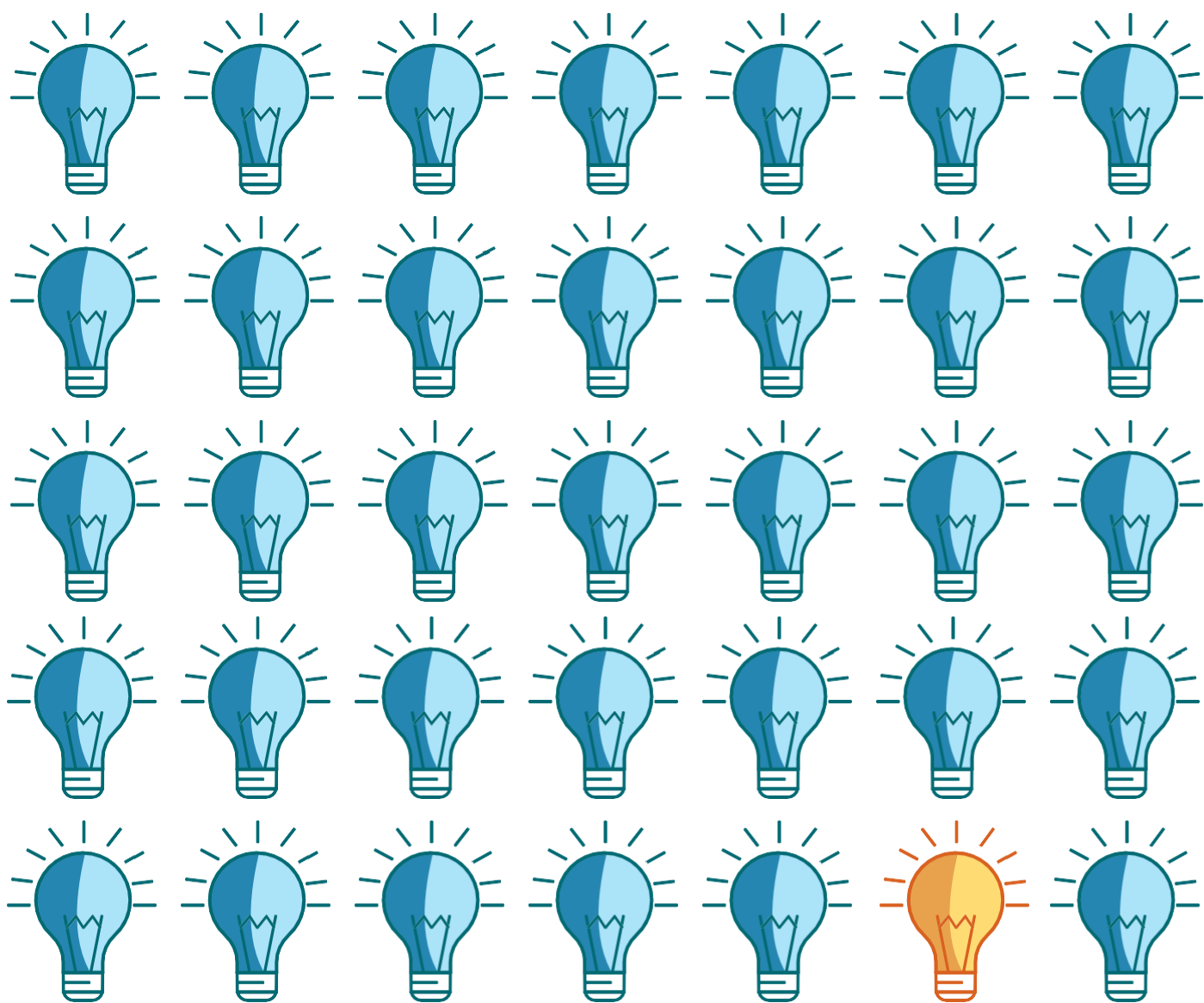


AQA SCIENCE

A-level Biology Transition Pack



Year 11 to Year 12



WELCOME

This pack is designed to support your transition from GCSE Biology to A-Level Biology. It focuses only on Biology content and introduces key A-Level skills such as extended writing, data analysis, and independent research.



SPECIFICATION

PAPER 1

1. Biological molecules
2. Cells
3. Organisms exchange substances with their environment
4. Genetic information, variation and relationships between organisms

PAPER 2

5. Energy transfers in and between organisms
6. Organisms respond to changes in their internal and external environments
7. Genetics, populations, evolution and ecosystems
8. The control of gene expression

PAPER 3

Any content from topics 5–8, including relevant practical skills



NOTES



PRACTICALS

1. Investigation into the effect of a named variable on the rate of an enzyme-controlled reaction

2. Preparation of stained squashes of cells from plant root tips; set-up and use of an optical microscope to identify the stages of mitosis in these stained squashes and calculation of a mitotic index

3. Production of a dilution series of a solute to produce a calibration curve with which to identify the water potential of plant tissue

4. Investigation into the effect of a named variable on the permeability of cell-surface membranes

5. Dissection of animal or plant gas exchange or mass transport system or of organ within such a system

6. Use of aseptic techniques to investigate the effect of antimicrobial substances on microbial growth

7. Use of chromatography to investigate the pigments isolated from leaves of different plants, eg leaves from shade-tolerant and shade-intolerant plants or leaves of different colours

8. Investigation into the effect of a named factor on the rate of dehydrogenase activity in extracts of chloroplasts

9. Investigation into the effect of a named variable on the rate of respiration of cultures of single-celled organisms

10. Investigation into the effect of an environmental variable on the movement of an animal using either a choice chamber or a maze

11. Production of a dilution series of a glucose solution and use of colorimetric techniques to produce a calibration curve with which to identify the concentration of glucose in an unknown 'urine' sample

