Year 9

Biology

Mid-Year Assessment Revision Pack

Contents:

Year 9 Content: (**50% of Mid-Year Exam Questions**):

Big Question (Unit)	**Self-Study Pack**	**Independent Practice Pack**
What are living things made of? (B10: Microorganisms)	*Self-study pack*	*B10 - Practice Pack*
What keeps organisms healthy? (B11: Diseases)	*Self-study pack*	*B11 – Practice Pack*
Why do organisms depend on each other and their environment? (B12: biodiversity and human impact)	*Self-study pack*	B12 – Practice Pack
Why are organisms so diverse? (B13: Evolution of Species)	*Self-study pack*	B13 – Practice Pack

Instructions:
1) When starting revising a big question use the short summary and your own knoweldge to make a spider diagram in the space provided. The practice questions for each big question are broken into sections.
2) Before starting the practice questions for a section read the pages in the self-study pack that are noted at the top of each section.
3) Attempt all the practice questions in your book or on lined paper.
4) Check the answers using the markscheme in a green pen. Add any missing information to your spider diagram.

What are organisms made of?

(A short summary of what we have learnt this year in answer to the big question above)

All living things are made of microscopic structures called cells. Cells are the smallest structure that can be living. Cells come in many different types and can be classified by which 'sub-cellular structures they are made of. The structure of cells helps them carry out different functions. All cells contain:

- Cytoplasm made of molecules constantly moving over each other.
- A cell membrane which allows some, but not all, substances in and out.

Most cells can only be seen by a microscope which magnifies the cells enough that we can study them.

Humans and plants are organisms made of lots of cells. What animals and plants are made of can be studied at different levels by biologists. From studying:

- individual cells
- groups of similar cells (tissues)
- groups of tissues working together (organs)
- groups of organs working together (organ systems)
- Whole organisms.

The different levels of organisation in animals and plants help keep all the cells in the organism alive. All organisms respire to release energy to fuel their living processes. Several organ systems in a human body must work together to allow all the cells in a person to respire using oxygen and glucose.

Task - Draw a spider-diagram summarising the information in the text above

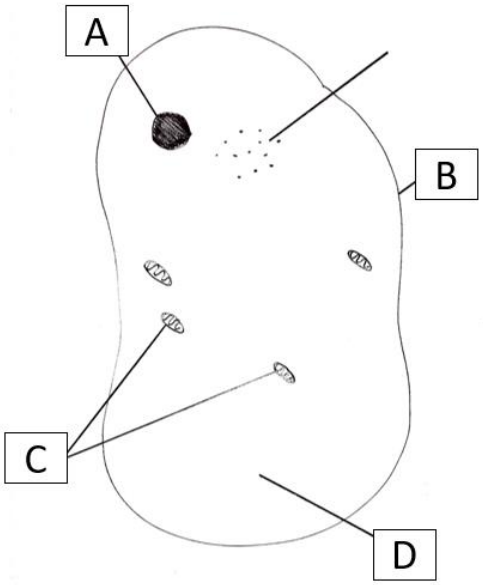
Knowledge Practise & Application:

Practise questions to test your recall of important knowledge and ability to apply this knowledge. Italics note relevant self-study packs to refer to should you get stuck.

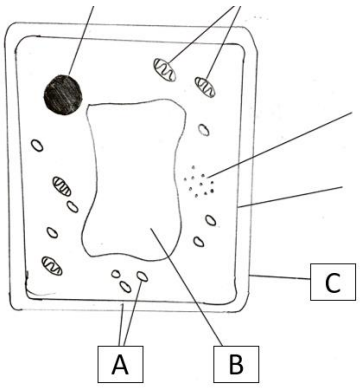
Part A: *B1 self-study pack – Lessons 01, 02, 03, 04, 05 & 07*

1. What is an organism?
2. What is the characteristic chemical reaction all living things do?
3. What are the seven characteristics of living organisms (Mrs Gren)?
4. What are all living things made of?
5. What can we use to observe cells?
6. What is bigger an atom or a cell?
7. What do we call the smaller structures cells are made of?
8. Put the following in order from smallest to largest: cell, biological molecule, atom.
9. How does the cell membrane control which substances pass in and out of the cell

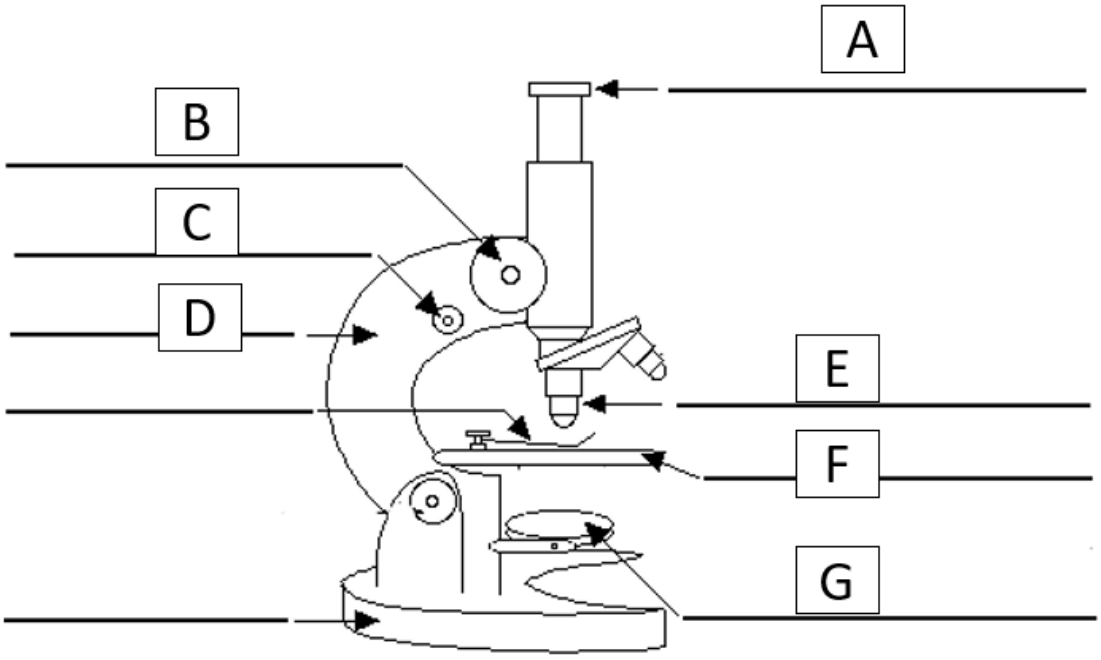
The diagram shows an image of a cell.



10. Name labels A-D
11. Give the function of A
12. Give the function of B
13. Name the chemical reaction that occurs at C
14. What two substances are needed for the chemical reaction at C?
15. This drawing of a cell was produced by looking at it through a microscope.
    a. Write the equation that links total magnification, eye piece lens magnification and objective lens magnification.
    b. A microscope has an eyepiece lens of x10 magnification and a objective lens of x20. Calculate the total magnification:
    c. A microscope has an eyepiece lens of x10 magnification and total magnification of x400. Calculate the magnification of the objective lens
16. What type of cell is shown in the diagram. Explain your answer.
17. Protein molecules cannot enter the cell drawn. Explain why.
18. Oxygen molecules can enter the cell drawn. Explain why.
19. The image below shows another cell. What type of cell is shown in this diagram?
20. Name three sub-cellular structures found in this cell but not in an animal cell.
21. What is the function of label A?
22. What is the function of label B?



