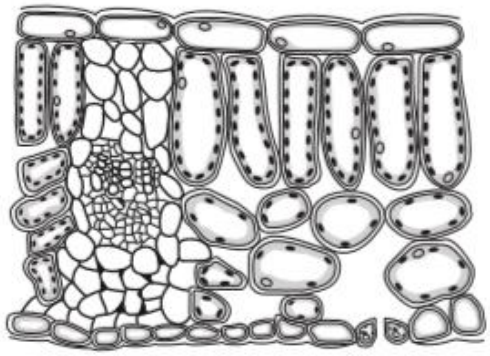
Year 12 Biology Summer Work Task 1 Question Sheet

You are not expected to write your answers on this sheet but **on the separate answer grid.**

1 The actual thickness of the leaf shown in the diagram is 2000 μm, but its thickness in the diagram is 50 mm.



What is the magnification of the diagram?

A ×0.025 **B** ×25 **C** ×100 **D** ×100 000

2 Which organelles are present in large numbers in cells that produce insulin?

A nuclei and mitochondria

B ribosomes and mitochondria

C rough endoplasmic reticulum and cell walls

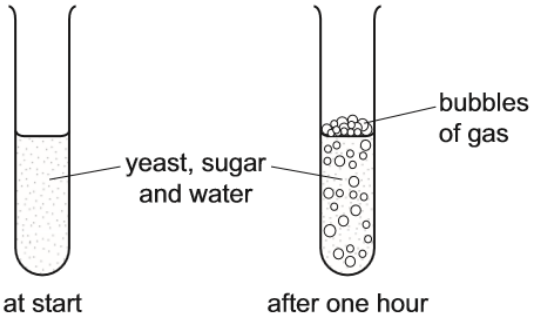
D vesicles and nuclei

3 Which structures are present in a bacterial cell?

	cell wall	nucleus
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

Year 12 Biology Summer Work Task 1 Question Sheet

4 Some yeast, sugar and water are mixed in a test-tube. The diagrams show the test-tube at the start and after one hour.



Which process causes this change?

A growth

B reproduction

C respiration

D sensitivity

5 Small molecules are used as the basic units in the synthesis of large food molecules.

Which statement is correct?

A Amino acids are basic units of carbohydrates.

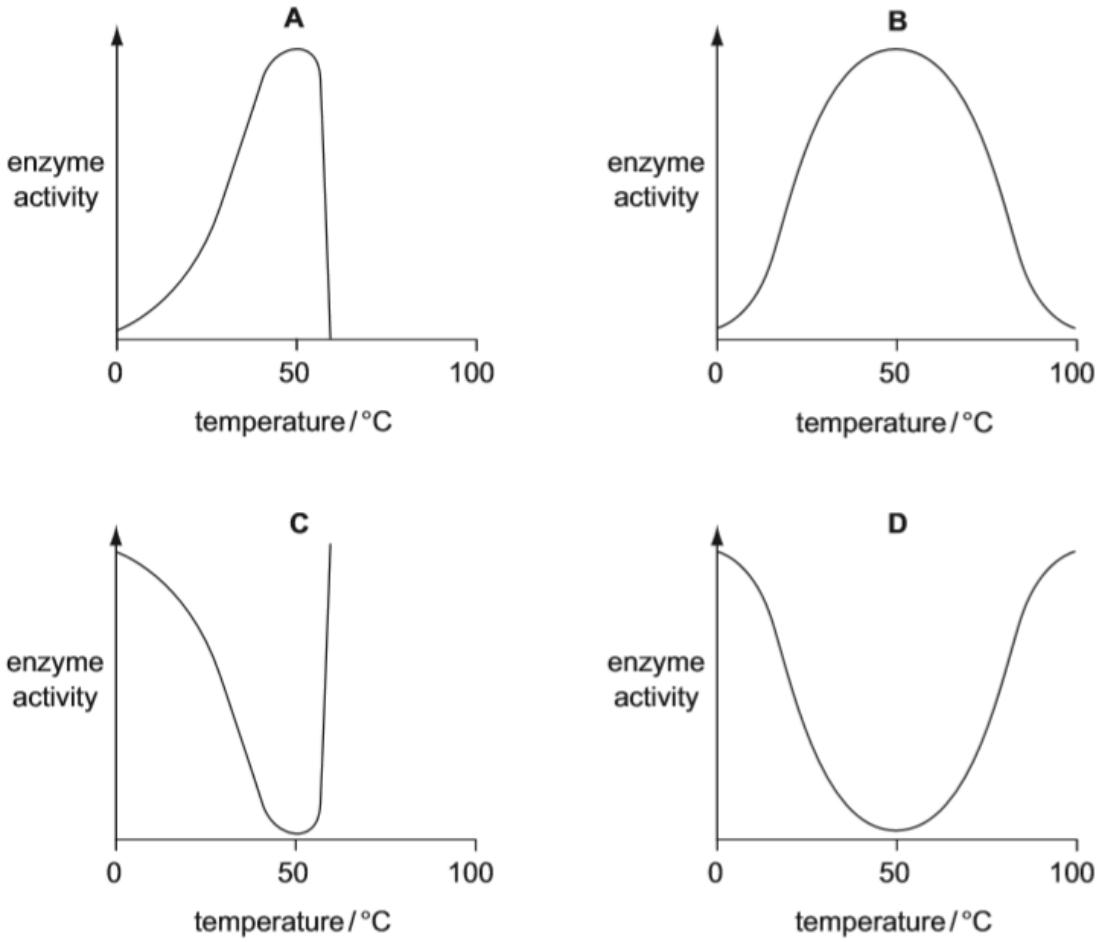
B Fatty acids are basic units of glycogen.