12. Investigation into the effect of a named environmental factor on the distribution of a given species



COMMAND WORDS

Command Word	Definition	Example Question	Example Answer
State, give, name, write down	Short answer only and does not require an explanation.	State the units for acceleration.	m/s^2
Describe (not graphs or practical)	Recall facts, events or process in an accurate way.	Describe how quadrats should be used to estimate the number of plants in a field.	Place a large number of quadrats randomly in the field. Count the number of plants in the quadrat. Calculate the mean number in each quadrat then use the area of the quadrat and field to estimate the number of plants.
Describe (graphs)	Identify the pattern in the graph and use numbers from the graph to make this clear.	Describe the pattern of tooth decay in Figure 3 for water without fluoride.	The percentage of tooth decay increases with age by 4% for each age group in figure 3.
Describe (practical)/ Plan	Write the method for the practical or the results that you would expect to see.	Plan an experiment to test the hypothesis "the higher the temperature, the faster the rate of reaction".	Measure the rate of reaction by adding a set amount of metal to set type, volume and concentration of acid and time how long it takes to stop fizzing. Repeat the experiment at 5 different temperatures.
Determine	Use given data or information to obtain and answer.	Determine the half-life of a sample if it decreases from 1000g to 250g in 2.6million years.	1.3 million years
Explain	Make something clear or state the reasons for something happening. You will need to state what is happening and then say why it happens.	Explain why soot forms.	Soot forms during incomplete combustion this is because there isn't enough oxygen present.
Evaluate	Use the information supplied and your own knowledge to consider the evidence for and against a point. You may also be required to include a <i>justified conclusion</i> .	A company stated: 'A Life Cycle Assessment shows that using plastic bags has less environmental impact than using paper bags'. Evaluate this statement.	Paper bags are made from a renewable resource whereas plastic bags are made from finite resources. However, paper bags are bad because they produce much more solid waste and more CO ₂ is released when they are produced therefore the negative impacts of paper bags outweigh the problem of plastic coming from a finite resource.
Compare	Describe the similarities and/or differences between things. Avoid writing about just one.	Compare the differences between cracking and distillation.	Cracking involves a catalyst <i>whereas</i> distillation does not.
Sketch	Draw approximately.	Sketch a current-potential difference graph for a filament lamp.	



SCIENTIFIC SKILLS

Variables

INDEPENDENT

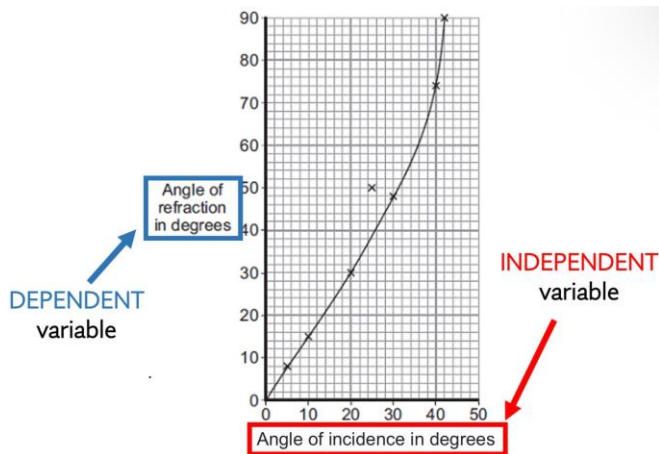
The independent variable is always the title on the left of a table or the title on the bottom of a graph. It shows what is being changed. in the experiment

DEPENDENT

The dependent variable is always the title on the right of a table or the title on the side of a graph. It shows what is being measured in the experiment

CONTROL

The CONTROL variables you have to think of yourself. Think about what they had to KEEP THE SAME to make it FAIR



A student investigated the effect of pond organisms on the amount of carbon dioxide in their surroundings.

The student set up six boiling tubes as shown in the figure below.

They were left for 2 days.

Each boiling tube contained pond water with an indicator.

The indicator was pink at the start of the investigation.

- If the amount of carbon dioxide in the water increased the indicator turned yellow.
- If the amount of carbon dioxide in the water decreased the indicator turned purple.

The independent variable (what they changed to see if it made a difference): Amount of pond organisms.

The dependent variable (what they measured): Amount of carbon dioxide.

A control variable (what they kept the same): Pond water and indicator.

Variables - questions

A student investigates how the concentration of an acid affects the rate of a reaction.

This is the method used.

- Put a 3 cm piece of magnesium ribbon into a conical flask.
- Add 50 cm³ of 0.5 mol / dm³ hydrochloric acid to the flask.
- Collect and measure the volume of gas produced at 10 second intervals.
- Repeat with different concentrations of hydrochloric acid using the same length of magnesium ribbon and volume of acid.

What is the independent variable?
What is the dependent variable?
Suggest some control variables.

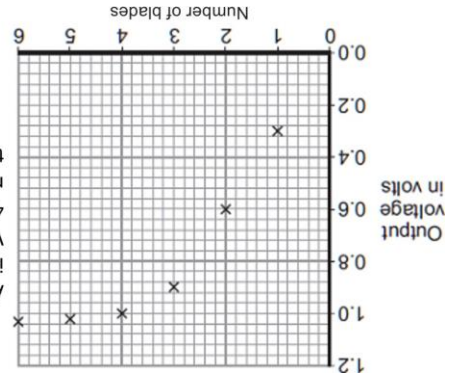
Answer: independent: concentration of hydrochloric acid; dependent: volume of gas produced; control: 3cm of magnesium ribbon

Answer: The pH increased the time for no starch to be detected decreased up to pH 7.0 where it was 1..5 minutes after pH 7.5 the time increases again

8.0	2.0
7.5	1.5
7.0	1.5
6.5	2.0
6.0	3.0
5.5	4.5
5.0	7.0
pH	Time when no starch was detected in minutes

Write a conclusion for this table

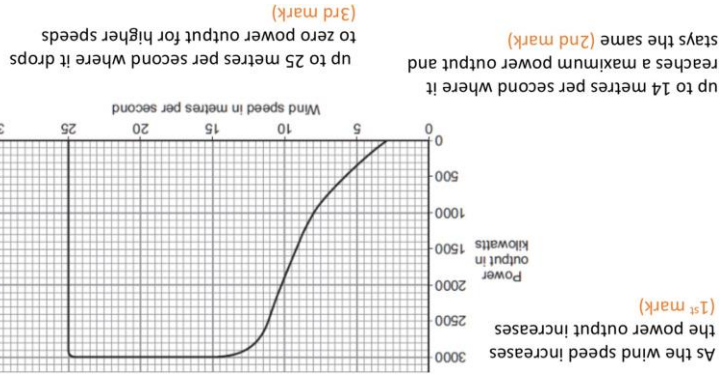
Conclusions - questions



As THE NUMBER OF BLADES increases, the OUTPUT VOLTAGE VOLTS INCREASES (1st mark) up 4 blades, then increasing the number of blades doesn't affect the output voltage. (2nd mark)

The perfect conclusion should start: As _____ increases, _____

- Write what the independent variable is here (e.g. mass of metal)
- Write what the dependent variable is here (e.g. temperature)
- Choose the right word: increases, decreases or stays the same



As the wind speed increases the power output increases (1st mark) up to 14 metres per second where it reaches a maximum power output and stays the same (2nd mark) up to 25 metres per second where it drops to zero power output for higher speeds (3rd mark)

Conclusions

SCIENTIFIC SKILLS



SCIENTIFIC SKILLS



Compare & evaluate

Compare means say **similarities** and **differences**.