23. What is the function of label C?
24. The diagram below shows a microscope. Name the labels.

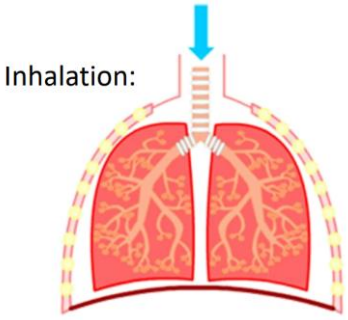


Part B: B3 *self-study pack* – *Lessons 01, 02, 03, 04, 05, 06, 07 & 08*

1. Place the following in order of smallest to biggest: organ, tissue, cell, organ system.
2. Why do cells need oxygen and glucose?
3. What substance allows other substances to be dissolved and transported in the body
4. Why do plants need water and carbon dioxide?
5. Give the function of a plants roots
6. Why do plant cells need oxygen and glucose?
7. Name the organ in a plant where most photosynthesis happens
8. Name the gas that diffuses from blood into the air during gas exchange
9. Name the part of the lungs where gas exchange takes place
10. Name the gas that diffuses from air into the blood during gas exchange
11. In humans nutrients are absorbed into the blood in the _____ _____
12. What breaks large nutrients into smaller ones during digestion?
13. Why do larger nutrients need to be broken into smaller ones to be absorbed into the blood?
14. Explain why the heart is called a double pump.
15. Name the type of blood vessel that carries blood towards the heart
16. Name the type of blood vessel that carries blood away from the heart

This question is about gas exchange.

17. Where does gas exchange take place?
18. Oxygen is transferred from the air into the blood by diffusion. Explain why oxygen diffuses from the air into the blood.
19. Why do cells require oxygen?
20. How is oxygen transported from the lungs to body cells?
21. Describe the process of inhaling air.



This question is about digestion.

22. Why can't large molecules such as carbohydrates be absorbed by the body?
23. Name the substance that breaks large molecules into smaller ones?
24. Glucose can be absorbed during digestion
    a. Name the organ where glucose is absorbed during digestion
    b. Why do cells require glucose?
    c. How is glucose transported from the digestive system to body cells?
25. A child drops food on the floor then eats it. She consumes some bacteria with her food.
    a. The child's digestive system prevents her from absorbing the bacteria. Explain how.
    b. The child absorbs water. Name the organ where water is absorbed in digestion.
26. A 28 year old male suffers from a condition called malabsorption. This is caused by his enzymes not working properly.
    a. One symptom is that he is very underweight for his height. Explain why
    b. Another symptom is that he is feel bloated and often has diarrhoea. Explain why.

This question is about the heart and blood.

27. Name the organ that pumps blood around the body
28. Explain why blood is pumped to the lungs
29. Explain why blood is pumped to all body cells
30. The heat is part of a double circulatory system. Explain why.
31. Name two substances from the blood absorbed by body cells.
32. A 74 year old lady suffers a stroke. This is when a blood vessel carrying blood away from the heart to the lungs gets blocked.
    a. Name the blood vessel that is blocked
    b. Explain why brain cells stop functioning if blood cannot reach these cells.

33. All our organ systems work together to keep our cells alive. Three organ systems work together so all our cells can respire:
    - The gas exchange system
    - The digestive system
    - Our circulatory system

    Explain how each organ system helps our bodies cells respire and why they all need to be working to keep us alive.

Answers:

Part A:

1. An individual living thing
2. Respiration
3. Movement, respiration, sensitivity, growth, reproduction, excretion, sensitivity
4. Cells
5. Microscopes
6. A cell
7. Sub-cellular structures
8. Atom, biological molecule, cell
9. It has small holes in it which only allow some substances through it
10. A = Nucleus, B = Cell membrane, C = Mitochondria, D = Cytoplasm
11. Controls the activities of the cell and contains DNA
12. Controls what dissolved substances enter and leave the cell
13. Respiration
14. Oxygen and glucose
15. a) total magnification = eyepiece lens x objective lens b) x200 c) x 40
16. Animal cell – no cell wall
17. They are too big to fit through the holes in the cell membrane
18. They are small enough to fit through the holes in the cell membrane
19. Plant cell – there is a vacuole, cell wall and chloroplasts
20. Vacuole, cell wall and chloroplasts
21. Chloroplast – produces nutrients for the plant by photosynthesis
22. Vacuole – contains cell sap, keeps cell turgid
23. Cell wall – strengthen and support the cell
24. A = Eyepiece lens, B = Course focus , C = Fine focus , D = Arm , E = Objective lens, F = stage, G = Light source

Answers:

Part B:

1. Cell, tissue, organ, organ system
2. To transfer energy through respiration
3. Water
4. To produce their own food through photosynthesis
5. Absorb water and mineral ions from the soil
6. To transfer energy through respiration
7. Leaf
8. Carbon dioxide
9. Alveoli
10. Oxygen
11. Small intestine
12. Enzymes
13. So that they can pass through the partially permeable membrane of the small intestine
14. Blood passes through the heart twice in its journey around the body
15. Vein
16. Artery
17. Alveoli in the lungs
18. Because there is a higher concentration of oxygen into the air than the blood
19. For respiration (to transfer energy)
20. In blood through arteries and capillaries
21. Diaphragm contracts and moves down. Ribs move up. This increases lung volume.
22. They are too big to fit in the tiny holes of the partially permeable membrane of the small intestine
23. Enzymes
24. a) Small intestine b) For respiration c) In blood through arteries and capillaries
25. a) The stomach contains acid which kills the bacteria b) Large intestine
26. a) Larger molecules cannot be broken down into smaller ones and therefore cannot pass through the small intestine to be absorbed b) Larger molecules cannot be broken down into smaller ones and therefore will stay in the gut
27. The heart
28. To become oxygenated
29. Because oxygen is needed for respiration (to transfer energy)
30. Blood passes through the heart twice in its journey around the body
31. Oxygen and glucose
32. a) Artery b) Because they do not receive the oxygen and glucose that they need for respiration
33. The gas exchange system is where oxygen is diffused into the blood and carbon dioxide is removed from the blood. The digestive system is where larger molecules are broken down into smaller molecules, including glucose. The circulatory system consists of the heart and blood vessels. The blood vessels carry oxygen and glucose to all body cells for respiration (to transfer energy).

How do living organisms grow and reproduce?

(A short summary of what we have learnt this year in answer to the big question above)

All members of a species show some variation, small differences in their characteristics. Variation is caused by a combination of genetic and environmental factors.

Some characteristics are controlled by our genetic information. Our 'genome' is all the genetic information we have. A copy of our genome is stored on DNA in the nucleus of every cell in our body.

Our genome is inherited from our biological parents. We randomly inherit 50% of our genome from each of our parent. The genome of an organism is carried by a chemical substance called DNA which forms structures in the nucleus called Chromosomes. DNA has a double helix structure. Sections of DNA called genes control different inherited features. A copy of an organisms entire genome is carried in the nucleus of every cell in its body.

Task - Draw a spider-diagram summarising the information in the text above

Knowledge Practise & Application:

Practise questions to test your recall of important knowledge and ability to apply this knowledge. Italics note relevant self-study packs to refer to should you get stuck.

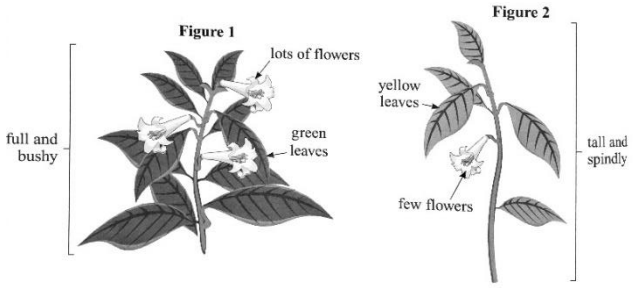
Part A: *B2 self-study pack – Lessons 01 & 02.*

1. What is variation?
2. What are the two causes of variation in a species?
3. What does "Genome" mean?
4. Where does an organism's genome come from?
5. Which characteristics can be inherited?
6. Which characteristics cannot be inherited?
7. Can we inherit characteristics our parents have learnt?