C Glycerol is a basic unit of oils.

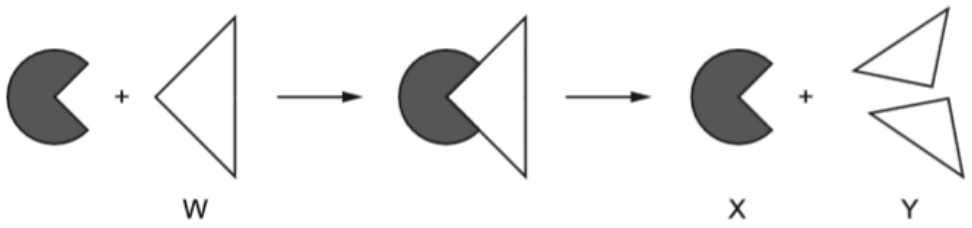
D Simple sugar is a basic unit of protein.

Year 12 Biology Summer Work Task 1 Question Sheet

6 Which graph shows the effect of temperature on the activity of an enzyme?



7 The diagram represents enzyme action.



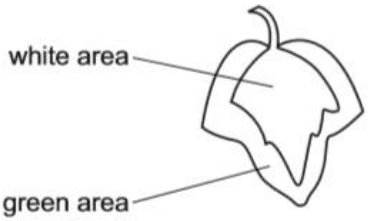
What are parts W, X and Y in this chemical reaction?

	enzyme	product	substrate
A	W	X	Y
B	X	W	Y
C	X	Y	W
D	Y	W	X

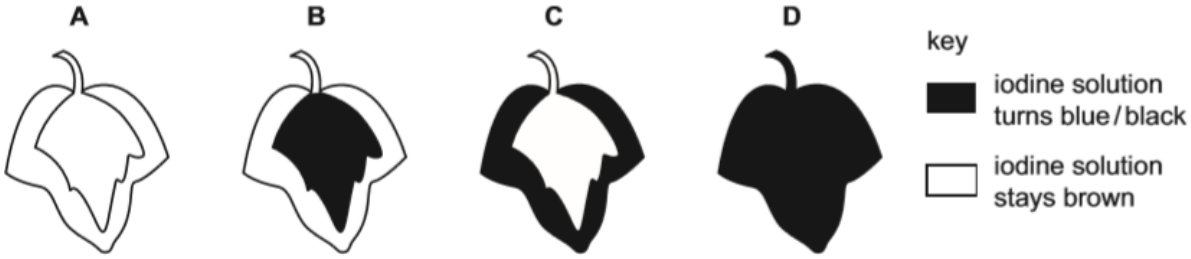
Year 12 Biology Summer Work Task 1 Question Sheet

8 In a photosynthesis experiment, a plant is left in bright sunlight for several hours. A leaf is then removed from the plant and tested for starch, using iodine solution.

The diagram shows the leaf from the plant that was used in the experiment.



Which diagram shows the result of the experiment?



Which substance, needed for protein synthesis, is carried into a leaf from the stem?

A carbon dioxide

B nitrate

C oxygen

D starch

9 When bases pair up in the formation of DNA, what is one of the pairings?

A G with A **B** G with C **C** G with G **D** G with T

10 Which row matches the cell membrane and cell wall of a palisade cell to their functions?

	cell membrane	cell wall
A	active transport	active transport
B	active transport	support
C	support	active transport
D	support	support

Year 12 Biology Summer Work Task 1 Question Sheet

11 Active transport is the movement of

A molecules from a region of their higher concentration to a region of their lower concentration.

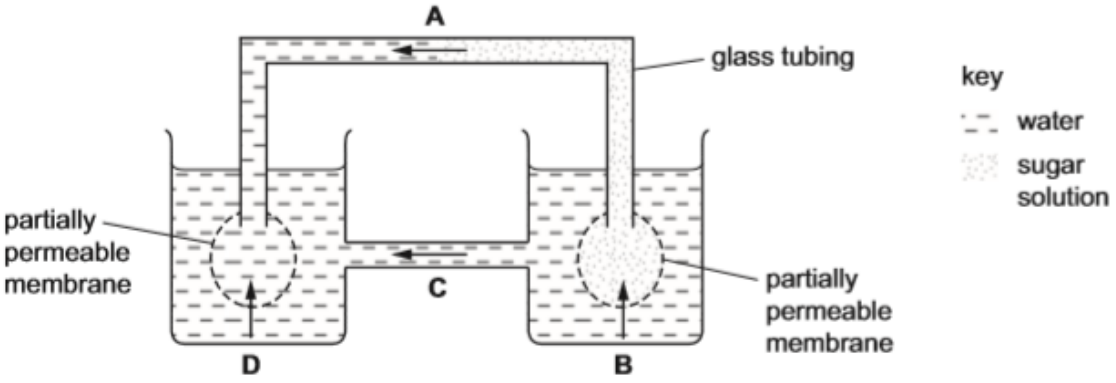
B particles from a region of lower concentration to a region of higher concentration using energy from respiration.

