By the end of Autumn 1 you will know:

Specialised animal cells

1. Where can stem cells be found in animals?
2. When do most types of animal cells differentiate?
3. Name two conditions human stem cells can be used to treat.
4. What can stem cells from human embryos be used for?
5. What can stem cells from adult bone marrow be used for?
6. What is made in therapeutic cloning?
7. Why do we do therapeutic cloning?
8. Why are some people against using stem cells?
9. State the function of a sperm cell
10. How is a sperm cell specialised for its function?
11. State the function of a nerve cell
12. How is a nerve cell specialised for its function?
13. State the function of a muscle cell
14. How is a muscle cell specialised for its function?

Blood components and blood vessels

1. What are the 3 different types of tissues in animals?
2. What are the components of blood?
3. What is the function of the plasma?
4. What is the function of the platelets?
5. What is the function of the red blood cells?
6. What are the adaptations of red blood cells?
7. What is the function of the white blood cells?
8. Name two risks of using blood products to treat patients.
9. What organ system are the heart and blood vessels part of?
10. What does the circulatory system do?
11. What is a double circulatory system?
12. Name three types of blood vessels
13. Which blood vessel goes:
    a. Towards the heart
    b. Away from the heart
    c. Around all organs in the body.
14. How are arteries are adapted to carry blood under high pressure
15. How are veins are adapted to carry blood under low pressure
16. How are capillaries are adapted to allow exchange of substances
17. What 3 things make up the circulatory system?

The heart

1. What does the heart do?
2. What tissue is the heart mainly made of?
3. What type of circulatory system does the body have?
4. List/label the parts of the heart.
5. What is the role of the right ventricle?
6. What is the role of the left ventricle?
7. Which blood vessel takes blood to the lungs?
8. Which blood vessel takes blood to the rest of the body?
9. Which blood vessel brings blood from the rest of the body to the heart?
10. Which blood vessel brings blood from the lungs back to the heart?
11. Which blood vessels supply blood to the heart?
12. Why does the left ventricle have a thicker muscle wall?
13. How is natural resting heart rate controlled.

Coronary heart disease and helping the heart

1. What are the coronary arteries?
2. What is coronary heart disease?
3. Give 2 lifestyle factors that increase your risk of CHD
4. Give 2 medical factors that increase the risk of CHD
5. Where does fatty material build up?
6. What does the fatty material do to the coronary arteries?
7. What effect does CHD have on the heart?
8. What can be used to keep the coronary arteries open?
9. What drug can be used to reduce blood cholesterol?
10. How does reducing blood cholesterol reduce the risk of a heart attack?
11. What is a stent?
12. What is a statin?
13. What is an artificial pacemaker?
14. List 2 problems associated with artificial pacemakers
15. What does mean when heart valve becomes faulty?
16. What problems can occur from a faulty heart valve?
17. What are two types of heart replacement valve?
18. When would an artificial heart be used?
19. When is a heart transplant carried out?

Lungs, gas exchange and smoking

1. List the parts of the respiratory system
2. List the parts of the lung in the order that air travels through it.
3. What is diffusion?
4. What are 3 ways to increase the rate of diffusion?
5. What gas diffuses from the lungs into the blood?
6. What gas diffuses from the blood into the lungs?
7. What is surface area to volume ratio?
8. What happens to the SA:V as an organism gets bigger?
9. Why do multi-cellular organisms need exchange surfaces?
10. Give 4 ways the alveoli are adapted for efficient gas exchange
11. What 3 chemicals are in cigarettes?
12. Give 3 diseases that can be caused by smoking?
13. Give 3 differences between the lungs of people who smoke and people who don't smoke

Digestive system

1. What is an organ system?
2. Put these into size order, starting with the smallest: organism, cell, tissue, organ system, cell
3. List the parts of the digestive system in order
4. What is the function of the salivary glands?
5. What is the function of the stomach?
6. What is the function of the small intestine?
7. What is the function of the liver?
8. What is the function of the gall bladder?
9. What is the function of the pancreas?
10. What are 2 uses of bile?
11. What pH is bile?
12. Where is the villi found?
13. What is the function of the villi?
14. How are the villi adapted to support their function?

Food Tests RP

1. What is the test for starch?
2. What is the colour change if starch is present?

3. List 2 foods that contain starch
4. Where is starch stored in a plant?
5. What is the test for simple sugars (glucose)?
6. What is the colour change if simple sugars are present?
7. Why do we heat the sugar solution to 37°C?
8. List 2 foods that contain simple sugars
9. What is the test for protein?
10. What is the colour change if protein is present?
11. List 2 foods that contain protein
12. What is the test for lipids?
13. What is the colour change if lipids are present?
14. List 2 foods that contain lipids
15. What is the biggest source of error with this experiment?
16. What type of data does this practical give us?