The girls shown in the image are identical twins. They have exactly the same genes.

8. Both twins have blue eyes. What determines the twins' eye colour?
9. The twin on the left is taller than the twin on the right. Suggest on possible explanation for this difference in height.

For the plant characteristics below, say whether they are determined by genes only, the environment only or both.



10. Stem Height
11. Spots caused by a fungus

Dalmatians and pugs are both members of the same species. However they look very different. For example Dalmatians have spots and pugs do not.

12. What type of variation is causing this difference?

The image shows two plants of the same species growing in opposite corners of a garden. The plant on the left was grown in a sunny corner, whereas the plant on the right was grown in a shady corner.

13. What type of variation is causing the differences between the two plants?

Your sporting ability may be affected by your genes and your environment.

14. Suggest one environmental factor that may affect your sporting ability.

Lewis inherited 50% of his genome from his mother.

15. Where did his mother inherit her genome from?
16. Where did Lewis inherit his other 50% of his genome from?

Lewis' father was a professional football goalkeeper, famous for his penalty saves. He was also colour blind, this is a condition which affects the colours someone can see, it is controlled by your genetic information.

17. Can Lewis inherit his father's ability to be a good at saving penalties?
18. Explain why you think Lewis can/cannot inherit the colour blindness condition.
19. Why can Lewis inherit some characteristics off his father but not others?

Lewis' grandfather was also a great football player. He represented England. What is the most likely explanation. Copy the correct answer.

- Playing football runs in the family
- The children all started played football from a young age
- After one person has learnt a skill they can pass it on to their offspring's genome.
- If you practice something enough it becomes part of your genome.

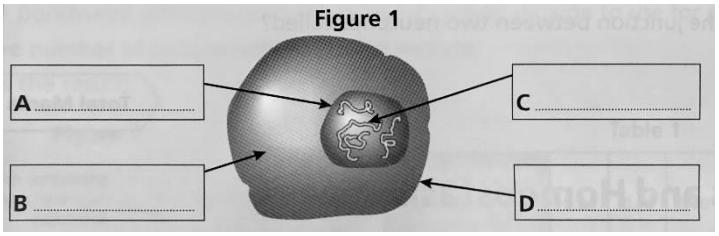
Part B: *B2 self-study pack – Lessons 03 & 04.*

1. What chemical substance carries an organisms genome?
2. Describe the structure of DNA
3. What structures in the nucleus are made of DNA?
4. What part of a cell contains genetic information?
5. What is a “gene”?
6. Where in a cell is DNA found?
7. What are chromosomes made up of?
8. How does a gene help a cell make a specific inherited feature?
9. What is meant by the term ‘genome’?
10. Use the words below to label the cell in figure 1.

    Chromosomes, Nucleus, Cytoplasm, Cell Membrane.
11. Name the shape which best describes the DNA polymer.
12. How is DNA organised inside the cell nucleus?
13. Which is larger, a chromosome or a gene?
14. Place the following in order of size (largest to smallest):

    DNA, nucleus, cell, tissue, chromosome, organ, gene.

Figure 1



Answers:

Part A:

1. Small differences between members of a species
2. Environmental and genetic information
3. All the genetic information in an organism
4. Organisms inherit 50% of their genome from one parent and 50% from the other
5. Characteristics caused by our genetic information (genome)
6. Characteristics caused by our environment or that have been learnt.
7. No, they have to be learnt.
8. Genes
9. Caused by differences in their environment, for example diet.
10. Both
11. Environment only
12. Genetic
13. Environmental
14. How often you train / how hard you train / how well you are coached / how good the facilities you train at are / your diet (any sensible suggestion will get a mark)
15. 50% from her father and 50% from her mother
16. From his father.
17. No Lewis cannot inherit the ability to be a good goalkeeper.
18. Yes he can, because it is controlled by genetic information which Lewis could have inherited from his father.
19. Lewis can only inherit characteristics caused by his fathers genome and not things he has learnt or that have been caused by the environment.
20. The children all started played football from a young age

Part B:

1. DNA
2. A double helix
3. Chromosomes
4. The nucleus
5. A section of DNA which controls an inherited feature
6. Nucleus
7. DNA
8. Provides the information/code ton control an inherited feature
9. All the genetic information in an organism
10. A – Nucleus, B – cytoplasm, C – chromosomes, D – cell membrane
11. Double helix
12. As chromosomes
13. Chromosome
14. Organ, tissue, cell, nucleus, chromosome, gene, DNA

Why are living things so diverse?

(A short summary of what we have learnt this year in answer to the big question above)

Biologists describe a species as being a group of organisms that can reproduce to have fertile offspring. Fertile offspring are able to reproduce the next generation of offspring. All species show variation caused by genetic inheritance and the environment.

Variation in a characteristic can be continuous (like height) or discrete (like eye colour). Biologists can study variation in a species by collecting data from lots of individuals and looking for patterns.

Fossils allow biologists to study how the characteristics of species have changed over billions of years. The fossil record shows us that the characteristics of living things have changed slowly over time.

Task - Draw a spider-diagram summarising the information in the text above

Knowledge Practise & Application:

Practise questions to test your recall of important knowledge and ability to apply this knowledge. Italics note relevant self-study packs to refer to should you get stuck.

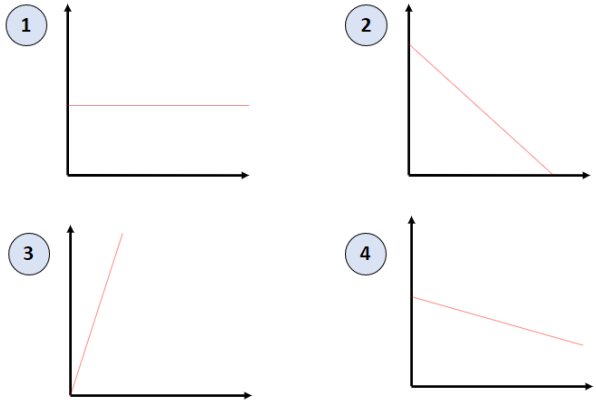
Part A: *B4 self-study pack – Lessons 01, 02 & 03.*

1. What is a species?
2. What does being "fertile" mean?
3. What are the two causes of variation in a species?
4. What is a continuous variable?
5. What is a discrete variable?
6. What is a correlation?
7. What is a positive correlation?
8. Does a positive correlation prove one variable causes the other?

For the following examples of variation, state whether they are continuous or discrete.

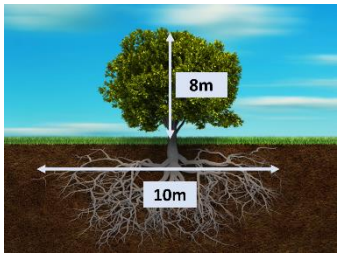
9. Eye colour
10. Hair colour
11. Weight
12. Double jointed or not
13. Height
14. Length of arm

Below shows some graphs.



15. Which graph(s) shows a positive correlation?
16. Which graph(s) shows a negative correlation?
17. Which graph(s) shows no correlation.
18. What should be added to the axis of each graph?
19. How do you represent a data point on a graph?

Scientists completed an investigation to look at the spread of a trees roots. They noticed that the spread was slightly wider then the tree is tall. They wanted to see if the taller the tree the wider the roots spread.

