

St Martins Biology Department

Summer 2023 Year 11 into 12 Summer Homework

Name

There are four parts to this work, listed here. Do not leave it all until the end of August. We expect the work to be handed in during your FIRST Biology lesson in September.

Part 1 - Produce a written report

Choose a native British species from the list below. Tell us:

- why this species is endangered
- why we should save this species from extinction
- the mechanisms in place to do this (with reference to *in situ* and *ex situ* conservation and any local, national or international agreements)

Species list - Scottish wildcat, pine marten, hazel dormouse, water vole, hedgehog, red squirrel

For guidance your report should be 2 – 3 sides of A4 in length.

Images may be included – but they must be included for a reason, NOT just to make your report look good. Their sources must also be clearly indicated. See the link for 'how to reference'

<https://www.open.ac.uk/library/referencing-and-plagiarism/quick-guide-to-harvard-referencing-cite-them-right#:~:text=Referencing%20consists%20of%20two%20elements,used%20instead%20of%20a%20date.>

Part 2 – Mathematical Skills

Converting between units of measurement and calculating percentage change are two skills you will be expected to demonstrate regularly at A level. Complete the two sets of calculations

Useful video:- <https://www.youtube.com/watch?v=rJJrR8h-DtA&list=PLidqqIGKox7X5UFT-expKluR-i-BN3Q1g&index=4>

Part 3 – Content Transition

The first units in year 12 cover the Foundations in Biology; content which is fundamental to ALL the units you will study. These build on what you have learned at GCSE. To give you a head start please complete the following (particularly important if you studied Combined Science at GCSE):

Review the topics listed in bold; you may choose to use your existing GCSE work to do this, or make additional notes using GCSE websites or resources. We have included links to some videos which may help.

Cell types and structure:-

<https://www.youtube.com/watch?v=qHkUOlC8Nbo&list=PLldqqIGKox7X5UFT-expKluR-i-BN3Q1g&index=2>

Diffusion:- <https://www.youtube.com/watch?v=lxHMJaXOzP4&list=PLldqqIGKox7X5UFT-expKluR-i-BN3Q1g&index=7>

Active Transport:-

<https://www.youtube.com/watch?v=tM0bGaaQ2jY&list=PLldqqIGKox7X5UFT-expKluR-i-BN3Q1g&index=9>

Osmosis:- <https://www.youtube.com/watch?v=4Eq8rO3fABM&list=PLldqqIGKox7X5UFT-expKluR-i-BN3Q1g&index=8>

How enzymes work:-

<https://www.youtube.com/watch?v=VNx9UQ08fZ4&list=PLldqqIGKox7X5UFT-expKluR-i-BN3Q1g&index=19>

Factors affecting enzymes:-

https://www.youtube.com/watch?v=n9He_FK6nao&list=PLldqqIGKox7X5UFT-expKluR-i-BN3Q1g&index=93

Cell cycle:- <https://www.youtube.com/watch?v=RHyzVmbiA78&list=PLldqqIGKox7X5UFT-expKluR-i-BN3Q1g&index=69>

DNA structure:- https://www.youtube.com/watch?v=T6_wKPAbf2k

Protein synthesis:- <https://www.youtube.com/watch?v=ubdoUqmNF98>

You may find this transition guide useful

<https://www.amazon.co.uk/Head-Start-level-Biology-Level/dp/1782942793>

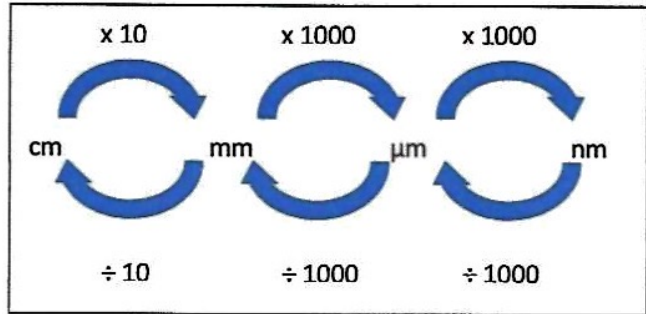
Part 4 – Exam Questions

Included in the pack are three data presentation questions - these will be marked against the A level criteria.

3.

Converting between cm, mm, μm and nm

This...	...equals
10mm	1cm
1000 μm	1mm
1000nm	1 μm



1. Convert 0.000026 mm to nm
2. Convert 41,300,000,000 nm to cm
3. Convert 0.01005 μm to nm
4. Convert 26,100 μm to mm
5. Convert 468,200,000 nm to mm
6. Convert 9,900,000,000 nm to cm
7. Convert 0.00365 cm to nm
8. Convert 2020 nm to μm
9. Convert 0.006677 cm to μm
10. Convert 0.0053 mm to μm

Percentage Change Calculations

The number of TVs sold increased from 70 to 98. Work out the percentage increase.

The value of a painting rises from £120,000 to £192,000. Work out the percentage increase in the value of the painting.

A puppy weighed 2kg. Eight weeks later the puppy weighed 3.5kg. What was the percentage increase in the puppy's weight?

Peter's weight decreases from 80kg to 64kg. Calculate the percentage decrease in Peter's weight.

Alice buys a book for £19.80. A year later she sells the book for £12.87. Calculate the percentage decrease in the value of the book.

In a sale the price of a sofa is reduced from £2500 to £1840. What is the percentage decrease?

The volume of juice in a can is increased from 250ml to 330ml. Work out the percentage increase.

Sarah bought a TV for £250. She sold it three years later for £180. Work out her percentage loss.

5.

Percentage Change Calculations

A car is travelling at 40 kilometres per hour. The car increases its speed to 56 kilometres per hour. Calculate the percentage increase in speed.