Enzymes and metabolism

1. What are enzymes?
2. What are enzymes made of?
3. Where does the substrate bind to an enzyme?
4. What is the lock and key model?
5. Why are enzymes needed in digestion?
6. Name the enzyme that digests starch
7. Name the enzyme that digests carbohydrase
8. Name the enzyme that digests protein
9. Name the enzyme that digests lipids
10. Where in the body are the 3 digestive enzymes produced?
11. Where in the body do the digestive enzymes work?
12. What are carbohydrates digested into?
13. What are lipids digested into?
14. What are proteins digested into?
15. What two factors affect enzyme activity?
16. What does it mean when an enzyme is denatured?
17. What happens when an enzyme is denatured?
18. What happens to enzyme activity when an enzyme is denatured?
19. What does optimum mean?
20. What is metabolism?
21. What are two examples of metabolic reactions?

Factors affecting enzymes and Required practical

1. What is a buffer solution?
2. Why are the solutions placed in a 37°C water bath?
3. What is the control variable in this experiment?
4. What is the independent variable in this experiment?
5. What is the dependent variable in this experiment?
6. What type of sampling technique is used in this experiment?

Aerobic and anaerobic respiration:

1. Where does aerobic respiration take place?
2. What are the reactants in respiration?
3. What are the products of respiration?
4. Where do the reactants of respiration come from?
5. Where do the products of respiration come from?
6. What is the word equation for aerobic respiration?
7. Is respiration an endothermic or exothermic reaction?
8. When does aerobic respiration happen?
9. List 3 reasons why organisms need energy from respiration
10. When does anaerobic respiration take place?
11. What is the word equation for anaerobic respiration in animals?
12. What is the word equation for anaerobic respiration in plant and yeast cells?
13. Why does anaerobic respiration release less energy?
14. What is another name for anaerobic respiration in yeast?
15. What is a commercial use of fermentation?

Effect of exercise (and long-term benefits)

1. What happens to heart rate when you exercise?
2. What happens to breathing rate when you exercise?
3. What happens to breath volume when you exercise?
4. What are the long-term benefits of regular exercise?
5. What happens to glycogen during exercise?
6. What happens to the rate of aerobic respiration during exercise?
7. What is muscle fatigue?
8. What is oxygen debt?
9. What effect does lactic acid have on the body?

Lifestyle factors – alcohol, smoking

1. What is a risk factor?
2. What is a non-communicable disease?
3. What other factors can affect health?
4. What is a causal mechanism?
5. Which two organs are most affected by drinking?
6. Which two diseases is smoking a risk factor for?
7. Which diseases is obesity a risk factor for?
8. List ways smoking can affect an unborn baby
9. What is the effect of smoking on the lungs?
10. List ways that alcohol can affect an unborn baby
11. What is the effect of alcohol on the liver?
12. What is the effect of alcohol on brain function?
13. What is a carcinogen?
14. What are 2 examples of carcinogens?
15. Where does ionising radiation come from?

Cancer and treatments

1. What is cancer?
2. What is a benign tumour?
3. What is a malignant tumour?
4. Name a risk factor for skin cancer
5. Name a risk factor for lung cancer
6. Name a risk factor for liver cancer
7. Name a risk factor for bowel cancer
8. What else could be a risk factor for certain cancers?
9. What are two ways to treat cancer?

Communicable disease and Non-specific defences

1. What is the definition of health?
2. What is a micro-organism?
3. What is a pathogen?
4. What are the 4 main groups of pathogens?
5. What is a communicable disease?
6. What are 3 ways that communicable diseases spread?
7. What disease is spread in contaminated drinking water?
8. What disease is spread in droplets in the air?
9. What disease is spread by direct contact?
10. What are 3 ways that pathogens can enter the body?
11. What is meant by a non-specific defence?
12. What are 2 ways the skin protects us from pathogens?
13. What is the function of the stomach acid in fighting disease?
14. What is the function of the nose hair in fighting disease?
15. What is the function of cilia and mucus in fighting disease?
16. What is produced by bacteria to make you feel ill?
17. What do viruses do to make you feel ill?