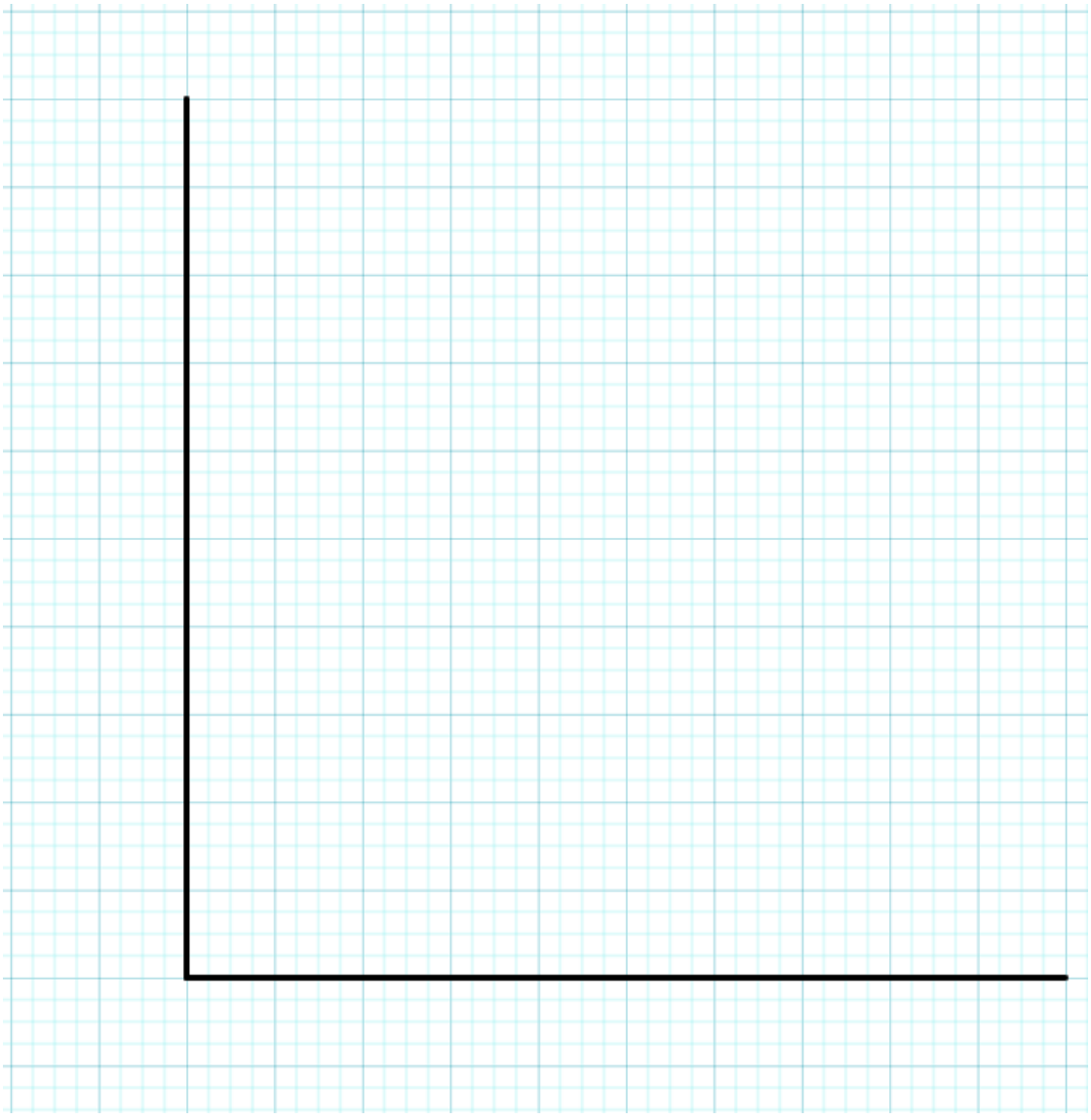


Hypothesis: The taller the tree the greater the spread of their roots.
Results:

Root Spread Area (m)	Average Height of Tree (m)
5	4
10	8
15	12
20	16
25	20

20. Use the table to add axis to the graph below
21. Use the table to add appropriate scales to the axis below
22. Use the table to plot root spread area against average height of tree
23. Draw a line of best fit using a ruler

24. Write a conclusion for your results. Do the results support the scientists hypothesis?



Part B: *B4 self-study pack – Lessons 03 & 04.*

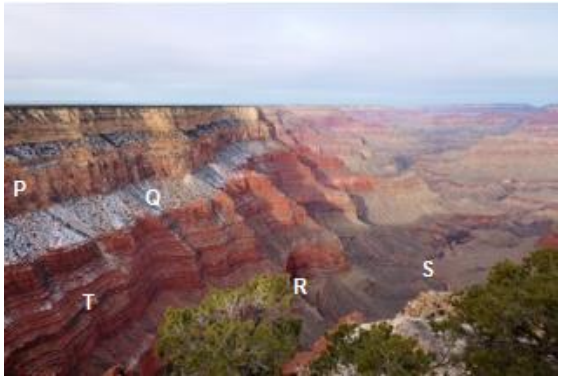
1. What is a fossil?
2. What must a dead organism be buried in to become a fossil?
3. What replaces decomposed bone and shells to form a fossil
4. Why are fossils important in understanding organisms that no longer exist?
5. Why do fossils give us a better record of bones and shells than soft tissues?
6. What does the fossil record show about how species change?
7. How do scientists work out the age of a fossil?
8. How do scientists work out where an organism lived from its fossil?

The images show some fossils.




9. Explain how fossils are formed from dead organisms
10. Explain how scientists can work out the age of a fossil
11. Explain how the characteristics of more recent fossils compare to older ones

The image is a photograph of the Grand Canyon. The layers of rock contain fossils. Scientists found five fossils of different species of animal, **P**, **Q**, **R**, **S** and **T**, at the positions shown in **Figure 1.**

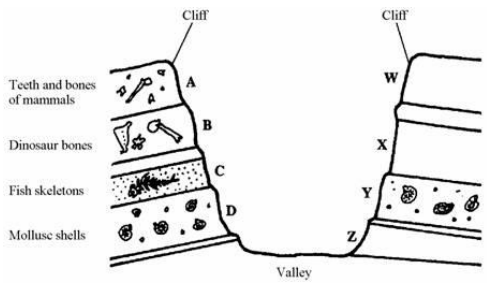


12. What is the evidence in **Figure 1** that animals **P** and **Q** were alive at the same time?
13. Was animal **R** alive at an earlier time or at a later time than animals **P** and **Q**? Give the reason for your answer.
14. Which **two** of the following would be evidence that animal **T** may have evolved from animal **S**? Copy and complete the correct sentences:
    - The fossils of animals S and T have many features in common, but T is more complex than S.
    - The fossils of animals S and T are the same size.
    - The fossils of animals S and T have the same skin colour.
    - The fossil of animal S was found in a deeper layer of rock than the fossil of animal T.
    - The fossil of animal T is more similar to the fossil of animal R than to the fossil of animal S.

Ammonite fossils are often found on beaches in the UK. Ammonites were marine animals that had coiled external shells that provided protection. They probably fed on small plankton or vegetation growing on the sea floor

15. Explain why only the shell of the animal is seen in an ammonite fossil

The drawing shows some of the fossils found in the layers of rock in two cliffs. The two cliffs are on opposite sides of a large valley. Geologists think that the valley has been carved out by rivers, and that the order of rock layers has not changed.



16. Which of the rock layers, **A**, **B**, **C** or **D**, is the oldest?
17. Give the letters of **two** layers of rock on opposite sides of the valley that are the same age.
18. How do fossils provide evidence that species change slowly over time?

Answers:

Part A:

1. A group of organisms who can breed together to make fertile offspring
2. Able to reproduce to make offspring
3. Environmental and genetic information (genome)
4. A variable that can take a range of values
5. A variable that can only take set values
6. When there is a clear relationship between two variables
7. As one variable increases the other increases as well
8. No
9. Eye colour - Discrete
10. Hair colour - Discrete
11. Weight - Continuous
12. Double jointed or not - Discrete
13. Height - Continuous
14. Length of arm – Continuous
15. Graph 3
16. Graphs 2 and 4
17. Graph 1
18. Quantity and unit
19. Small crosses (or + signs)
20. Ask your teacher to check your graph
21. Ask your teacher to check your graph
22. Ask your teacher to check your graph
23. Ask your teacher to check your graph
24. As the root area spread increases the height increases. They are positively correlated to each other.