Evaluate means say the **pros** and **cons** for each one and a **conclusion**

A driver wishes to buy a new car.

The table below gives some data about an electric car and one with a petrol engine.

Cost (£)	Petrol engine car	Electric car
Running cost per year (£)	27 000	250
Average lifetime (years)	15 000	12

Which car would be the most economic over its 12 year lifetime?

Don't just restate the info you are given

The petrol car is cheaper to buy initially

NOT... the electric car costs £27000 and the petrol

car costs £15000

Compare and evaluate - questions

(c) The table below shows information about three methods of contraception.

Condom	Oral contraceptive	Hormone skin patch
Percentage (%) effectiveness	98.0	99.7
How contraception is obtained	From shops or sexual health clinic	From doctor or sexual health clinic
Possible side effects	No serious side effects	Headaches, nausea, high blood pressure

Evaluate the use of these contraceptive methods.

Answer: allow converse where applicable

- condom effectiveness is lower than oral contraceptive and patch
- hormone patch slightly more effective than oral contraceptive
- all are highly effective
- condoms more easily accessible
- condoms have no serious side effects, oral contraceptive and patch have possible side effects
- only condoms protect against STIs / STDs or named STIs / STDs
- side effects don't affect all women
- could forget to take oral contraceptive, but patch is applied for long time
- could forget to replace patch
- patch is visible



cons

- might save some lives
- vaccine could reduce chance of future outbreaks
- patient made aware of risk and agreed to use of drug
- sharing of results could speed up development of effective vaccines /
- used mainly for health workers who were risking their lives to help

Give a conclusion, pros

Evaluate the use of unlicensed drugs and vaccines during the EVD outbreak.

The number of deaths from EVD continued to increase. The World Health Organization (WHO) decided it was ethical to use unlicensed drugs. The WHO said unlicensed drugs could only be given to people who gave their permission. Also, any results had to be shared with other researchers and drug companies. Some vaccines had shown positive results in animal testing, but the vaccines had not been tested and trialled in humans. The supplies of the vaccine were low. At first the vaccines were only used for health workers.

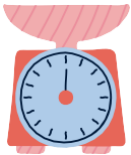
a justified conclusion

- could be dangerous or vaccine could harm a healthy person
- goes against legislation / laws governing drug development
- might set a precedent for other drugs not to be fully tested
- unfair as not available to the African people

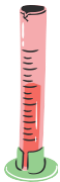


SCIENTIFIC SKILLS

Measuring techniques



Mass should be measured using a balance



Measuring cylinders measure out a specific volume of liquid



To measure the volume of gas produced we use a gas syringe



A eureka can are used along side measuring cylinders to find the volume of irregular objects



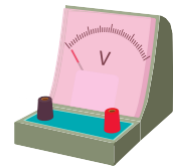
A ruler will measure the length of a ruler



Temperature can be measured using a thermometer



A stop watch can be used to measure time taken



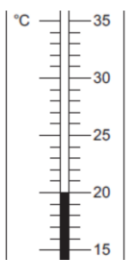
Voltmeters measure potential difference



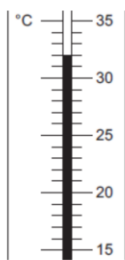
Ammeters measure current

Measuring - questions

Before adding metal



After adding metal



Use Figure 2 to complete Table 1.

Table 1

Temperature before adding metal in °C	_____
Temperature after adding metal in °C	_____
Change in temperature in °C	_____



MATHS SKILLS

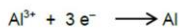
Handling data

- Use an appropriate number of significant figures.
- Find arithmetic means.
- Construct and interpret frequency tables and diagrams, bar charts and histograms.
- Understand the principles of sampling as applied to scientific data (biology questions only).
- Understand simple probability (biology questions only).
- Understand the terms mean, mode and median.
- Use a scatter diagram to identify a correlation between two variables (biology and physics questions only).

Handling data questions

1

The half equation at the cathode is:



Calculate the number of moles of electrons needed to produce 1 000 kg of aluminium.

Give your answer to three significant figures.

Relative atomic mass (A_r): Al = 27

[3 marks]

Answer = _____ moles

Table 2

Test number	Distance ruler dropped in cm	
	Student A	Student B
1	9	12
2	2	13
3	6	13
4	7	9
5	7	8
Mean	7	X

1.1

Calculate the value of X in Table 2.

[1 mark]

Mean distance ruler dropped = _____ cm

Two alleles control the body colour of carp:

- brown (B)
- blue (b).

The brown allele is dominant to the blue allele.

The genetic cross from breeding two carp is shown in Figure 8.

Figure 8

	B	b
b	Bb	
b		

1.2

What is the probability that the offspring from this genetic cross will be brown? [1 mark]

Tick **two** boxes.

- 0
- 0.25
- 0.5
- 1.0

0.5

55/5 = 11

12+13+13+9+8 = 55

3:1 ratio, so moles of e- = 37.03 x 3 = 111 moles

Moles Al = 1000/27 = 37.03

Moles = mass/rmm

Answer:



MATHS SKILLS

Arithmetic and numerical

- Recognise and use expressions in decimal form
- Recognise and use expressions in standard form
- Use ratios, fractions and percentages.
- Make estimates of the results of simple calculations.

Arithmetic and numerical questions

1 This question is about speed.

1.1 What is a typical value for the speed of sound?

[1 mark]

Tick one box.

3.3 m/s

3.3×10^2 m/s

3.3×10^3 m/s

3.3×10^6 m/s

1.2 A coarse particle has a diameter of 1×10^{-6} m.

A nanoparticle has a diameter of 1.6×10^{-9} m.

Calculate how many times bigger the diameter of the coarse particle is than the diameter of the nanoparticle.

[2 marks]

Table 1 shows how the count rate from a radioactive source changes with time.

Table 1

Time in seconds	0	40	80	120	160
Count rate in counts/second	400	283	200	141	100

1.3 Use Table 1 to calculate the count rate after 200 seconds.

[2 marks]

Answer: 3.3×10^3 m/s
 $(1 \times 10^{-6}) / (1.6 \times 10^{-9}) = 625$ times bigger



MATHS SKILLS

Algebra

- Understand and use the symbols: =, <>, >, <, ~.
- Change the subject of an equation.
- Substitute numerical values into algebraic equations using appropriate units for physical quantities (chemistry and physics questions only).
- Solve simple algebraic equations (biology and physics questions only).