Types and treatments of disease

1. How is measles spread?
2. What are the symptoms of measles?
3. How is HIV spread?
4. Which cells does HIV affect?
5. What type of drug is used to treat HIV?
6. What type of organism causes malaria?
7. What type of organism spreads malaria?
8. What is a vector?
9. What are two ways to prevent malaria from spreading?
10. What are two diseases caused by bacteria in animals?
11. What are the symptoms of *Salmonella* food poisoning?
12. What is a way that *Gonorrhoea* is spread?
13. What are the symptoms of gonorrhoea?
14. What are 2 ways to prevent the spread of gonorrhoea?
15. Why is penicillin no longer used to treat gonorrhoea?
16. Name 3 plant diseases?
17. What pathogen is responsible for TMV?
18. What would you see on a plant affected by TMV?
19. How is TMV transmitted/spread?
20. Is there a cure for TMV?
21. What are the treatments for TMV?
22. What pathogen is responsible for Rose black spot?
23. What would you see on a plant affected by rose black spot?
24. How is Rose black spot transmitted?
25. What are the treatments for rose black spot?
26. What pathogen is responsible for crown galls?
27. What would you see on a plant affected by crown galls?
28. How can crown galls be spread?

Immune defences and vaccination

1. What is an immune defence?
2. What are 3 ways in which white blood cells help defend against disease?
3. Why are antibodies effective against only one disease?
4. What is a vaccine?
5. What happens after a vaccine is given?
6. What are 2 advantages of vaccinations?
7. What are 2 disadvantages of vaccinations?
8. What does immune mean?
9. What is herd immunity?
10. What happens to the response time if the same pathogen re-enters the body?
11. What happens to the antibody concentration if the same pathogen re-enters the body?

Antibiotics and painkillers

1. What is a painkiller?
2. What are examples of painkillers?
3. Why are painkillers not always helpful?
4. Where does aspirin come from?
5. What are antibiotics used for?
6. Why is difficult to produce drugs that kill viruses?
7. What are the reasons we should avoid overusing antibiotics?
8. What was the first antibiotic and who discovered it?
9. Where does this antibiotic come from?
10. What are some disadvantages of antibiotics?

Discovering and developing drugs

1. What are 3 places we can get new from?
2. What drug do we get from foxgloves?
3. What drug do we get from willow?
4. What are the 3 stages of testing a new drug?
5. What 3 things are scientists trying to find out when testing on animals?
6. What is the optimum dose?
7. What is a placebo?
8. What is the purpose of a placebo in drug testing?
9. What is a blind trial?
10. What is a double-blind trial?
11. What is the advantage of a double-blind trial?

By the end of Autumn 1, the skills you will know are:

Microscopy:

1. What is the equation for magnification?
2. How many um are in 1mm?
3. How many nm are in 1um?
4. Write 1cm, 1mm, 1um and 1nm in standard form.
5. What piece of apparatus is used to measure the size of an image?
6. What does resolution mean?

Key Maths Skills

7. Calculate the size of the real object, the size of the image or the magnification.
8. Express answers in standard form (1×10^{x})
9. Use prefixes centi-, milli-, micro- and nano-

Osmosis:

1. What is the equation to calculate percentage mass change?
2. What piece of equipment is used to measure mass?
3. Why must the food sample be dried before measuring the mass?

Key Maths Skills

4. Use fractions and percentages
5. Plot two variables from experimental or other data.

Food Tests:

1. What does qualitative mean?
2. What piece of equipment is used to measure 10ml?
3. What is the reagent and test for carbohydrates?
4. What is the positive result in the test for carbohydrates?
5. What is the reagent and test for lipids?
6. What is the positive result in the test for lipids?
7. What is the reagent and test for proteins?
8. What is the positive result in the test for proteins?
9. Why should ethanol be kept away from a naked flame?

Key Maths Skills

10. Measure small volumes

Enzymes:

1. Why do you need a water bath?
2. Identify the main sources of error.
3. What is the pH scale?
4. How can you use the pH scale to identify how acidic or alkali a substance is?
5. What is amylase and what does it do?
6. What indicator is used to investigate the effect of amylase?
7. What are the main sources of error in the experiment?

Key Maths Skills

8. Calculating pH differences.

Photosynthesis:

1. What factors affect the rate of photosynthesis?
2. What piece of equipment is used to measure distance?

3. What piece of equipment is used to measure time?
4. Identify the main sources of error in the experiment.
5. Why are experiments repeated more than once?
6. Why use an LED rather than a traditional lamp?
7. Define limiting factor. (HT)
8. What does inversely proportional mean (HT)?

Key Maths Skills

9. Calculate the mean of a set of figures
10. Understand inverse proportions (HT)
11. Present information graphically

By the end of Autumn 2 you will know:

States of Matter

1. What are the three states of matter?
2. What are the symbols for the three states of matter and aqueous solutions?
3. What is the name of the changes of state between the three states of matter?
4. How does the force between particles affect the melting/boiling point?

