



**Year 7**

# Biology

## revision pack

### **Contents:**

Page 2: What are organisms made of?

Page 9: How do organisms grow and reproduce?

Page 14: Why are organisms so diverse?

### **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:

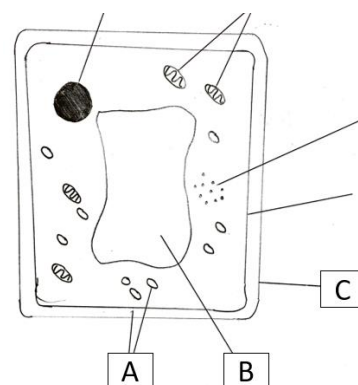
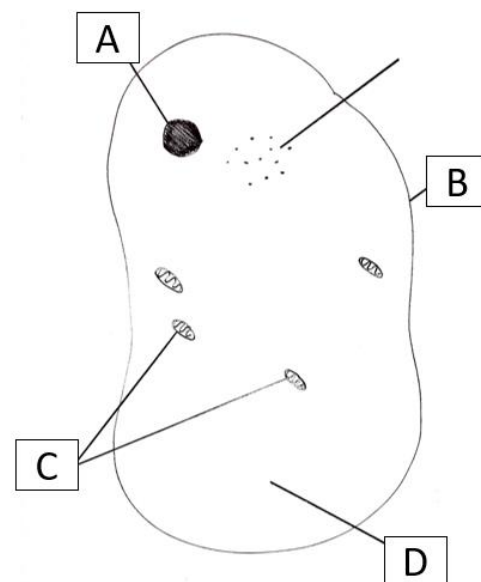
Practise questions to test your recall of important knowledge and ability to apply this knowledge. *Italics note relevant self-study packs to refer to should you get stuck.*

### 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

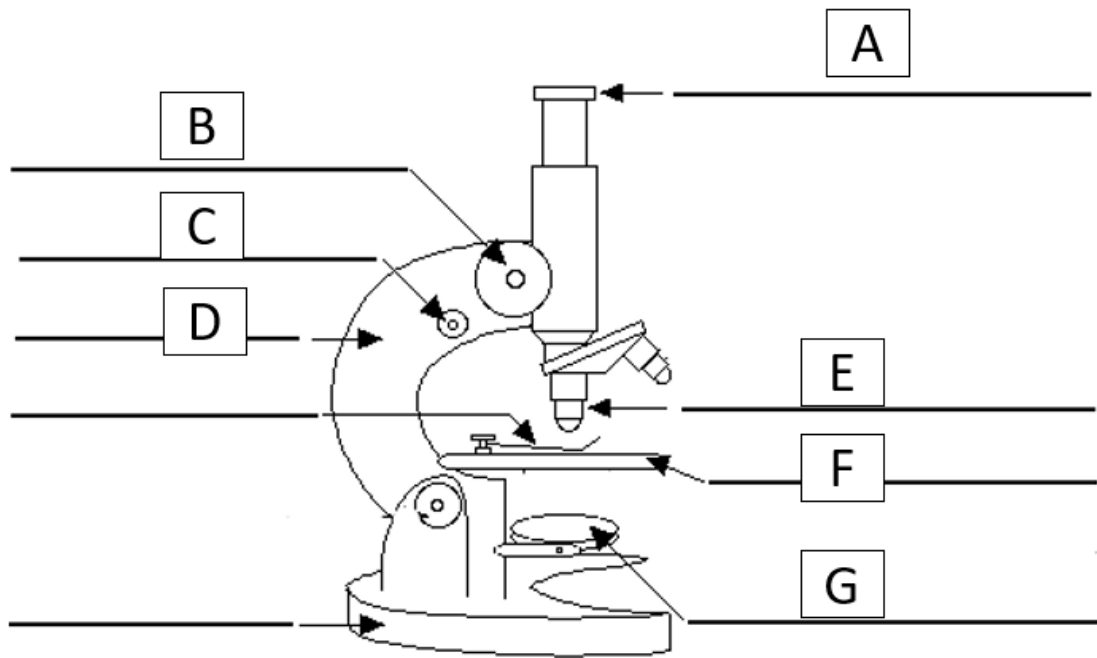
The diagram shows an image of a cell.

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 plant's 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.

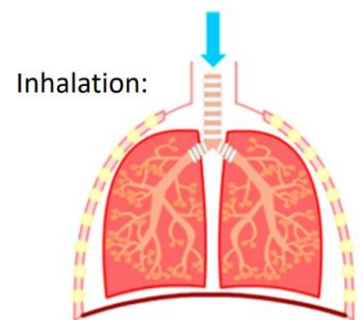
17. Where does gas exchange take place?
18. Oxygen is transferred from the air into the blood by diffusion. Explain why oxygen diffuses from the air into the blood.
19. Why do cells require oxygen?
20. How is oxygen transported from the lungs to body cells?
21. Describe the process of inhaling air.