Algebra questions

1 The car travels a distance of 2040 metres in 2 minutes.

Use the following equation to calculate the mean speed of the car.

$$\text{mean speed} = \frac{\text{distance}}{\text{time}}$$

[2 marks]

Mean speed = _____ m/s

1.1 The spring constant for the spring in Table 1 is 20 N/m.

Calculate the work done in stretching the spring until the extension of the spring is 0.050m

Use the correct equation from the Physics Equation Sheet.

[2 marks]

Work done = _____ J

work done = 0.5 x spring constant x (extension)²
 Work done = 0.5 x 20 x (0.05)²
 Work done = 0.025J

Mean speed = 2040/120 = 17m/s



MATHS SKILLS

Graphs

- Translate information between graphical and numeric form.
- Understand that $y = mx + c$ represents a linear relationship.
- Plot two variables from experimental or other data.
- Determine the slope and intercept of a linear graph.
- Draw and use the slope of a tangent to a curve as a measure of rate of change (chemistry and physics questions only).
- Understand the physical significance of area between a curve and the x-axis and measure it by counting squares as appropriate (physics questions only).

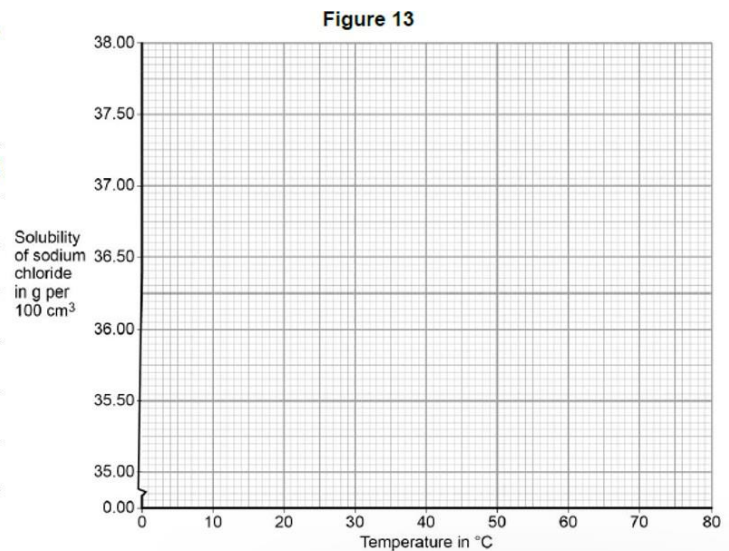
Graphs questions

1

Table 3 shows the solubility of sodium chloride in 100 cm^3 of aque at different temperatures.

Table 3

Solubility of sodium chloride in g per 100 cm^3	Temperature in $^{\circ}\text{C}$
35.72	10
35.89	20
36.09	30
37.37	40
36.69	50
37.04	60



On **Figure 13**:

- plot this data on the grid
- draw a line of best fit.

[3 marks]

All points plotted correctly
Suitable line of best fit

Answer:



MATHS SKILLS

Graphs

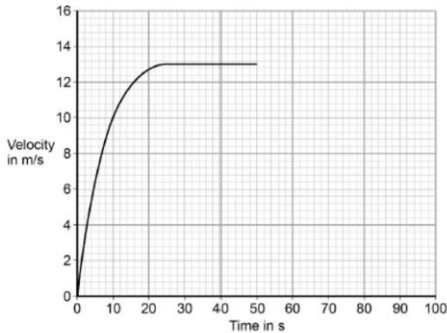
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- Understand the physical significance of area between a curve and the x-axis and measure it by counting squares as appropriate (physics questions only).

Graphs questions

At the top of the slope the skier leaves the drag lift and skis back to the bottom of the slope.

Figure 13 shows how the velocity of the skier changes with time as the skier moves down the slope.

Figure 13



- 1** After 50 seconds the skier starts to slow down.
The skier decelerates at a constant rate coming to a stop in 15 seconds.

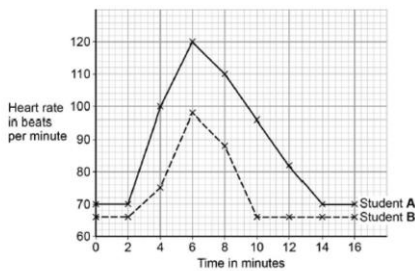
Draw a line on Figure 13 to show the change in velocity of the skier as she slows down and comes to a stop.

[2 marks]

- 1.1** Some students investigated how exercise affects heart rate.

Figure 4 shows their results.

Figure 4



- 1.2** For how many minutes did the students run?

Tick one box.

- 2
- 4
- 6
- 14

[1 mark]



MATHS SKILLS

Geometry

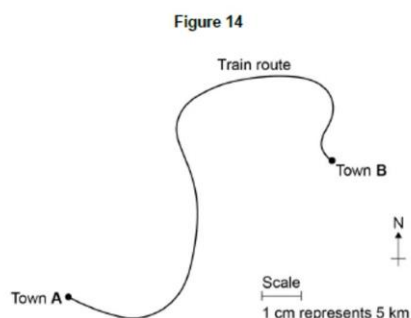
- Use angular measures in degrees (physics questions only)
- Visualise and represent 2D and 3D forms including two dimensional representations of 3D objects (chemistry and physics questions only).
- Calculate areas of triangles and rectangles, surface areas and volumes of cubes.

Geometry questions

1

A train travels from town A to town B.

Figure 14 shows the route taken by the train.
Figure 14 has been drawn to scale.



1.1

Use Figure 14 to determine the displacement of the train in travelling from A to B.

Show how you obtain your answer.

[2 marks]

Displacement = _____ km

Direction = _____

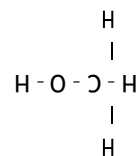
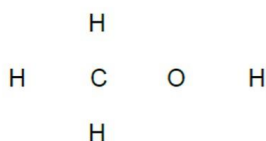
1.2

A molecule of methanol has five single covalent bonds.

Draw the missing bonds in Figure 6 to complete the displayed formula for methanol.