Separation Techniques

1. What is a mixture?
2. What is the difference between soluble and insoluble?
3. State the 4 physical processes by which mixtures can be separated.
4. Are new products made in physical processes?
5. What property of liquids does distillation separate liquids by?
6. What does chromatography separate?

Atoms & their structure

1. What is an atom?
2. What is an element?
3. What is a compound?
4. How many elements are there?
5. How are compounds made or separated?
6. What do chemical reactions involve?
7. How can chemical reactions be represented?
8. Draw and label the atom.
9. State the charge and mass of the 3 subatomic particles.
10. Define mass number
11. Define atomic number
12. What is the size of an atom?
13. What is the radius of the nucleus of an atom?
14. Where is the mass located in an atom?
15. Why are atoms neutral?

The History of the Atom

1. What leads to the change in scientific models?
2. What were atoms thought to be by the Greeks?
3. What subatomic particle did JJ Thomson discover?
4. Describe the plum pudding model.
5. What particles were used in the gold leaf experiment?
6. Why did some particles deflect and some go through the gold foil?
7. What model replaced the plum pudding model?
8. Where in the nuclear model is the mass found?
9. How did Niels Bohr adapt the nuclear model?
10. What did James Chadwick discover?

Electronic Structures & the Periodic Table (& RAM)

1. Name where electrons are found in an atom
2. What are the two ways the electronic structure can be represented?
3. How many electrons can fit in the first three energy levels of an atom?
4. How are elements in the Periodic Table arranged?
5. What are the columns on the Periodic Table called?
6. Why is it called the Periodic Table?
7. Why are elements put in the same group e.g. lithium, sodium and potassium, on the Periodic Table?
8. What does the group number tell you about the number of electrons in the outer shell?
9. What type of elements form positive ions?
10. What type of elements from negative ions?
11. What is another name for the elements in Group 0/8?
12. Why are the Noble gases unreactive?
13. What happens to the boiling point of Noble gases?
14. On which side of the Periodic Table are metals found?
15. On which side of the Periodic Table are non-metals found?

Group 1

1. What is another name for Group 1?
2. What is similar for all Group 1 elements electronic configuration?
3. How does reactivity change as you go down Group 1?
4. What ions do Group 1 elements form?
5. Name 2 physical properties of Group 1 elements.
6. Write the complete reaction when sodium reacts with water.
7. What is formed when lithium reacts with chlorine?

Atoms into Ions and Ionic Bonding

1. What are the three types of strong chemical bonds?
2. What are the atoms do to form ionic bonding?
3. What do the atoms do to form a covalent bond?
4. What do the atoms do to form metallic bonds?
5. How can we represent electron transfer in diagrams?
6. What do metals atoms do to form an ionic bond?
7. What do non-metal atoms do to form an ionic bond?
8. How does the charge on ion relate to the Group number?

Giant Ionic Structures

1. What is the name of the force acting in ionic compounds?
2. Is it a strong or weak force?
3. State the key physical properties of giant ionic compounds.
4. Why is large amounts of energy needed to break down giant ionic compounds?

Covalent Bonding and simple molecules

1. Are covalent bonds strong or weak?
2. State 5 simple covalent molecules.
3. State 3 giant covalent structures.
4. Give 3 ways covalent bonds can be represented.
5. State the physical properties of simple molecules.
6. Name the force between simple molecules and whether it is strong or weak.
7. What is the relationship between the force and the size of molecule?
8. What is a polymer?
9. Why is a polymer solid at room temperature?

Giant Covalent Structures and carbon allotropes

1. State the melting/boiling points for giant covalent structures (low/high).
2. Name 2 allotropes of carbon.
3. How many C-C bonds are there in: graphite? Diamond?
4. Why can graphite conduct electricity?
5. What is the structure of graphite like?
6. What is the difference between graphene and graphite?

7. What is a fullerene?
8. What was the first fullerene to be discovered?
9. What is a carbon nanotube?
10. What can nanotubes be used for?

Metallic bonding and giant metallic structures

1. What is the structure of a metal like?
2. What makes the metallic bonds strong?
3. What is the melting/boiling points for giant metallic structures (low/high)?
4. Define alloy.
5. What is the difference between metals and alloy?
6. Why can a metal conduct thermal energy and electricity?

By the end of Autumn 2, the skills you will know are:

Models:

1. What is a model?
2. What are the different models that are used to show bonding?
3. Why do models change over time?
4. What are the drawbacks to using models?
5. What are the advantages to using models?
6. What is the difference between a prediction and a hypothesis?

Key Maths Skills

7. Calculate the size of atoms