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 feels 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 heart 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 packs – 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?

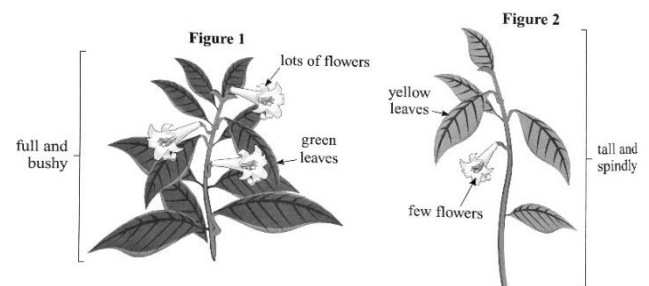
The girls shown in the image are identical twins. They have exactly the same genes.



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.

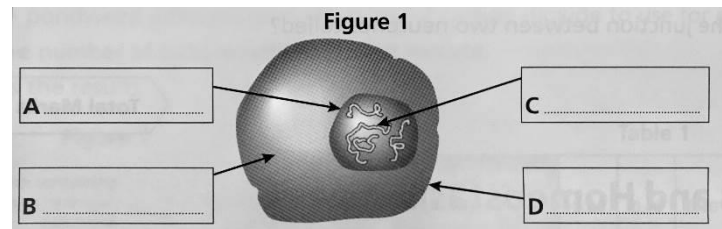
## Part B: B2 self-study pack – Lessons 03 & 04.

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.**



**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 to 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.

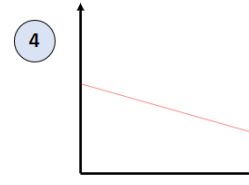
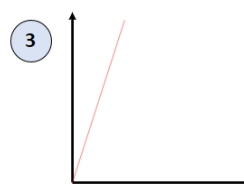
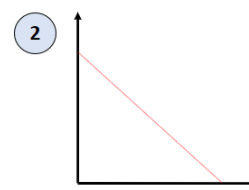
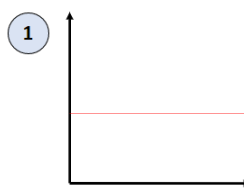
1. What is a species?
2. What does being “fertile” mean?
3. What are the two causes of variation in a species?
4. What is a continuous variable?
5. What is a discrete variable?
6. What is a correlation?
7. What is a positive correlation?
8. Does a positive correlation prove one variable causes the other?

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

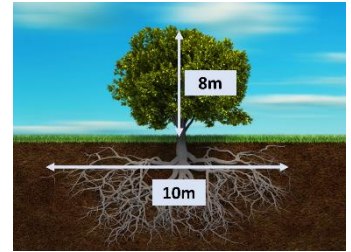
9. Eye colour
10. Hair colour
11. Weight
12. Double jointed or not
13. Height
14. Length of arm

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.