C urine by relaxation of a sphincter muscle in the bladder.

D water through a partially permeable membrane from a more dilute to a more concentrated solution.

12 The diagram shows an experiment on osmosis.

Which arrow shows the direction of the net movement of water at the start of the experiment?



13 What happens to the chromosome number after meiosis and after mitosis?

	meiosis	mitosis
A	halved	halved
B	halved	stays the same
C	stays the same	halved
D	stays the same	stays the same

14 What are advantages of sexual and asexual reproduction?

	advantage of sexual reproduction	advantage of asexual reproduction
A	less population growth	only one parent required
B	more energy efficient	gametes can be transferred by environment
C	more genetic variation	faster
D	no transfer of gametes needed	does not compete with the parent for nutrients

Year 12 Biology Summer Work Task 1 Question Sheet

15 What is the approximate percentage of oxygen in expired air?

A 0.04% **B** 4% **C** 16% **D** 21%

16 Compared with atmospheric air, air breathed out by a human contains

A less water vapour, less carbon dioxide.

B less water vapour, more carbon dioxide.

C more water vapour, less carbon dioxide.

D more water vapour, more carbon dioxide.

17 Which substances are dissolved in human blood plasma?

A carbon dioxide, haemoglobin and glucose

B carbon dioxide, oxygen and haemoglobin

C glucose, hormones and urea

D oxygen, urea and starch

18 Which chamber of the heart has the thickest muscle wall?

A left atrium

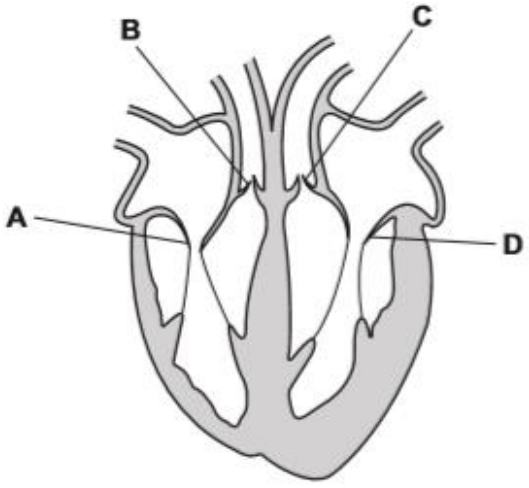
B left ventricle

C right atrium

D right ventricle

19 The diagram shows a section through the human heart.

Which is the right atrioventricular valve?



Year 12 Biology Summer Work Task 1 Question Sheet

20 What is the word equation for aerobic respiration in plants?

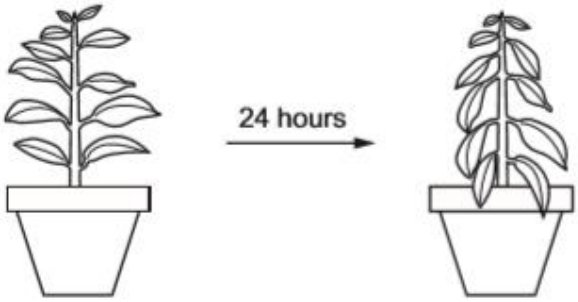
A carbon dioxide + water → glucose + oxygen

B glucose + carbon dioxide → water + oxygen

C glucose + oxygen → carbon dioxide + water

D glucose + water → carbon dioxide + oxygen

21 The diagram shows a potted plant and the same plant 24 hours later.



What causes the change in the appearance of the plant?

A Water loss is greater than water uptake.

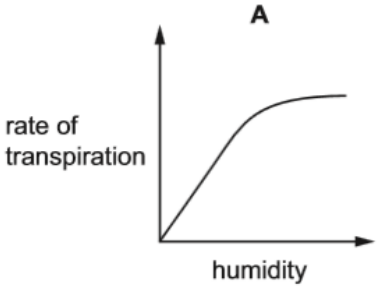
B Water moves from the leaves to the stem.

C Water uptake is equal to water loss.

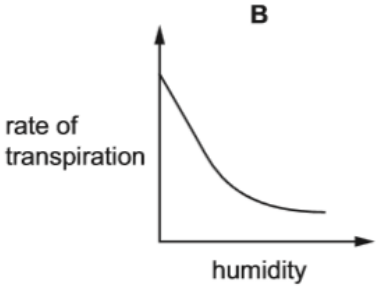
D Water uptake is greater than water loss.