[1 mark]

Figure 6



0620 or N620E
37.5 km

Answer:



CHECKLIST

Summer 2026 checklist:

Complete pages 17 and 18

Extension – work through the questions on pages

1. Core Knowledge Review – Cells

- Describe the structure and function of prokaryotic vs eukaryotic cells.
- Explain mitosis and its importance (growth, repair).
- Define diffusion, osmosis, and active transport and compare them.
- A-Level bridge: Explain how surface area to volume ratio limits cell size.

2. Organisation & Exchange

- Explain the structure of the heart and blood vessels.
- Describe gas exchange in alveoli.
- Explain how the digestive system breaks down macromolecules.
- A-Level bridge: Link structure of exchange surfaces to Fick's Law.

3. Infection & Immunity

- Describe how white blood cells defend the body.
- Explain vaccination and immunity.
- Define pathogens and modes of transmission.
- A-Level bridge: Explain primary vs secondary immune response.

4. Bioenergetics

- State the equation for photosynthesis and respiration.
- Explain limiting factors of photosynthesis.
- Compare aerobic and anaerobic respiration.
- A-Level bridge: Describe how ATP is used in cells.



CHECKLIST

5. Homeostasis

- Define homeostasis and negative feedback.
- Explain regulation of blood glucose.
- Describe nervous vs hormonal coordination.
- A-Level bridge: Explain how receptors, coordinators and effectors interact.

6. Genetics & Evolution

- Define gene, allele, genotype and phenotype.
- Explain dominant vs recessive inheritance.
- Describe natural selection.
- A-Level bridge: Explain protein synthesis (DNA → RNA → protein).

7. Ecology

- Define ecosystem, population, and community.
- Explain food chains and energy transfer.
- Describe biodiversity and human impacts.
- A-Level bridge: Explain energy transfer efficiency between trophic levels.

A-Level Skills Development

- Complete the following tasks:
- Analyse a graph showing enzyme activity vs temperature.
- Write a 6-mark explanation of why diffusion rate increases with temperature.
- Interpret data from a photosynthesis experiment.

Independent Research Task

- Research one of the following topics and produce a one-page summary:
- Stem cells and ethical issues
- Antibiotic resistance
- Climate change and biodiversity loss



CELL BIOLOGY

Cell structure

1. State the function of the nucleus
2. State the function of the cytoplasm
3. State the function of the cell membrane
4. State the function of the mitochondria
5. State the function of the ribosomes
6. State the function of the cell wall
7. State the function of the chloroplasts
8. State the function of the permanent vacuole
9. State three differences between animal and plant cells
10. Name the substance that makes up the cell wall of a plant
11. Describe what a bacteria cell has instead of a nucleus
12. Name the small rings of DNA found in bacteria are called
13. State an example of 2 eukaryotic and 1 prokaryotic cell
14. Describe 2 differences between prokaryotic and eukaryotic cells

Magnification

1. Describe how we calculate the total magnification of a microscope
2. State the equation that links magnification, image size and actual size
3. Describe how to convert millimetres to micrometres
4. Explain why the specimen needs to be stained before looking at it underneath the microscope
5. State the 2 types of stains that are used
6. Describe how you would observe a specimen (animal or plant cell) underneath a microscope
7. Describe what you would if your specimen appears blurry underneath the microscope
8. Describe 2 things you will do if your specimen appears too small underneath the microscope

Exchange surface

1. The efficiency of cells exchanging substances with their environment, depends on what two properties of the organism
2. How do you calculate surface area?
3. How do you calculate volume?
4. State 2 examples of exchange surfaces in humans
5. State the function of the alveoli and villi
6. Describe 3 adaptations of exchange surfaces

Cell division

1. State the definition of cell differentiation
2. State the definition of specialised in biology
3. State the function of the sperm cell
4. Describe the 3 adaptations of the sperm cell
5. State the function of the nerve cell
6. State the function of the muscle cell
7. State the function of the root hair cell
8. State the function of the phloem and xylem
9. Describe the structure of the xylem
10. Describe the structure of the phloem
11. Put in the correct order, from smallest to biggest: cell, gene, chromosome, and nucleus
12. State how many pairs of chromosomes do human body cells have?
13. State how many chromosomes do gametes contain
14. State how many chromosomes you inherit from each parent
15. State the function of the cell cycle
16. Define mitosis
17. Describe the function of mitosis
18. Describe the 3 stages of the cell cycle

Transport in out of cells

1. Define diffusion
2. State the 3 factors that impact the rate of diffusion
3. Describe how temperature affects the rate of diffusion
4. Describe how concentration gradient affects the rate of diffusion
5. Describe how surface area affects the rate of diffusion
6. Define osmosis
7. Explain why root hair cells require active transport
8. Explain why root hair cells have lots of mitochondria
9. Describe how active transport is used in digestion

Osmosis



1. Define dilute
2. Define concentration
3. Define partially permeable membrane
4. Define hypertonic
5. Define hypotonic
6. Describe what happens if you put a cell in a hypertonic (concentrated) solution
7. Describe what happens if you put a cell in a hypotonic (dilute) solution



paper one: biology

CELL BIOLOGY

Stem cells

1. Define a stem cell
2. What are the 2 types of stem cells?
3. Describe the difference between adult tissue stem cells and embryonic stem cells in regards to potency
4. Describe a medical use of adult tissue stem cells
5. Describe the medical uses of embryonic stem cells
6. Describe the process of therapeutic cloning and why it's useful
7. Describe why some people are against stem cell research?
8. Name the tissue where plant stem cells are found and where is that tissue located in the plant?
9. Name one difference between differentiation in plants and animals
10. State 3 advantages of plant cloning

Culturing micro organisms

R
T

1. State which organism uses binary fission to divide
2. Describe the process of binary fission
3. State the correct conditions that allow bacteria to divide quickly
4. Explain why the inoculating loop is sterilised
5. Explain why a culture medium is used to grow bacteria
6. Explain why the petri dish lid is lightly taped back on
7. Explain why the petri dish is turned upside down when the bacteria are growing
8. Explain why microorganisms are not kept above 25°C in a school lab
9. Describe how we use the zone of inhibition to compare the effectiveness of antibiotic



paper one: biology

ORGANISATION

Cell organisation

1. Define tissue
2. Define organ
3. Reorder the following in increasing size order: organ, cell, tissue, organ system, organism

The lungs

1. Describe the journey air takes to get from the atmosphere to the alveoli
2. State the function of the alveoli
3. Describe what gas exchange is
4. Describe the 3 adaptations of the alveoli for its function