Part B:

1. Mineralised remains of dead organisms
2. Sediment
3. Minerals
4. Evidence of their characteristics
5. Bones and shells decay more slowly
6. Species change slowly over time.
7. Depth of rock it is found in
8. The type of rock its found within.
9. Buried in sediment
   Body of organism rots / decomposes
   Minerals crystalise / form fossil
10. By where they are found in rock
    Older fossils found deeper layers of rock
11. Can study the characteristics of the fossils
    Characteristics become more complex in newer fossils
    Newer fossils have new characteristics
12. Fossils of **P** and **Q** in same stratum / layer / level / height
13. Earlier − fossil in deeper layer / further down
14. The fossils of animals **S** and **T** have many features in common, but **T** is more complex that **S**
    The fossil of animal **S** was found in a deeper layer of rock than the fossil of animal **T**
15. Soft parts will decay

Harder parts replaced by minerals over a long period of time

16. D
17. D & Y (*both*) or C & X (*both*) or B & W (*both*)
18. show types of animals / plants that <u>no longer exist</u> / named ref eg dinosaur
    show <u>changes</u> in types *(of animals / plants)*
    similar fossils found in rocks of similar age

What keeps organisms healthy?

(A short summary of what we have learnt this year in answer to the big question above)

Human health is about more than just the absence of disease. Good health is “state of complete physical, mental and social wellbeing.” This means we need to look after our mental and physical health if we are to remain healthy. To remain physically healthy, we need to maintain our physical fitness and eat a balanced diet. A balanced diet is one that includes all the main nutrients our body needs. If we eat too little, or too much, of any nutrient it can lead to ill health and cause disease. Our body transfers the energy we need from chemical stores in food. The amount we need to eat to get the energy we need is different for everyone and depends on our age, gender, size, and level of physical activity

Regular exercise is good for our health and physical fitness. Regular exercise increases our lung volume and strengthens our heart muscles. This means the body can supply more oxygen and glucose to our cells for respiration and improves our physical fitness. Physical fitness is our ability to carry out physical activities.

Task - Draw a spider-diagram summarising the information in the text above

Knowledge Practise & Application:

Practise questions to test your recall of important knowledge and ability to apply this knowledge. Italics note relevant self-study packs to refer to should you get stuck.

Part A: *B5 Topic self-study pack – Lessons 01 - 09*

1. What are the symptoms someone may be suffering from ill health?
2. What causes infectious diseases?
3. Give three causes of non-infectious diseases?
4. What causes diseases that can be inherited from our parents?
5. What happens in an asthma attack?
6. Why can asthma attacks be dangerous?
7. What is a nutrient?
8. What is a balanced diet?
9. Which of the main nutrients are sources of energy?
10. Which nutrient is used make new cells and repair tissues?
11. What are food tests used to test for?
12. Fibre is not a nutrient – why do we need it in our diet?
13. What is malnutrition?
14. How can to much fat in a diet lead to ill health?
15. How can having too little fat in a diet can lead to ill health?
16. How is energy stored in food?
17. How does the body transfer energy from food?
18. What unit is used to measure the amount of energy stored in food?
19. Name three factors that affect how much energy we need from our diet?
20. Give two long term effects of regular exercise
21. What is "physical fitness?"
22. What does resting heart rate mean?
23. If someone is physically fit will their heart rate return to rest quickly or slowly after exercise?
24. The information shown in the image is taken from a Baked bean can.
    a. Which ingredient provides most of the protein in the can?
    b. Why is protein important to the human body?
    c. Give one group of substances, needed for a healthy diet, which is missing from the nutritional information.
    d. Name one food, shown in the list of ingredients, which provides fibre.
    e. Why is fibre important to the human body?

nutritional information		list of ingredients
100g provides:		
energy	406 kJ	haricot beans, tomato purée, water, sugar, modified starch, salt, paprika, onion powder, herb extracts, spices
protein	5.4 g	
total carbohydrate	17.6 g	
sugar	6.0 g	
fat	0.4 g	
fibre	3.7 g	

25. Toby is a vegan. He reports finding it hard to eat protein. Recommend two sources of protein suitable for him.
26. Ashley is planning on running a marathon (26 miles) race.
    a. He asked for some advice about what to eat in the days before the race. What advice would you give him? Explain your answer.
    b. Ashley reads he should eat a meal high in protein after the race. Explain why.
    c. Why must Ashley continue to drink water during his race?
    d. Why is water important to the human body?
    e. Ashley has trained for 6 months for his marathon by running 5 times a week. How should his nutrient intake be different to a person who works in an office and does not run?
27. Suggest why a sedentary teenager needs more energy per day than a sedentary person in their 40s.
28. A man in his 40s changes from being very active to sedentary. He continues to eat the same amount of food each day. How might his body change?
29. A sedentary teenager starts the couch to 5k challenge. She continues to eat the same amount of food each day. How might her body change?

Answers:

Part A:

1. A change from their normal appearance or behaviour.
2. microorganisms
3. Lifestyle, environment and genetic information
4. Genetic information (genes, genome)
5. Air ways into lungs become inflamed and blocked.
6. Hard for the body to get enough oxygen
7. A chemical compound found in food that the body needs to stay healthy
8. A diet that provides the correct amounts of the main nutrients
9. Carbohydrates and lipids
10. proteins
11. Which nutrients are found in different foods
12. To help us digest food
13. Having too much, too little, or the wrong balance of nutrients in your diet
14. Can become overweight or obese which can cause heart disease
15. Can become underweight which can cause heart disease
16. chemical
17. By chemical reactions (mainly respiration).
18. Kilojoules
19. gender, age and level of activity
20. Increases lung volume and makes heart stronger
21. Our ability to carry out physical activities
22. The number of beats per minute when we are not exercising, are relaxed and calm
23. quickly
24.
    a. Haricot beans
    b. Used to make new cells and repair tissues
    c. Vitamins and minerals
    d. Haricot beans / tomato puree
    e. Helps us digest food
25. Beans / pulses
26.
    a. High carbohydrate and fat diet so he has enough energy stored for his race.
    b. He will have damaged muscle tissues during the race, protein is needed to repair these tissues.
    c. He will be sweating and exhaling whilst running a lot so will lose water by evaporation.
    d. Means chemical reactions can happen in cells and blood can flow.
    e. Exercise requires muscles to contract more which requires energy released from respiration. Therefore, he will be transferring more energy than the office worked. HE should therefore eat more carbohydrates and fats to ensure he has enough energy stored. He will also be damaging muscle tissue so may need to increase his protein intake to repair this damage.
27. The teenager is growing (even though they are sedentary) and this requires extra energy/food, but a person in their 40s is no longer growing.
28. He might gain body fat (or body mass), and could become obese, as he no longer needs to use some of the food (in cellular respiration) as a source of energy and it will be converted to fat and stored under the skin.
29. She might lose body fat (or body mass), and could become underweight, as she now needs more food for respiration as a source of energy and therefore will start to use up stores of fat and potentially muscle long term.

How do organisms grow and reproduce?

(A short summary of what we have learnt this year in answer to the big question above)

All organisms have a life cycle which goes through different stages. All multicellular organisms grow by increasing the number of cells they are made of through cell division. The cell division that causes growth produces genetically identical body cells. This means all the body cells in an organism are genetically identical. All multicellular organisms go through stages of growth, development and reproduction. When an organism develops its body, or parts of it, change their shape or develop new functions. Humans develop the ability to sexually reproduce during puberty. Insects can go through much bigger changes – like changing from a caterpillar to a butterfly.