22 Which graph shows most clearly what will happen to the rate of transpiration as humidity increases?

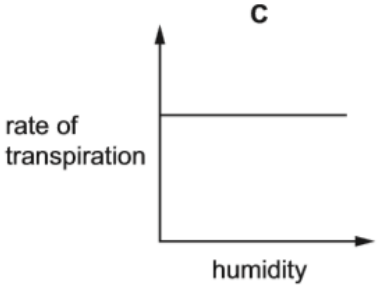
A



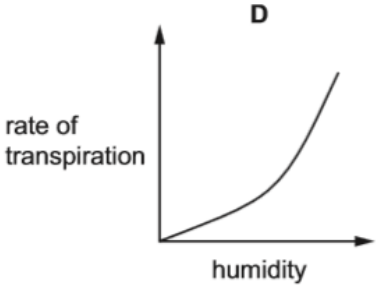
B



C



D



Year 12 Biology Summer Work Task 1 Question Sheet

23 What is the function of lymphocytes in the blood?

A antibody production

B blood clotting

C phagocytosis

D transport of hormones

24 Which part of a pathogen is recognised by the immune system?

A active site

B antibiotic

C antibody

D antigen

25 Which effect is **least** likely to occur as a result of deforestation?

A an increase in biodiversity

B an increase in soil erosion

C an increase in the level of carbon dioxide in the atmosphere

D an increased risk of flooding

26 The whole of an island's population of short-haired bumblebees is descended from just two parents. These were introduced from the mainland.

Which statement about the island's short-haired bumblebee population, compared with that of the mainland, is correct?

A The population is less in danger of collapsing from disease.

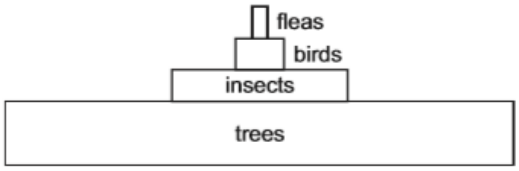
B The population is more able to adapt to environmental changes.

C The population shows more genetic variety.

D The population will adapt to environmental changes more slowly.

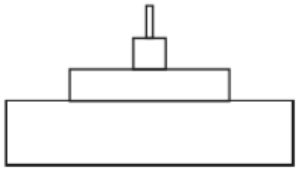
Year 12 Biology Summer Work Task 1 Question Sheet

27 The diagram shows a pyramid of biomass for a food chain in a woodland ecosystem.

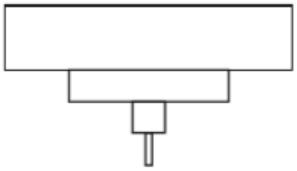


What is the pyramid of numbers for this food chain?

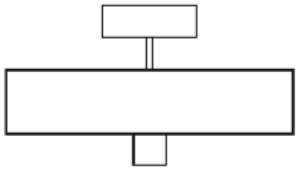
A



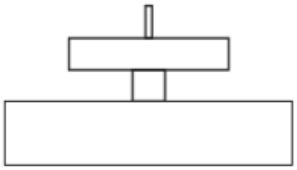
B



C



D



28 Which name is given to a group of individuals that can reproduce to produce fertile offspring?

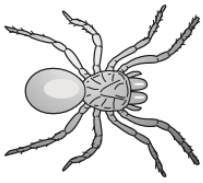
A a genus

B a kingdom

C a species

D an organ system

29 Use the key to identify the animal shown in the diagram.



has jointed legs

- three pairs of legs
  - has tail → **A** *Hexagenia*
  - no tail → **B** *Dytiscus*
- more than three pairs of legs
  - four pairs of legs → **C** *Argyroneta*
  - more than four pairs of legs → **D** *Asellus*

Year 12 Biology Summer Work Task 1 Question Sheet

30 What is **not** a feature of natural selection?

A competition for resources

B production of many offspring

C selection by humans

D variation within the population

31 Where is urea made?

A bladder

B kidney

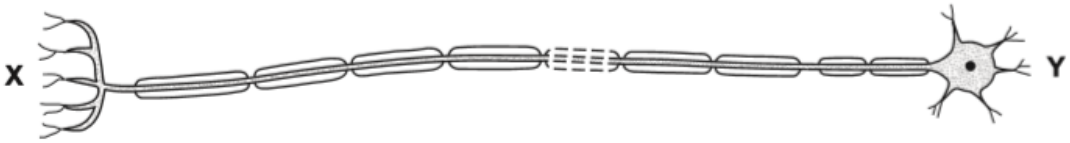
C liver

D urethra

32 What will be the effect of strenuous exercise on the volume of water lost through the skin and the kidneys?

	volume of water lost through the skin	volume of water lost through the kidneys
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

