than was needed to break bonds
10. When would a reaction be endothermic overall?	When more energy was required to break bonds than was released when bonds were made
11. How do you use a bond energy table like the one below to calculate the energy transferred? $H_{2(g)} + I_{2(g)} \rightleftharpoons 2HI(g)$ Bond: H-H, Average Bond Energy / kJmol^{-1}: + 436 Bond: I-I, Average Bond Energy / kJmol^{-1}: + 151 Bond: H-I, Average Bond Energy / kJmol^{-1}: + 298	Add up the energy used in breaking bonds and subtract the amount of energy released when bonds are made in the products, e.g: 436 + 151 = 587 required 2 x 298 = 596 released 587-596 = -9kJ
12. What type of reaction is represented by the diagram shown: 	Exothermic
13. What type of reaction is represented by the diagram shown: 	Endothermic
14. Draw an arrow on the diagram to represent the activation energy	 Do NOT just draw an arrow pointing to the tip of the slope
Questions 15 – 19 relate to the equipment below which can be used to investigate the variables that affect temperature change by testing 'The temperature change in the solution depends on the volume of sodium hydroxide added' 	
15. Why is a polystyrene cup used for the reaction instead of a beaker?	To **reduce** energy transfers (don't say 'stop')
16. How could energy losses be reduced further?	Put a lid on the cup
17. If the reaction is exothermic, what will happen to the temperature?	It will increase
18. A digital temperature probe can be used instead of a thermometer. How could this affect the readings' a) accuracy b) resolution	a) It would increase the accuracy as the digital readout is easier to read b) resolution could be increased if the probe can measure to 1 or two decimal places
19. Name 3 control variables for the experiment	Concentration of both acid and alkali, volume of acid, starting temperature of the liquids (NOT the 'temperature of the room')

Energy and Specific heat RP

Question	Answer
1. Name the 8 energy stores	Kinetic, magnetic, nuclear, electrostatic, gravitational potential, elastic potential, chemical, thermal
2. Which energy store is filled when an object is lifted upwards?	Gravitational potential
3. Which energy store is filled when an elastic object is stretched or squashed?	Elastic potential
4. Which energy store is filled when an object is moving?	Kinetic
5. If an object falls from a height, which energy store decreases?	Gravitational potential
6. If an object falls from a height, which energy store fills?	Kinetic
7. During an energy transfer, which store is filled when energy is 'wasted' or dissipated?	Thermal store of the environment
8. What unit should mass always be in for a calculation?	Kilograms
9. What is the unit for velocity?	m/s
10. What sort of relationship is shown by the graph: 	Directly proportional
11. What is the specific heat capacity?	The amount of energy needed to raise the temperature of 1Kg of a substance by 1°C
Q 12 – 16 relate to the equipment below, which is used to calculate the specific heat capacity of the block. 	
12. How is the mass of the block measured?	Using a balance / weighing scales
13. Why is water placed in the hole with the thermometer?	To improve the contact with the block (air is an insulator)
14. What is the heater for?	To transfer energy to the block
15. Why would the value calculated for specific heat capacity using this method be much higher than the true value?	A lot of energy is transferred from the block to the thermal store of the environment
16. Name one improvement to the method.	Insulate the block
17. What is power?	The rate at which energy is transferred
18. What is the unit for power?	Watts (W)
19. What is 1 Watt equivalent to in joules?	1 joule per second
20. If the motors shown below both lift the same object, but one is more powerful, what would be the difference? 	One would lift faster

Circuits and IV characteristics RP

Question	Answer
1. What is electricity?	A flow of charge
2. What is current?	The **rate** of flow of charge
3. What are the units for current?	Amps (A)
4. What are the units for charge?	Coulombs
5. What is this component? 	Fixed or ohmic resistor
6. What is this component? 	Dioide
7. What is this component? 	Thermistor
8. What is this component? 	Light dependent resistor (LDR)
9. What is this component? 	Light emitting diode (LED)
10. What is the unit for potential difference?	Volts (V)
11. What is the unit for resistance?	Ohms (Ω)
12. What is the relationship shown: 	Directly proportional
13. Which component gives the relationship shown in Q 12?	Fixed/ohmic resistor
14. Which component gives this relationship in a circuit: 	Filament lamp
15. Why does the current stop increasing even when the pd increases in a filament bulb?	The resistance increases as the bulb gets hot
16. Which component gives this relationship: 	Diode
17. What happens to resistance in a thermistor as the temperature increases?	The resistance decreases
18. What happens to resistance in a light dependent resistor when light intensity increases?	The resistance decreases
19. How does a diode only allow current in one direction?	It has very high resistance in the other direction
20. Which component is shown : 	Variable resistor
21. What is the National Grid?	A series of cables and transformers for transferring electricity
22. What do 'step up transformers' do?	Increase the potential difference
23. What is the advantage of carrying electricity at such high voltages?	The current can be kept low which reduces energy losses in wires (they don't get as hot)
24. What is the pd into homes?	230 V
25. What two factors affect how much energy is transferred by an electrical appliance?	The power of the appliance and how long it is used for (e= p x t)