Flowering plants and animals have reproductive systems that produce and release gametes for sexual reproduction. Sexual reproduction is the fusing of male and female gametes (sex cells) – sperm and ovum in animals; pollen and ovules in plants. Gametes contain half the number of chromosomes as body cells. This means when two gametes fuse the fertilised egg (or seed) produced has a full set of chromosomes. A fertilised egg, or seed gets 50% of its genome from each parent. Sexual reproduction produces genetically varied offspring

Plants (and some animals) can also reproduce asexually by cell division. This produces offspring that are genetically identical to the parent.

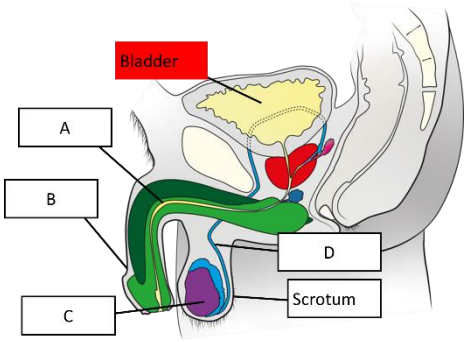
Task - Draw a spider-diagram summarising the information in the text above

Knowledge Practise & Application:

Practise questions to test your recall of important knowledge and ability to apply this knowledge. Italics note relevant self-study packs to refer to should you get stuck.

Part A: *B6 Topic self-study pack – Lessons 01 - 07*

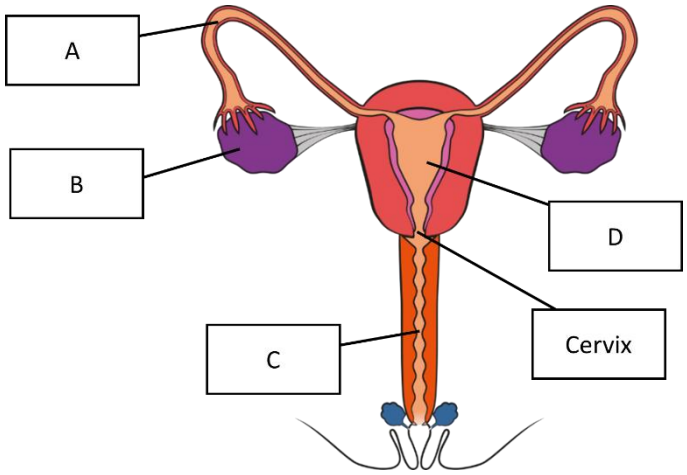
1. What is growth?
2. What causes multicellular organisms to grow?
3. What must a cell do before it divides?
4. How many new cells are produced when a cell divides?
5. How do new cells produced by cell division compare genetically?
6. What three stages are involved in the lifecycle of all animals and flowering plants?
7. What is sexual reproduction in animal?
8. When does growth occur in plants
9. What is development (of an organism)?
10. What is sexual reproduction in plants?
11. When do men begin producing sperm?
12. What is the role of the male reproductive system?
13. Which part of the male reproductive system produces sperm?
14. Which part of the male reproduce system releases sperm?
15. How does the number of chromosomes in a sperm cell compare to the number in a body cell?
16. When do women start releasing gametes?
17. What is the name of the female gamete cell produced by humans?
18. Which part of the female reproductive system releases gametes?
19. What is the role of the menstrual cycle?
20. What controls the menstrual cycle?
21. Where is sperm released into the female reproductive system?
22. Where does fertilisation occur in the female reproductive system?
23. Where does the genetic material in a fertilised ovum come from?
24. What organ does a human embryo develop inside?
25. What organ supplies nutrients and removes waste from a foetus?
26. What type of reproduction produces offspring that are genetically identical?
27. What type of reproduction produces offspring which are genetically different?
28. Why does sexual reproduction produce genetically varied offspring?
29. The figure shows a diagram of the male reproductive system. Name labels A – D.



30. The table show the number of chromosomes found in different mammals. How many chromosomes are present in the different types of cells found in these mammals? Copy and complete the gaps in the table

Organism	Number of chromosomes in a body cell	Number of chromosomes in a female sex cell	Number of chromosomes in a male sex cell	Number of chromosomes in a fertilised egg cell
Human	46			
Tiger		19		
Elephant			28	

31. The diagram shows the female reproductive system. Name labels A – D.



32. Plants can reproduce sexually and asexually. Compare asexual and sexual reproduction

Answers

Part A:

1. An increase in the number of cells an organism is made of
2. Cell division
3. Enlarge and make a copy of its genetic information
4. Two new cells
5. They are genetically identical
6. Growth, development and reproduction
7. When gametes fuse to form a fertilized egg.
8. From when they germinate until they die
9. When an organism (or parts of it) change shape or function
10. When gametes fuse to form a seed.
11. During puberty
12. To make and release sperm
13. Testes
14. Penis (through the urethra)
15. Half the number
16. During puberty
17. ovum
18. ovaries
19. To control when a ovum is released and when the uterus lining develops
20. Hormones (chemical messengers)
21. The vagina
22. The fallopian tubes
23. 50% from a sperm cell and 50% from the ovum cell
24. The uterus
25. The placenta
26. Asexual
27. sexual
28. Because 50% of the genetic material comes from each parent.
29. A – urethra
    B – Penis
    C – Testes (accept testicle)
    D – sperm duct
30. See table:

Organism	**Number of chromosomes in a body cell**	**Number of chromosomes in a female sex cell**	**Number of chromosomes in a male sex cell**	**Number of chromosomes in a fertilised egg cell**
Human	46	23	23	46
Tiger	38	19	19	38
Elephant	56	28	28	56

31. A – Fallopian tube (accept oviduct)
    B – ovary
    C – Vagina
    D – uterus
32. One parent in asexual reproduction

Two parents in sexual reproduction
Offspring genetically identical in asexual reproduction
Offspring genetically different in sexual reproduction

Why are organisms so diverse?

(A short summary of what we have learnt this year in answer to the big question above)

Biologists classify all living things into five kingdoms. Each kingdom contains millions of species that can be classified into smaller and smaller 'groups within groups.' The classification system can be used to work out how closely related species are. The smaller the level of classification that two species have in common the more closely related they are. Humans are part of the animal kingdom but all the species most closely related to us are now extinct. Our closest living relatives are chimpanzees, gorillas and orangutans.

Carl Linnaeus developed the first version of our classification system. He classified organisms using their observable characteristics. Developments in technology, like microscopes, have massively increased our knowledge of living things and the cells they are made of. Knowledge of cells has allowed biologists to develop Linnaeus system into the 'five kingdom' model. However, we still use Linnaeus system of classifying organisms in each kingdom into smaller and smaller 'groups within groups.' We also still use his system of giving each species a unique binomial name.

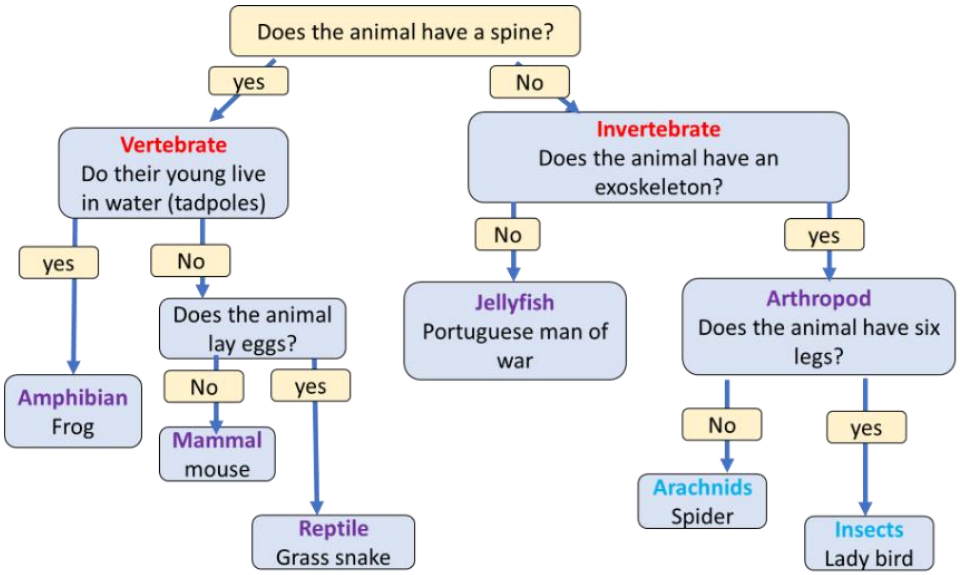
Task - Draw a spider-diagram summarising the information in the text above

Knowledge Practise & Application:

Practise questions to test your recall of important knowledge and ability to apply this knowledge. Italics note relevant self-study packs to refer to should you get stuck.