33 The diagram shows a neurone.

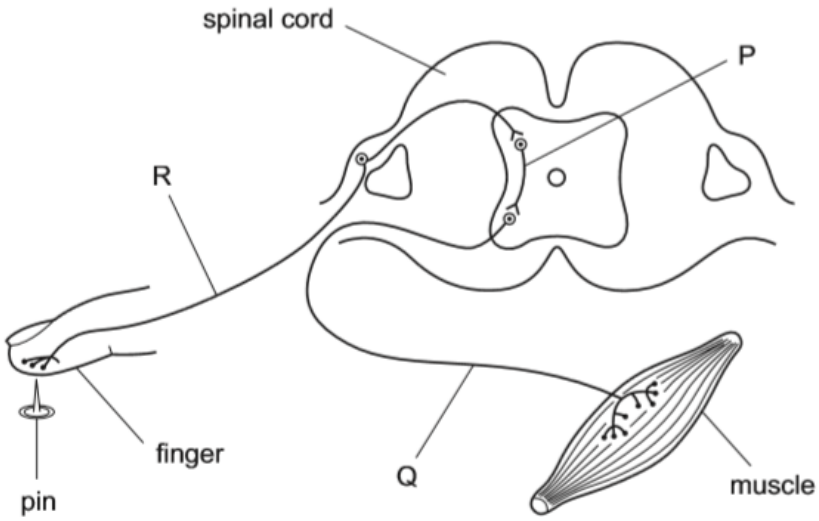


Which structures could be found at **X** and **Y**?

	X	**Y**
A	brain	intestine
B	brain	leg
C	eye	hand
D	gland	spinal cord

Year 12 Biology Summer Work Task 1 Question Sheet

34 The diagram represents a simple reflex arc.



What is the sequence of nerve cells through which an impulse passes during a reflex action?

	first →		last
A	P	Q	R
B	Q	R	P
C	Q	P	R
D	R	P	Q

35 What are the effects of insulin and glucagon on the concentration of blood glucose?

	effect of insulin on blood glucose concentration	effect of glucagon on blood glucose concentration
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

Year 12 Biology Summer Work Task 1 Question Sheet

36 Albinism is an inherited condition in which pigment does not develop in the skin, hair and eyes.

The allele for albinism is recessive.

What are the chances of albino parents having an albino child?

A 0% **B** 25% **C** 75% **D** 100%

37 Which name is given to the observable features of an organism?

A alleles

B genes

C genotype

D phenotype

38 A gene for insulin is taken from a human cell and placed in a bacterium.

The bacterium can then make human insulin.

What is this process called?

A artificial selection

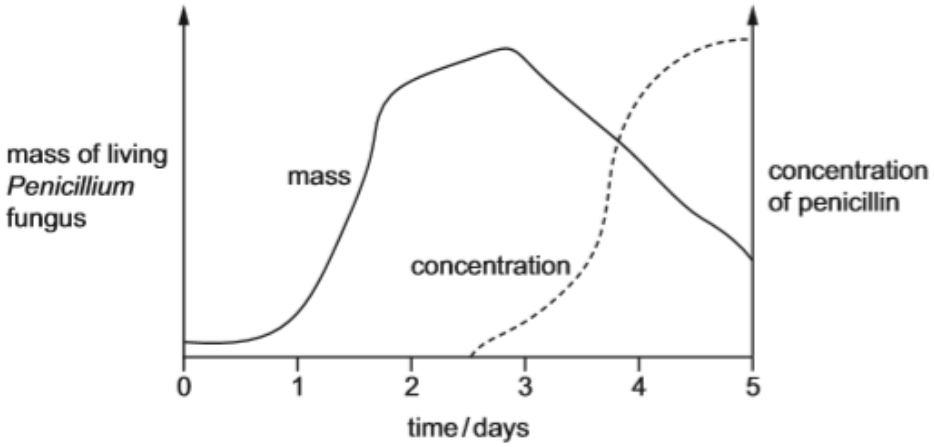
B genetic engineering

C heterozygous inheritance

D natural selection

Year 12 Biology Summer Work Task 1 Question Sheet

39 Penicillin is produced in a fermenter by growing the fungus *Penicillium*. The graph shows how the mass of living *Penicillium* fungus and the concentration of penicillin changed over time.



When is the best time to collect the penicillin?

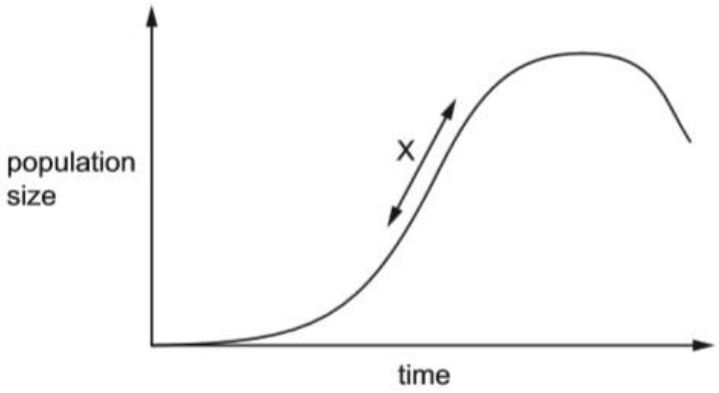
A at 1.5 days

B at 3 days

C at 3.5 days

D at 5 days

40 The graph shows a population growth curve.



Which factors would cause region X on the graph to become steeper?