Particles

Question	Answer
1. Which state of matter has particles in ordered neat rows that are all touching?	Solid
2. Which states of matter cannot be compressed (squashed)	Solid
3. What words can be used to describe the arrangement of the particles in a gas?	Far apart, random
4. In which state of matter is the attraction between the particles the strongest?	Solid
5. Why does 1Kg of a solid take up less space than a Kg of gas?	The particles are all close together in a solid, whereas in a gas they are spread out
6. Why are liquids and gases able to flow?	The attraction between the particles is weak so they are able to move around each other
7. Name the change of state when a liquid turns into a gas	Evaporation
8. Name the change of state when a gas turns into a liquid	Condensation
9. Which change of state occurs when a solid melts?	Melting
10. What happens to the temperature of a substance while a change of state happens?	It remains constant
11. What happens to the mass of a substance during a change of state?	It remains constant
12. What are the units for mass?	Kg
13. What are the units for volume?	cm^3 or m^3
14. What are the units for density?	Kg/m^3
15. Name the change of state when a solid turns straight into a gas	Sublimation
16. How should the particles in a solid be drawn?	In neat rows, all touching
17. How should the particles in a liquid be drawn?	Randomly, but all touching
18. How should the particles in a gas be drawn?	Randomly, and spaced far apart
19. What name is given to the temperature at which a solid turns into a liquid or a liquid turns into a solid?	Melting point
20. What term is given to the temperature at which a liquid turns into a gas or a gas turns back into a liquid?	Boiling point
21. What determines the temperature of a substance?	The kinetic energy of the particles in the substance
22. If you increase the temperature of a gas in a container, what happens to the pressure?	Pressure increases
23. What causes the pressure in a container of gas?	Collision of the particles with the walls of the container
24. Why does pressure decrease if you cool a gas?	The kinetic energy of the particles decreases, so collisions are less frequent and less forceful

Question	Answer
1. How big is an atom?	1×10^{-14} m
2. How much smaller is the nucleus than the atom?	10, 000 x smaller (or 4 orders of magnitude)
3. What can cause electrons to move further from the nucleus?	If the atom absorbs EM radiation
4. What can cause electrons to move closer to the nucleus?	If the atom emits EM radiation
5. What is an isotope?	An atom with the same number of protons but different number of neutrons
6. Before electrons were discovered, what were atoms thought to be like?	Tiny spheres that could not be divided into anything smaller
7. What is the order of discovery of the sub atomic particles?	Electron, proton, neutron
8. What was the major change to the atomic model from Rutherford's scattering experiment?	That the positive charge was contained in a small nucleus at the centre of the atom, not spread throughout
9. What made Rutherford think that the atom was mostly empty space?	Most of the alpha particles passed straight through the gold leaf
10. What evidence made Rutherford think that the positive charge was contained in a tiny nucleus?	Only a very small number of alpha particles were deflected or reflected back
11. What is radioactive decay?	When an atom emits particles and/or energy from its nucleus in order to become stable
12. What is the rate at which decay takes place known as?	Activity
13. What is activity measured in?	Becquerels (Bq)
14. Name the 4 main types of radiation	Alpha, beta, gamma, neutron
15. What does an alpha particle consist of?	2 protons and 2 neutrons
16. Which structure does an alpha particle resemble?	A helium nucleus
17. What is a beta particle?	An electron
18. How is a beta particle formed?	A neutron splits into a proton and an electron
19. What is a 'gamma ray'?	An EM wave from the nucleus
20. Which of the types of radiation has the shortest range in air (can travel least far)	Alpha
21. Which one can travel the furthest?	Gamma
22. Which type of radiation is the most ionizing?	Alpha
23. Which type of radiation is the most penetrating?	Gamma
24. What is 'half life'?	The time it takes for the count rate to fall to half its initial value or the time taken for half of the atoms in a sample to decay
25. In nuclear equations, what are the two ways an alpha particle can be represented?	$^{4}_{2}\mathrm{He}$ OR $^{4}_{2}\alpha$
26. How is a beta particle represented in nuclear equations?	$^{0}_{-1}\mathrm{e}$ OR $^{0}_{-1}\beta$
27. What is radioactive contamination?	The unwanted presence of radioactive atoms
28. What determines the level of hazard from contamination?	The type of radiation they emit (whether alpha, beta, etc) and where the contamination is (breathed in, on skin etc)
29. What is irradiation?	Exposure to one of the types of radiation – e.g alpha, beta, gamma etc
30. Why is it important that any findings on the effects of radiation on humans are published?	So they can be checked by other scientists