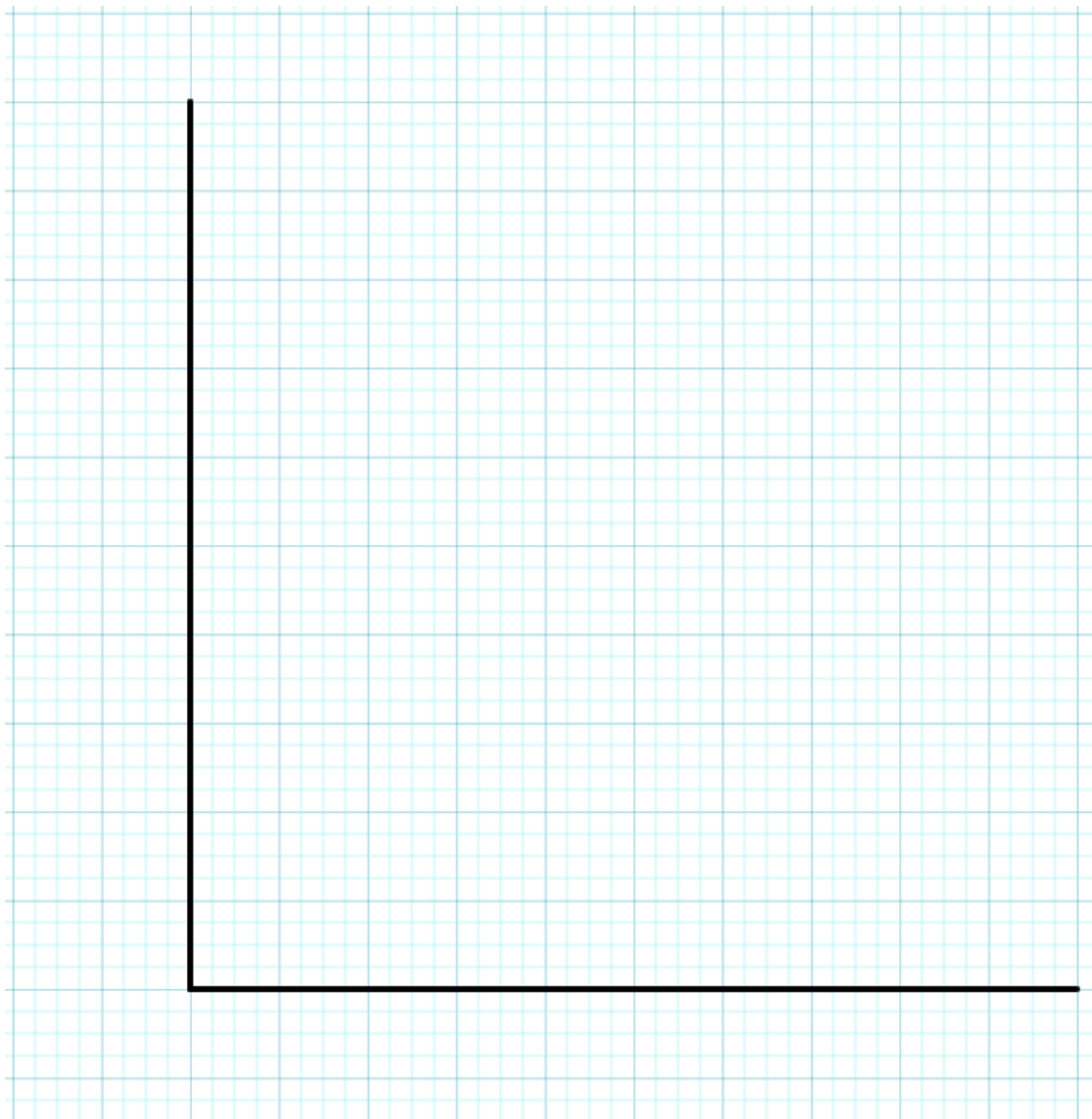
**Hypothesis:** The taller the tree the greater the spread of their roots.

**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

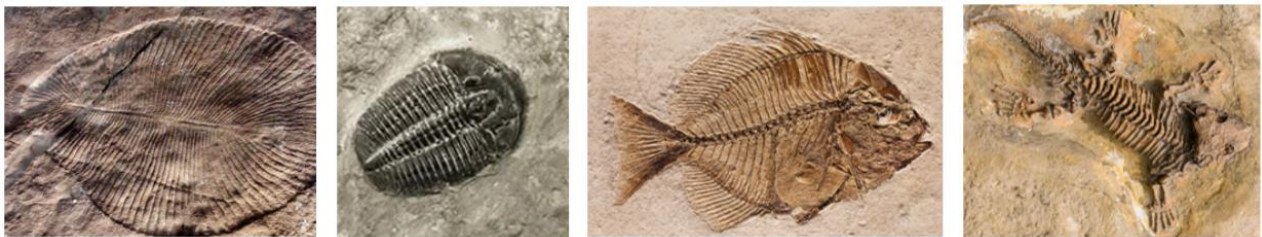
24. Write a conclusion for your results. Do the results support the scientists hypothesis?



## 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:



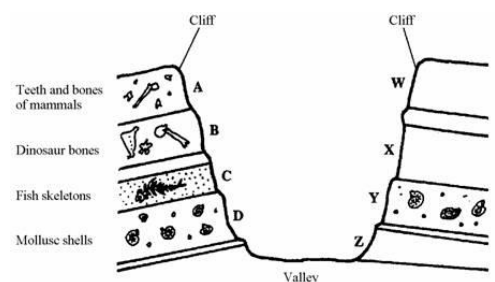
- The fossils of animals **S** and **T** have many features in common, but **T** is more complex than **S**.
- The fossils of animals **S** and **T** are the same size.
- The fossils of animals **S** and **T** have the same skin colour.
- The fossil of animal **S** was found in a deeper layer of rock 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 than **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 no longer exist / named ref eg dinosaur  
show changes in types (*of animals / plants*)  
similar fossils found in rocks of similar age