A decrease in predation, decrease in food supply

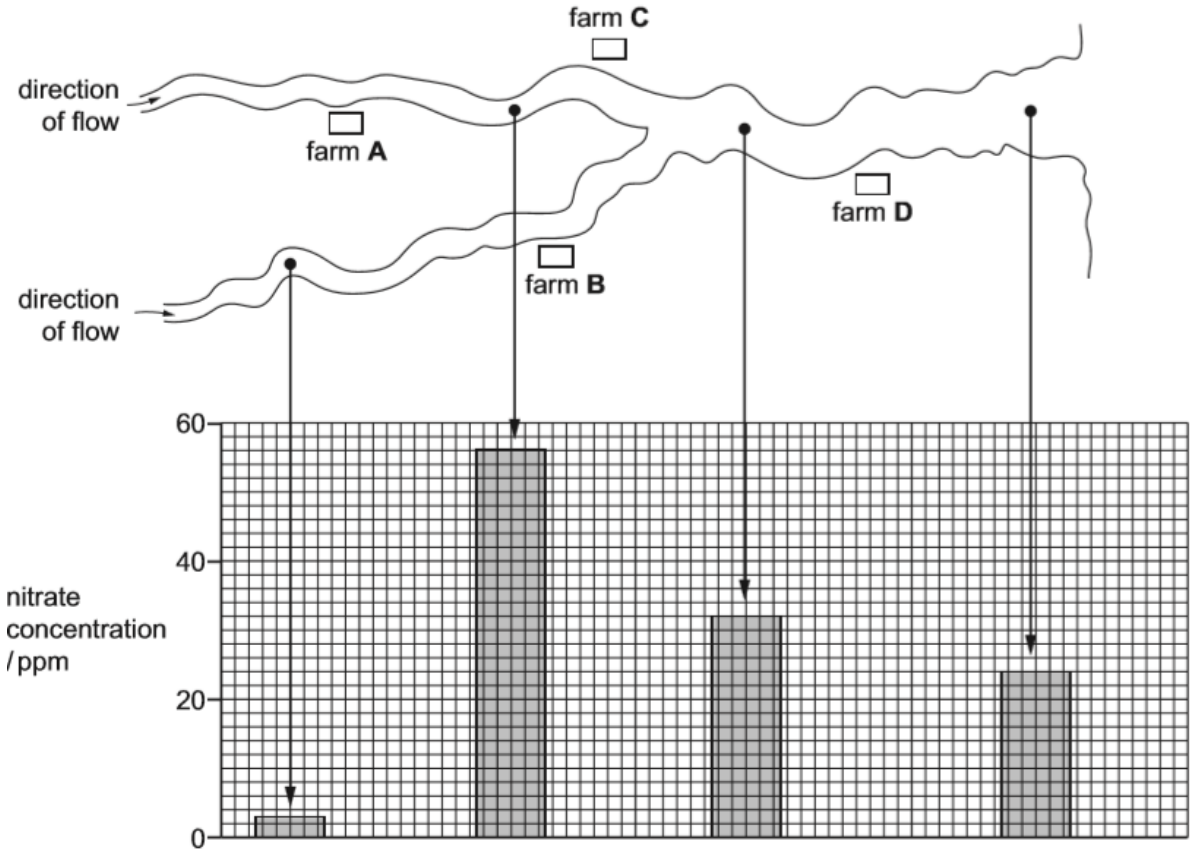
B increase in food supply, decrease in disease

C increase in food supply, increase in predation

D increase in predation, decrease in disease

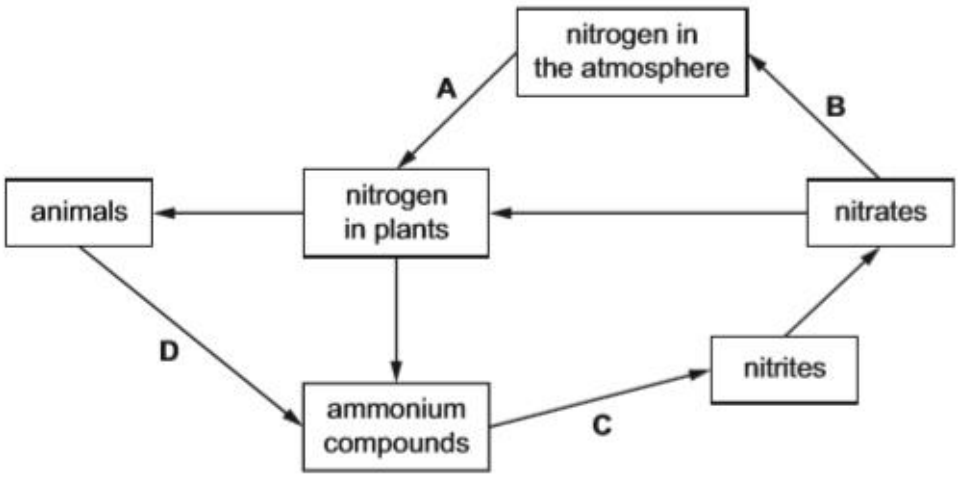
Year 12 Biology Summer Work Task 1 Question Sheet

41 Which farm is likely to have been using too much fertiliser on its land?



42 The diagram shows part of the nitrogen cycle.

At which stage is denitrification occurring?