Part A: *B6 Topic self-study pack – Lessons 01 - 03*

1. What do biologists use to classify organisms?
2. What do all organisms in a classification group have in common?
3. Do organisms classified into different groups share any characteristics?
4. What do biologists use to classify, and organism based on its observable characteristics?
5. Which biologist developed the first modern system of classification?
6. What was the largest level of classification in Linnaeus' system?
7. How did Linnaeus classify the organisms inside each kingdom?
8. Why have biologists developed and improved Linnaeus system?
9. How many kingdoms are there in the modern classification system?
10. How many parts are there to a species' binomial name?
11. Are species that have small classification levels in common closely or distantly related?
12. Are species that only have large classification levels in common closely or distantly related?
13. What has happened to the species most closely related to humans?
14. What living species are humans most closely related to?
15. The image shows a classification key:



   a. Name the animal most closely related to the grass snake
   b. Name the animal(s) most closely related to the frog.
   c. Define vertebrate
   d. Define mammal

16. The image shows details about three animals.
   a. State which two species are most closely related
   b. Explain your answer.
   c. Give the binomial name of an elephant.

	Elephant	Zebra	Horse
Kingdom	Animalia	Animalia	Animalia
Phylum	Chordata	Chordata	Chordata
Class	Mammals	Mammals	Mammals
Order	Proboscidea	Perissodactyl	Perissodactyl
Family	Elephantidae	Equidae	Equidae
Genus	Loxodonta	Equus	Equus
Species	africana	capensis	ferus

Answers:

Part A:

1. Their observable characteristics
2. At least one observable characteristic
3. yes
4. A key
5. Carl Linnaeus
6. Kingdoms
7. Into smaller and smaller 'groups within groups'
8. Technology has improved our knowledge of organisms (of cells)
9. five
10. Two parts
11. closely related
12. Distantly related
13. They have become extinct
14. Chimpanzees, orangutans and gorillas
15.
    a. Mouse
    b. Mouse or grass snake
    c. An animal with a backbone
    d. AN animal with a backbone that does not lay eggs (accept gives birth to live young).
16.
    a. Horse and zebra
    b. As we move down the chart the groups get smaller. The smaller the group the more closely related species in it are.
       Zebra and horse are in the same genus which is the second smallest group.
       Their binomial names will show they are very closely related as the first work will be the same
    c. *Loxodonta Africana*

What is the chemistry of living things?

(A short summary of what we have learnt this year in answer to the big question above)

Chemical reactions take place in all cells. Two important chemical reactions are photosynthesis and respiration.

All animal and plant cells transfer the energy they need from oxygen and glucose in a chemical process called respiration. Respiration is an exothermic reaction as energy is transferred to the surroundings (the cell) by the reaction. Cellular respiration in plant and animals takes place in the mitochondria. The overall equation for respiration is: **oxygen (g) + glucose (aq) → carbon dioxide (g) + water (l)**
Plants are called producers because they can produce their own carbohydrate food (glucose). Animals can only get carbohydrate foods by consuming plants or other animals.

Plants use a chemical process called photosynthesis to produce the carbohydrate food (glucose) that all their cells need for respiration. All plants need carbon dioxide, water and energy from light to photosynthesis. Photosynthesis is an endothermic reaction which transfers energy from light (from the sun). The overall equation for photosynthesis is: **carbon dioxide (g) + water (l) → oxygen (g) + glucose (aq)**

Task - Draw a spider-diagram summarising the information in the text above

Knowledge Practise & Application:

Practise questions to test your recall of important knowledge and ability to apply this knowledge. Italics note relevant self-study packs to refer to should you get stuck.

Part A: *B8 Topic self-study pack – Lessons 01 - 05*

1. Why are plants called producers?
2. What three things does a plant need for photosynthesis?
3. What are the two reactants in photosynthesis?
4. What chemical substances are produced by photosynthesis?
5. Is photosynthesis exothermic or endothermic?
6. Where does photosynthesis take place in a plant cell?
7. Give the word equation for photosynthesis.
8. What reaction do animal and plants cells use to provide them with energy?
9. Does respiration transfer energy to or from a cell?
10. What substances does respiration transfer energy from?
11. Is respiration an exothermic or endothermic reaction?
12. Where does respiration take place?
13. What is the word equation for respiration?
14. What chemical reaction takes place in all plant cells?
15. Where does respiration take place in a plant cell?
16. Where does photosynthesis take place in a plant cell?
17. Do all plant cells photosynthesise?
18. Why do all plant cells need water to stay alive?
19. What is the word equation for anaerobic respiration (in animals)?
20. Why might muscle cells respire anaerobically during exercise?
21. Does aerobic or anaerobic respiration transfer more energy from glucose?
22. Why can muscle cells only respire anaerobically for a short time?
23. What type of respiration does not require oxygen?
24. Name the site of photosynthesis in all plant cells
25. Write the word equation for photosynthesis
26. Which gas is produced in photosynthesis?
27. Which of the following statements is correct? Copy the correct sentence into your book.
    i. Energy is transferred from the environment during photosynthesis
    ii. Energy is transferred to the environment during photosynthesis
    iii. Energy is made during photosynthesis
    iv. Energy is broken down during photosynthesis
28. Which gas is used in photosynthesis?
29. What type of energy does a plant use in photosynthesis?
30. Name the green pigment found inside plant cells
31. What type of reaction is photosynthesis?
32. Green plants can make glucose. Plants need energy to make glucose. How do plants get this energy?
33. Three identical plants were grown for a week. They were treated in exactly the same way, except they each received different amounts of sunlight per day, as shown in this table. The plants didn't have any source of light other than sunlight. Which plant do you think will have produced the most glucose after one week? Explain your answer.

Plant	Hours of sunlight received per day
A	3
B	7
C	10

34. What are the two products of photosynthesis?
35. Explain why photosynthesis is an example of endothermic reaction

36. A scientist studied three different types of plant cell (taken from the same plant) under a microscope. She recorded the average number of chloroplast she found in each type of cell, as shown in this table. Suggest which type of plant cell (1-3) is likely to have the highest rate of photosynthesis. Explain your answer

Type of plant cell	Average number of chloroplasts
1	20
2	0
3	51

37. Copy and complete the sentences below

Respiration is a chemical _____ that occurs inside the _____ of all living things. It releases the stored _____ from _____ to allow the organism to _____, keep warm and grow.

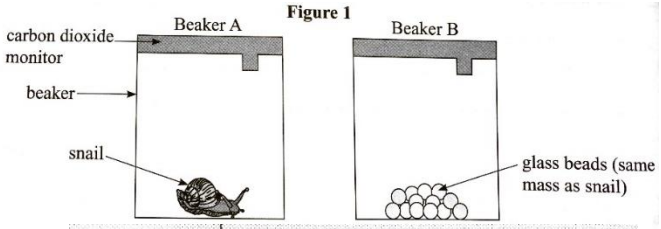
Cells, Reaction, Glucose, Energy, Move

38. State the sub-cellular structure at which respiration occurs.
39. What reactants does aerobic respiration require?
40. Write the word equation for aerobic respiration.
41. Name the chemical process that releases energy when it takes place in the cells of the body.
42. Name the substances produced by respiration.
43. This diagram shows the equation for aerobic respiration.