Circulatory system

1. State the function of the red blood cells
2. State the pigment found in red blood cells that binds to oxygen
3. Explain why a biconcave shape helps red blood cells with their function
4. Explain why the lack of a nucleus helps red blood cells with their nucleus
5. State the function of platelets.
6. State the functions of white blood cells
7. State the 3 functions of the plasma
8. Describe the differences between arteries, veins and capillaries – include both function and structure
9. State the blood vessel type that carries blood from the heart to other parts of the body
10. State the blood vessel type that carries blood from the organs back to the heart
11. State the blood vessel type that is found within organs, as well as linking arteries to veins
12. Why can substances diffuse easily between capillaries and the cells?
13. State the blood vessel that supplies oxygen to the heart cells only
14. State the name given to the upper chambers of the heart
15. State the name given to the lower chambers of the heart.
16. State the blood vessel that brings deoxygenated blood back to the heart from the rest of the body
17. State the blood vessel that carries deoxygenated blood from the heart to the lungs
18. State the blood vessel that brings oxygenated blood from the lungs back to the heart
19. State the blood vessel that carries oxygenated blood out of the heart to the rest of the body
20. Explain why muscle wall of the left ventricle is thicker than the right ventricle
21. Explain the function of the heart valves
22. Describe the function of the pacemaker cells
23. State where the pacemaker cells are located

Cardiovascular diseases

1. State how coronary heart disease impacts the coronary artery
2. State the function of the coronary artery
3. Describe and explain the medical and lifestyle risk factors that can lead to CHD
4. Explain how CHD causes a heart attack
5. Describe how stents help to treat CHD
6. Describe how statins help to treat CHD
7. Explain CHD causes a heart attack

Health and disease

1. State the effect of nicotine in tobacco smoke?
2. State the carcinogen in tobacco smoke
3. Define carcinogen
4. Describe how tobacco smoke increases chances of getting lung infections
5. Describe how tobacco smoke increases chances of getting cardiovascular diseases like CHD
6. State a risk factor for obesity.
7. State 2 risk factor for type 2 diabetes.
8. State which organ breaks down alcohol before it causes permanent damage
9. State one disease caused by long-term heavy drinking.
10. State the condition that babies may have if their mothers drink lots of alcohol during pregnancy

Cancer

1. Define tumour
2. Define benign tumours
3. Define malignant tumours
4. State 3 risk factors of developing cancer
5. Describe how chemotherapy and radiotherapy are used to treat cancer



ORGANISATION

Enzymes

1. Define a catalyst
2. Define an enzyme
3. Define active site
4. Describe the lock and key model.
5. Define denaturation
6. Explain how temperature affect enzymes activity
7. Explain why enzymes stop working past their optimum temperature
8. Explain why enzymes not work well at a lower temperature
9. Describe how change in pH affect enzyme structure
10. State the pH amylase works best in
11. Starch is broken into which small soluble molecule
12. State which 3 organs produce amylase
13. State where starch digestion occurs
14. State the pH protease works best in
15. Protein is broken down into which small soluble molecule
16. State which 3 organs produce protease
17. State where protein digestion occurs
18. State the pH lipase works best in
19. Lipids are broken down into which 2 small soluble molecules
20. State which 2 organs produces lipase
21. Where does lipid digestion occur
22. Explain how the hydrochloric acid in the stomach help with digestion
23. Describe how the stomach is adapted to protect itself from the hydrochloric acid
24. State the two functions of bile.
25. Define emulsification
26. Hydrochloric acid in the stomach breaks down food. True or false?
27. State the function of the salivary glands.
28. State the name of the tube that carries food from the mouth to the stomach.
29. State the function of the stomach.
30. Describe the 3 types of muscles that make up the stomach and their function
31. State the function of the liver in the digestive system.
32. State the function of the small intestine.
33. State the function of the large intestine.
34. State the function of the pancreas.
35. State the function of the gall bladder

Food test



1. State the reagent used to test for starch and describe what a positive result looks like
2. State the reagent used to test for sugar and describe what a positive result looks like
3. State the reagent used to test for proteins and what does a positive result look like
4. State the reagent used to test for lipids and what does a positive result look like
5. Explain a risk of doing the food tests practical

Plants

1. State the function of the epidermal tissue
2. State the function of the waxy cuticle
3. State the function of the palisade (mesophyll) tissue
4. Describe 2 ways the palisade cells are adapted for photosynthesis
5. State the function of the spongy (mesophyll) tissue
6. State the function of the xylem and phloem
7. Describe the structure of the xylem and phloem
8. State the transport system the phloem use to transport glucose and what direction it moves in
9. State the transport system the xylem use to transport water and minerals and what direction it moves in
10. State the function of the stomata
11. State the function of the guard cells
12. Describe what transpiration means
13. Describe the transpiration stream
14. Describe and explain the 4 factors that affect the rate of transpiration
15. Describe how we can use a potometer to measure the rate of transpiration



paper one: biology

INFECTION & RESPONSE

Infectious diseases

1. Describe the difference between communicable and non-communicable diseases
2. Define a pathogen
3. State the four types of pathogens
4. State the 4 different ways pathogens are spread

Viral diseases

1. Describe how viruses cause us to fall ill
2. Describe the causation, symptoms and treatment of measles
3. State how HIV is spread
4. State the name of the treatment used to control HIV infection
5. Describe the symptoms of HIV
6. Describe how tobacco mosaic virus (TMV) stops the growth of a plant

Bacterial diseases

1. Describe how bacteria make us fall ill
2. State how we treat bacterial infections
3. Describe the conditions that increase the chances of getting salmonella food poisoning
4. In the UK, how do we decrease our chances of getting food poisoning
5. Describe the 2 symptoms of gonorrhoea
6. Describe how we stop the spread of gonorrhoea

Protist diseases

1. State the vector that spread malaria
2. Describe the symptoms of malaria
3. Describe the 3 ways to prevent the spread of malaria

Fungal diseases

1. Describe how rose black spot stops the growth of a plant
2. Describe 2 ways farmers and gardeners can stop the spread of rose black spot

WBC & vaccination

1. Describe how the skin defends your body against pathogens
2. Describe how the trachea defend the body against pathogens?
3. Describe how the stomach defend the body against pathogens?
4. State the three ways in which white blood cells defend the body
5. Define antibodies
6. Define antigens
7. Describe how WBCs produce antibodies
8. Describe how vaccinations work
9. Describe the advantages of vaccinations?
10. Describe the disadvantages of vaccinations?
11. Digitalis originated from
12. Aspirin originated from
13. Penicillin originated from
14. Describe what antibiotic resistance means
15. Describe the human activities that lead to antibiotic resistance
16. Describe how bacteria become antibiotic resistant