Year 12 Biology Summer Work Task 1 Answer Grid

Name:

Task 1 – GCSE Biology knowledge test

Please print this sheet and complete the GCSE Biology questions from the separate document by placing your answer in the box on the table below.

Question	Answer		Question	Answer	
1			22		
2			23		
3			24		
4			25		
5			26		
6			27		
7			28		
8			29		
9			30		
10			31		
11			32		
12			33		
13			34		
14			35		
15			36		
16			37		
17			38		
18			39		
19			40		
20			41		
21			42		

TOTAL: **/ 42** **%**

Keep this work somewhere safe and bring it with you to your first Biology lesson ☺

Year 12 Biology Summer Work Task 2

Name:

Task 2 – Investigative and maths skills

The A Level Biology course has a large number of required practical tasks and experiments. Most of these experiments you will conduct yourself, collect results and then analyse and explain your findings. You also need to be able to use mathematical functions to help interpret your results. The aim of this activity is to introduce you to the sorts of investigative and mathematical skills you will use in A Level Biology.

Please print this document and complete the questions below using the information provided:

1. Scientific vocabulary – link each term on the left to the correct definition on the right.

a)

Hypothesis	The maximum and minimum values of the independent or dependent variable
Dependent variable	A variable that is kept constant during an experiment
Independent variable	The quantity between readings, eg a set of 11 readings equally spaced over a distance of 1 metre would give an interval of 10 centimetres
Control variable	A proposal intended to explain certain facts or observations
Range	A variable that is measured as the outcome of an experiment
Interval	A variable selected by the investigator and whose values are changed during the investigation

(6)

Year 12 Biology Summer Work Task 2

b)

True value	The range within which you would expect the true value to lie
Accurate	A measurement that is close to the true value
Resolution	Repeated measurements that are very similar to the calculated mean value
Precise	The value that would be obtained in an ideal measurement where there were no errors of any kind
Uncertainty	The smallest change that can be measured using the measuring instrument that gives a readable change in the reading

(5)

c)

Random error	Causes readings to differ from the true value by a consistent amount each time a measurement is made
Systematic error	When there is an indication that a measuring system gives a false reading when the true value of a measured quantity is zero
Zero error	Causes readings to be spread about the true value, due to results varying in an unpredictable way from one measurement to the next

(3)

Year 12 Biology Summer Work Task 2

2. There are a wide range of prefixes. Most of the quantities in scientific contexts will be quoted using the prefixes that are multiples of 1000. For example, we would quote a distance of 33 000 m as 33 km.

   The most common prefixes you will encounter are given in the table below:

Prefix	Symbol	Power of 10	Multiplication factor	
Tera	T	10^{12}	1 000 000 000 000	
Giga	G	10^{9}	1 000 000 000	
Mega	M	10^{6}	1 000 000	
kilo	k	10^{3}	1000	
deci	d	10^{-1}	0.1	1/10
centi	c	10^{-2}	0.01	1/100
milli	m	10^{-3}	0.001	1/1000
micro	μ	10^{-6}	0.000 001	1/1 000 000
nano	n	10^{-9}	0.000 000 001	1/1 000 000 000
pico	p	10^{-12}	0.000 000 000 001	1/1 000 000 000 000
femto	f	10^{-15}	0.000 000 000 000 001	1/1 000 000 000 000 000

   What would be the most appropriate unit to use for the following measurements?

   a) The time between heartbeats

   b) The diameter of a cheek cell

   c) The distance that a migratory bird travelled each year

   d) The thickness of a DNA helix

   e) The mass of a rabbit

   f) The mass of iron in the body

   g) The diameter of a glucose molecule

(7)

Year 12 Biology Summer Work Task 2

Re-write the following:

a) 0.00224 metres in millimetres

b) 104 micrograms in grams

c) 6.2 kilometres in metres

d) 10 micrograms in nanograms

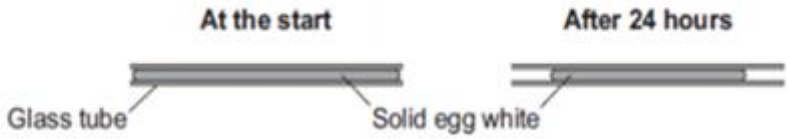
e) 70 decilitres in litres

f) 10 cm3 in litres

(6)

3. Some students were investigating how temperature and pH affect the digestion of egg white, which is made of protein.
   The students carried out the following procedure:
   - Filled six narrow glass tubes with fresh egg white
   - Boiled the tubes so the egg white became solid
   - Placed each tube into a different beaker containing human protease enzyme at different pH values at room temperature and 3 in neutral pH but at different temperatures for 24 hours
   - Measured the length of solid egg white in each tube after 24 hours

The diagram shows the investigation.