Glucose + **A** -> Carbon Dioxide + **B**

a. What is A in the equation?
b. What is B in the equation?

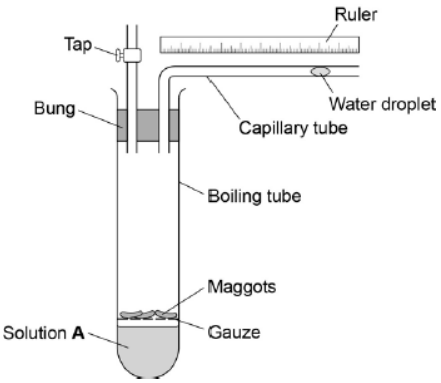
44. Explain the difference between respiration and breathing
45. An experiment was set up using two sealed beakers, each with a carbon dioxide monitor attached. The setup is shown below. The percentage (%) of carbon dioxide in the air in both beakers was measured at the start of the experiment and again after 2 hours. The results are shown in the table



Time (hours)	% carbon dioxide in the air	
	Beaker A	Beaker B
0	0.04	0.04
2	0.10	0.04

a. Suggest one ethical consideration that must be taken into account during this experiment
b. Describe and explain the results for Beaker A
c. What would happen to the level of oxygen in Beaker A after 2 hours? Explain your answer.
d. In the experiment Beaker B was set up in the same way as Beaker A but with glass beads instead of a snail. Suggest why Beaker B was used in the experiment.

46. Explain why muscle cells contain more mitochondria compared to bone cells
47. A student investigates the rate of respiration in maggots. The diagram shows the equipment he uses.



a. Why does the student put the maggots on gauze?
b. When maggots respire they take in a gas from the air and release a different gas. Solution A absorbs the gas released. At the start of the investigation the student records the distance of the water droplet from the bend in the capillary tube. Explain what happens to the water droplet as the maggots respire.

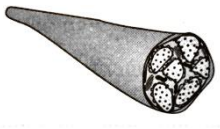
48. What is meant by the term 'anaerobic'?
49. Explain when the body uses anaerobic respiration
50. Give the word equation for anaerobic respiration in animals
51. Use the word in bold to complete the two spaces in the passage.

Anaerobic respiration can occur when an athlete does vigorous exercise. This is because there is not enough … in the body. The product of anaerobic respiration is …

Carbon dioxide lactic acid nitrogen oxygen water

52. Give the word equation for aerobic respiration.

53. Compare the reactants, products and the amount of energy produced for anaerobic respiration with those from aerobic respiration.
54. Which type of respiration releases more energy from glucose?
55. Respiration is a process which takes place in living cells. What is the purpose of respiration?
56. State the product of anaerobic respiration in animals
57. Describe the process of respiration which takes place in human beings when oxygen is not available and give an effect.
58. The image shows a muscle cell. Compare aerobic respiration and anaerobic respiration in muscle cells.



59. The table below shows the amount of energy released by aerobic and anaerobic respiration. Suggest why human cells might respire anaerobically, even though only a small amount of energy is transferred.

	Energy in kJ transferred from 1 g of glucose
Aerobic respiration	16.1
Anaerobic respiration	1.2

60. Lactic acid production during exercise affects an athlete's performance. Explain why lactic acid is produced during exercise.
61.

Answers:

Part A:

1. They produce their own food (by photosynthesis)
2. Water, carbon dioxide and light
3. Water and carbon dioxide
4. Glucose and oxygen
5. Endothermic as it transfers energy from surroundings
6. chloroplasts
7. carbon dioxide + water → glucose + oxygen
8. respiration
9. Respiration transfers energy to the cell
10. Oxygen and glucose
11. Exothermic
12. Mitochondria
13. oxygen (g) + glucose (aq) → carbon dioxide (g) + water (l)
14. respiration
15. mitochondria
16. chloroplasts
17. No
18. To store and transport dissolved substances
19. Glucose (aq)→ lactic acid (aq)
20. Cells need extra energy, and the body cannot supply oxygen fast enough
21. Aerobic respiration transfers more energy from glucose
22. Lactic acid causes tiredness and cramps
23. Anaerobic respiration
24. Chloroplast
25. Carbon Dioxide + Water -> Glucose + Oxygen
26. Oxygen
27. Energy is transferred from the environment during photosynthesis
28. Carbon Dioxide
29. Light Energy
30. Chlorophyll
31. Endothermic
32. Light is absorbed by chlorophyll for use in photosynthesis
33. Plant C because it received the most hours of sunlight, so it will have photosynthesis for longer. AS photosynthesis produced glucose, it will have produced the most glucose
34. Glucose and Oxygen
35. Because it absorbs light energy from the environment.
36. Plant cell 3 because this type of plant cell contains the most chloroplasts. Chloroplasts are the site of photosynthesis and contains chlorophyll which is needed for plants to photosynthesise.
37. Respiration is a chemical r**eaction** that occurs inside the **cells** of all living things. It releases the stored **energy** from **glucose** to allow the organism to **move**, keep warm and grow.
38. Mitochondria
39. Oxygen and Glucose
40. Glucose + Oxygen -> Carbon Dioxide + Water
41. Respiration
42. Carbon Dioxide and Water
43.
    a. Oxygen
    b. Water

44. Respiration is a chemical reaction which takes place in all cells, breathing is the mechanical process of inhaling and exhaling air
45.
    a. Snail must have enough oxygen for whole experiment (2 hours) / Snail must not be allowed to dry out
    b. % of Carbon Dioxide in the air has increased over the two hours because the snail gives out carbon dioxide as it respires
    c. It will have decreased because the snail will have used up oxygen as it respired.
    d. Act as a control to show that it was the snail producing carbon dioxide and not just the presence of something in the beaker.
46. Because more energy is required by muscle cells for muscle contraction allowing movement.
47.
    a. To stop them falling in the solution / To stop them drowning (in the solution)
    b. The oxygen in the boiling tube is used up in respiration and the carbon dioxide released from respiration is absorbed by solution A
       Which causes a pressure difference, so air is drawn into the tube bringing the water droplet with it.
48. Without oxygen
49. When the body cannot get enough oxygen to the mitochondria for respiration
50. Glucose -> Lactic Acid
51. Anaerobic respiration can occur when an athlete does vigorous exercise. This is because there is not enough oxygen in the body. The product of anaerobic respiration is lactic acid
52. Glucose + Oxygen -> Carbon Dioxide + Water
53. Anaerobic does not require oxygen aerobic does / aerobic more efficient (aerobic releases more energy) / the products of aerobic respiration are carbon dioxide and water whereas anaerobic respiration produces lactic acid.
54. Aerobic
55. Release energy from glucose
56. Lactic Acid
57. Any three from
58. In mitochondria
59. Glucose breaks down to give lactic acid (or glucose -> lactic acid)
60. Lactic acid is painful
61. Anaerobic respiration leaves an oxygen debt
62. Anaerobic provides body with source of energy when no oxygen available
63. Less efficient than aerobic respiration
64. Anaerobic does not require oxygen aerobic does / aerobic more efficient (aerobic releases more energy) / the products of aerobic respiration are carbon dioxide and water whereas anaerobic respiration produces lactic acid.
65. When not enough oxygen is available, allows cells to still release some energy from stored glucose
66. Produced during anaerobic respiration when not enough oxygen is available. This is because the body's demand for energy for muscle contractions exceed its ability to get oxygen to the working muscles quick enough.