Drug development

1. State how many stages are required to develop a new drug
2. Describe what happens in the preclinical testing stage 1
3. In preclinical stage 2, the drug is tested on live animals to test for efficacy, dosage, and toxicity. Define each keyword
4. Describe clinical trial stage 3 using the following keywords: double blind trial, placebo, and peer review

Monoclonal antibodies T

1. Define a monoclonal antibody
2. Describe how monoclonal antibodies are created
3. State two uses of monoclonal antibodies
4. Describe how monoclonal antibodies are used in pregnancy tests
5. Describe how monoclonal antibodies are used in treating disease
6. Describe the disadvantages of monoclonal antibodies

Plant defences T

1. Explain why plants need nitrates
2. Explain why plants need magnesium
3. State 2 physical defences plants have against disease
4. State 2 chemical defences plants have against predators
5. State 2 mechanical defences plants have against predators



paper one: biology

BIOENERGETICS

Photosynthesis

1. State the function of photosynthesis
2. Is photosynthesis endothermic or exothermic?
3. State the word and chemical equation for photosynthesis
4. State where photosynthesis occurs in the plant cell
5. State the name of the pigment in chloroplasts that absorbs light
6. Describe how the leaf is adapted for photosynthesis
7. State the 4 limiting factors
8. Describe what affects the amount of chlorophyll in a plant
9. Explain why the rate of photosynthesis decreases at a higher temperature
10. Describe the 4 use of glucose in plants
11. Describe 3 factors to maintain in a greenhouse for optimal plant growth

Observing how light intensity [Ⓜ] affects the rate of photosynthesis

1. Describe how you can observe how light intensity affects the rate of photosynthesis of pondweed
2. Describe the relationship between light intensity and distance
3. Describe 2 ways to measure the rate of photosynthesis
4. Explain why it's important to us a LED lamp in this investigation
5. Describe what inverse square law states

Respiration

1. Define aerobic respiration
2. State the word and chemical equation for aerobic respiration.
3. Is respiration endothermic or exothermic?
4. State where aerobic respiration occurs in the cell
5. Define anaerobic respiration
6. Name the toxic substance produced by anaerobic respiration.
7. State an effect on your body after anaerobic respiration
8. State the word equation for anaerobic respiration in animals
9. State the word equation for anaerobic respiration in plant and microorganisms
10. Describe the use of fermentation in the food industry
11. Describe the response of the body to exercise.
12. Describe happens to the glycogen stored in muscles when you exercise
13. Define oxygen debt
14. Define metabolism



HOMEOSTASIS

Homeostasis

1. Define homeostasis
2. State the three conditions that need to be controlled by homeostasis
3. State the 2 control systems that regulate homeostasis
4. Define a gland
5. Define a hormone
6. Describe the function of the master gland (pituitary gland) and state where it's located
7. Describe two differences between neurones and hormones
8. In what situation is adrenaline secreted
9. State which gland secretes adrenaline
10. Explain the effect adrenaline has on the body
11. State which gland secretes thyroxine
12. Describe the function of thyroxine
13. Describe what a negative feedback is

Nervous system

1. State the 5 sensory organs
2. State the name of the cell found in sensory organs that detects stimuli
3. Electrical impulses from the receptor are sent to which neurone
4. Describe the CNS pathway in coming up with a response to a stimulus
5. Describe the reflex pathway in coming up with a response to a stimulus
6. State the two components that make up the CNS
7. Describe the function of the CNS

Ruler drop test

1. Describe how we investigate the reaction time of an individual using a ruler drop test
2. Describe different factors that increase and decrease reaction time
3. State what we can use instead of a ruler drop test, to give more accurate result

The brain

1. State the 3 regions of the brain
2. Describe the function of the cerebral cortex
3. Describe the function of the cerebellum
4. Describe the function of the medulla

The eye

1. State the function of the sclera
2. State the function of the cornea
3. State the function of the iris
4. State the function of the pupil
5. State the function of the lens
6. State the function of the ciliary muscles and suspensory muscles
7. State the function of the optic nerve
8. Describe the iris reflex
9. Define hyperopia and myopia
10. Describe the treatments used for vision defects

Thermoregulation

1. State where the thermoregulatory centre found
2. Describe how the thermoregulatory centre regulates body temperature
3. Describe what your body does when your body temperature increases
4. Describe what your body does when your temperature decreases

The kidney

1. State the function of the kidney
2. Describe what is meant by selective reabsorption
3. State the 3 substances removed in the urine
4. Describe how urea is created
5. Define deamination
6. State the name of the hormone that controls water levels
7. Describe how a dialysis machine filters blood
8. Evaluate the use of kidney transplants and a dialysis machine



HOMEOSTASIS

Blood glucose levels

1. In what scenario will blood glucose levels be high
2. State the name of the hormone that is secreted when blood glucose levels are high
3. State the name of the gland which secretes insulin
4. Describe how insulin decreases blood glucose levels
5. State the name of the storage form of glucose and where it is stored
6. In what scenario will blood glucose levels be low
7. State the name of the hormone which is secreted when blood glucose levels are low
8. Describe how glucagon increases blood glucose levels
9. Describe the cause of type 1 diabetes
10. State the treatment for type 1 diabetes
11. Describe the lifestyle issues that cause type 2 diabetes
12. Describe and explain the treatment for type 2 diabetes

Plant hormones

1. State the function of the auxin
2. State which 2 stimuli does auxin respond to help the plant grow
3. Describe how auxin helps the plant grow
4. Describe 2 commercial uses of auxin
5. Describe 1 commercial use of gibberelins
6. Describe 1 commercial use of ethene

Growth of cress seeds

1. Describe how we can investigate the affect of light and gravity on the growth of cress
2. State the control variables of this practical

Hormones and reproduction

1. State the male sex hormone
2. State the female sex hormone
3. Describe what the menstrual cycle is
4. State which gland secretes FSH
5. Describe the 2 functions of FSH
6. State which gland secretes oestrogen
7. Describe the 3 functions of oestrogen
8. State which gland secretes LH
9. Describe the 1 function of LH
10. State which gland secretes progesterone
11. Describe the 2 functions of progesterone
12. State 2 examples of non-hormonal contraception
13. Explain why the combined pill contains both progesterone and oestrogen
14. State which hormone the implant, patch and injection contain
15. Explain why the implant, patch and injection is better than the combined pill
16. State which two hormones are issued as fertility drug in IVF treatments
17. Describe the process of IVF
18. Describe the disadvantages of IVF