The results were recorded in the tables below:

pH	Original length of solid egg white (cm)	Final length of solid egg white (cm)	% change
4	6.0	5.6	
7	6.0	3.8	
9	6.0	5.8	

Year 12 Biology Summer Work Task 2

Temperature (°C)	Original length of solid egg white (cm)	Final length of solid egg white (cm)	% change
15	6.0	5.7	
35	6.0	3.8	
55	6.0	5.3	

a) Identify the independent variables in this investigation

(1)

b) Identify the dependent variable in this investigation

(1)

c) Identify 2 control variables for this investigation

(1)

d) Calculate the % change for each result in this investigation. Write your answers in the tables and show your answers to 3 significant figures

(6)

4. A student was investigating an area of moorland. She used quadrats to measure the area covered by different plant species, bare ground and surface water every 10 metres along a transect. She also recorded the depth of soil at each quadrat. Her results are shown in the table.

	Area covered in each quadrat A to E in cm^2				
	A	B	C	D	E
Bog moss	55	40	10	–	–
Bell heather	–	–	–	15	10
Sundew	10	5	–	–	–
Ling	–	–	–	15	20
Bilberry	–	–	–	15	25
Heath grass	–	–	30	10	5
Soft rush	–	30	20	5	5
Sheep's fescue	–	–	25	35	30
Bare ground	20	15	10	5	5
Surface water	15	10	5	–	–
Soil depth / cm	3.2	4.7	8.2	11.5	14.8

– indicates zero cover.

Year 12 Biology Summer Work Task 2

a) Calculate:

i) The modal area of soft rush in the sample

ii) The mean soil depth

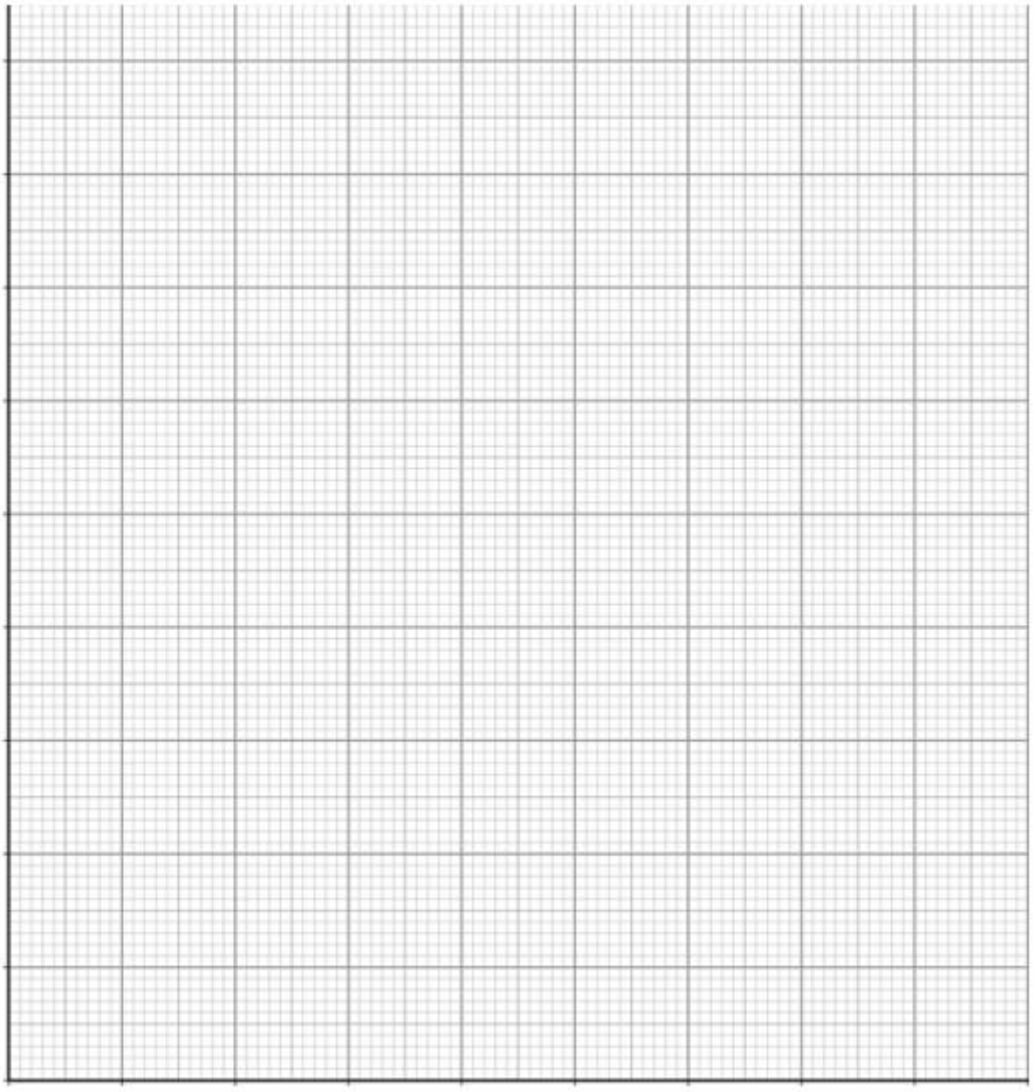
iii) The median amount of bare ground in the sample

(3)

b) Use data from the table to plot a scatter graph of soil depth against the area covered by:

i) bare ground
ii) soft rush
iii) bog moss

(Use a different colour for each one and provide a key)



(5)

Keep this work somewhere safe and bring it with you to your first Biology lesson ☺