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IVE

Reproduction

1. Define asexual reproduction
2. State the cell division type asexual reproduction relies on
3. Define sexual reproduction
4. State the cell division type sexual reproduction relies on
5. State which cell division produces gametes
6. Describe how a gamete is different from a normal body cell
7. State the name the structure formed by fertilisation (fusion of male and female gametes)
8. Describe two difference between asexual and sexual reproduction
9. Describe 2 differences between mitosis and meiosis
10. Describe how malarial parasites use both forms of reproduction
11. Describe how fungi use both forms of reproduction
12. Describe how plants like strawberry plants use both forms of reproduction

Variation

1. Describe what Mendel observed when he crossed pea plants of varying heights
2. Describe the 3 conclusions he came to
3. Define variation
4. State three causes of variation in a population
5. Give 2 examples each of genetic and environmental variation
6. Define the theory of evolution
7. Describe natural selection
8. State 3 pieces of evidence for evolution
9. Define species
10. Define fossils
11. Describe the 3 ways fossils are formed
12. Define endangerment
13. Define extinction
14. State three causes of extinction
15. Define antibiotic resistance
16. Describe the human activities that increase the chances of antibiotic resistances occurring
17. Describe the steps in which a bacteria strain develops resistance to an antibiotic
18. Describe 3 ways in which a hospital can reduce the spread of antibiotic resistant strains of bacteria

Inheritance

1. State the name of the chemical that makes up our genetic information
2. Describe where genetic information is found in the cell
3. Define a gene
4. Describe the function of a gene
5. Describe a genome
6. Explain the importance of understanding the human genome project
7. State two words used to describe the structure of DNA
8. Describe what a nucleotide consists of
9. Describe the complimentary bases that pair up with each other
10. Describe how DNA strands are held together
11. State how many bases code for a particular amino acid
12. Describe how ribosomes create proteins using DNA
13. Define an allele
14. Define a dominant allele
15. Define a recessive allele
16. Define a homozygous allele
17. Define a heterozygous allele
18. Define a genotype
19. Define a phenotype
20. State how many chromosomes are found in a human body cell
21. State how many chromosomes are found in a gamete
22. State how many pairs of chromosomes determine the sex of the individual
23. State the male sex chromosomes
24. State the female sex chromosomes
25. Define polydactyly
26. State whether polydactyly a dominant or recessive condition
27. Define cystic fibrosis
28. State whether cystic fibrosis a dominant or recessive condition
29. Describe the advantages of embryonic screening
30. Describe the disadvantages of embryonic screening



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IVE

Breeding

1. Define selective breeding
2. Describe the advantages of selective breeding
3. Describe the disadvantages selective breeding
4. Describe how selective breeding can be used to create dogs with soft fur and can run really fast
5. Define genetic engineering
6. State three traits plants might be genetically engineered to have
7. Describe how bacteria is genetically engineered to mass produce human insulin
8. State the names of the two vectors used in genetic engineering
9. Describe the difference between using cuttings or a tissue culture to grow plants

Classification

1. State the name of the scientist that come up with the 7-kingdom classification
2. State the name of the scientist that come up with the 3-domain system
3. Describe the three domains
4. Describe the function of an evolutionary tree



paper two: biology

ECOLOGY

Ecosystems

1. Define ecosystem
2. Define population
3. Define habitat
4. Define community
5. Define niche
6. State 3 biotic factors
7. State 3 abiotic factors
8. What is a stable ecosystem
9. What are the 4 things plants compete for?
10. What are the 4 things animals compete for?
11. Define interdependence

Food chains and food webs

1. Define a food chain
2. Describe how a food web is different to a food web
3. Define producers
4. Define carnivores
5. Define herbivores
6. Define omnivores
7. Define primary consumers
8. Define secondary consumers
9. Define tertiary consumers
10. Define apex/top predator
11. Define trophic level
12. Define biomass
13. Draw a pyramid of biomass for the following food chain: grass, deer, fox, maggots. Label the trophic levels too

Cycles

1. Define decomposer
2. State 2 examples of decomposers
3. Describe the function of the decay cycle
4. State the name of the process by which water gets released from plants
5. State the name of the process where water is rained down from the clouds.
6. State the name of the process where water escapes from the oceans and into the clouds
7. Describe the carbon cycle

Biodiversity

1. Define biodiversity
2. Explain why high biodiversity is important
3. Explain how water pollution e.g eutrophication reduces biodiversity
4. Explain how land pollution e.g herbicides, pesticides reduce biodiversity
5. Explain how air pollution e.g sulphur dioxide reduces biodiversity
6. State 2 greenhouse gases
7. Describe the greenhouse effect
8. Describe how the atmosphere keeps the earth warm
9. Describe the human effects that increase the levels of carbon dioxide in the atmosphere
10. Describe the human effects that increase the levels of methane in the atmosphere
11. Define global warming
12. Describe the consequences of global warming
13. Define deforestation and why it's done
14. Describe 3 consequences of deforestation
15. Define a bog
16. Define a peat
17. Explain how the usage of peat contributes to global warming and reduces biodiversity
18. Define a carbon sink
19. State two examples of carbon sinks
20. Describe how breeding programmes increase biodiversity
21. Describe how recycling, reusing and reducing materials increases biodiversity

Biotechnology

1. Define biotechnology
2. Define mycoprotein and its function
3. Describe how mycoprotein is produced
4. Describe how bacteria is genetically engineered to mass produce human insulin
5. Describe why golden rice is beneficial
6. State some of the reasons why crops are genetically modified
7. Describe why people are against genetically modified crops



paper two: biology

ECOLOGY

Rate of decay

1. State 4 factors that affect the decay rate
2. Describe the method you can use to measure the decomposition of milk
3. State the control variable
4. State the dependent variable
5. State the formula used to measure the rate of decay

Quadrats

1. State an equipment that is used to measure light
2. State an equipment that is used to investigate the abundance and distribution of an organism in their habitat
3. Describe the quantitative sampling of daisies in a field
4. Describe the how you can measure the distribution of daisies in a field
5. State a difference between quantitative sampling and transect sampling



Biology

BIOLOGY

exam questions

Biology paper one

Cell biology

Scan for exam questions & mark scheme



Organisation

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Infection & response

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Bioenergetics

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Biology paper two

Homeostasis

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IVE

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Ecology

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