Holly bought a table for £120 and sold it for £216. Calculate her percentage profit

The population of Northern Ireland was 1 256 561 in 1911. In 2011 it was 1 810 863. Calculate the percentage increase. Give your answer correct to one decimal place.

In 2000 the price of a house was £72,600. By 2010 the price of the house had increased to £125,598. Find the percentage increase in the price of the house.

An empty bucket weighs 800g. The weight of the bucket increases to 2.1kg when filled with water. Calculate the percentage increase in the weight of the bucket. Give your answer to two significant figures.

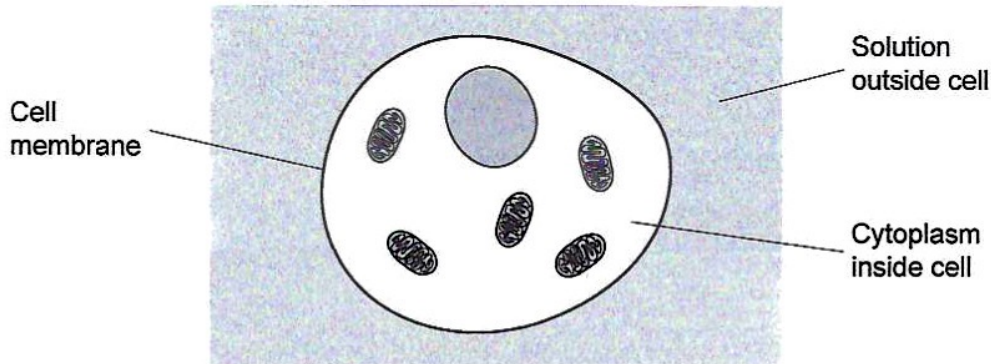
Orla weighed 3.77kg when she was born. On Orla's second birthday she weighed 12.8kg. Calculate the percentage increase in her weight.

The number of visitors to a museum in 2014 was 6.2×10^5 . In 2015, the museum had 7.8×10^5 visitors. Calculate the percentage increase.

Answer **all** the questions.

1 Substances can move into and out of cells.

(a) The diagram shows an animal cell.



(i) Osmosis is a type of diffusion.

Which type of particles move through the cell membrane by osmosis?

Tick (✓) **one** box.

Particles of all substances

☐

Particles of salt

☐

Particles of sugar

☐

Particles of water

☐

[1]

(ii) What would be the **net** movement of these particles by osmosis?

Draw **one** line to join the correct start of the answer to the correct end.

From where they
are concentrated...

...to where they are
less concentrated.

From where they
are **not** concentrated...

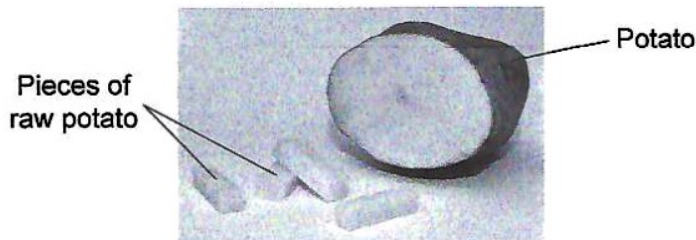
...to where they are
more concentrated.

...to where they have the
same concentration.

[1]

(b) Substances move into and out of plant cells.

A student investigated how the mass of raw pieces of potato is affected by soaking them in water containing different amounts of sugar.



The results of the investigation are shown in the table.

Volume of water (cm ³)	Mass of sugar (g)	Mean percentage change in mass of soaked potato pieces (%)
25	0	16
25	2	4
25	4	-11
25	6	-24

- (i)* At the start of the investigation the student was given:
- four cut pieces of potato ready to use
 - four beakers of water containing sugar, which were made using the volumes and masses stated in the table

Describe the apparatus **and** method the student could have used to collect the data in the final column of the table.

..... [6]

2 Milk contains proteins and other nutrients.

(a) Milk can be tested for proteins by adding a reagent.

Draw **one** line to connect the correct **reagent** with the correct **result if proteins are present**.

Reagent	Result if proteins are present
Benedict's solution	Brown-black colour
Biuret solution	Cloudy white emulsion
Ethanol	Lilac colour
Iodine solution	Red-brown precipitate

[2]

(b) Carbohydrates, lipids and proteins are all nutrients found in milk. Digestion breaks them down into smaller molecules that are absorbed into the blood.

Complete the table to identify the smaller molecules.

Large molecule	Smaller molecules it is broken down into
Carbohydrate	Sugars
Lipid AND
Protein

[2]

9
3 DNA is found in both eukaryotic cells and prokaryotic cells.

(a) Explain the difference in how DNA is stored in these two types of cells.

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.....
.....
..... [2]

(b) (i) Describe the structure of DNA.

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.....
.....
.....
.....
..... [3]

(ii) A student talks about DNA with their friend.

The student tells their friend that all features in a person's phenotype are controlled by single genes in their DNA.

Give **one** reason why the student is wrong.

.....
..... [1]

4 a) The human heart has many features that means it is adapted to its function.

For each statement decide which structure's function is described.

Tick (✓) only one box in each row.

Function	Structure		
	Heart valve	Cardiac muscle	Heart chambers
Contracts to force blood from atria to ventricles			
Contracts to force blood out of the ventricles through vessels			
Prevents backflow of blood during contractions			
Blood temporarily stored in these small spaces to allow blood to be pumped at a high pressure			

[4]

b) Some babies are born with a heart defect known as a 'hole in the heart'. This is where there is a hole between two of the heart's chambers.

Fig. 1.2 shows a normal heart. Fig. 1.3 shows a heart of a baby with a 'hole in the heart'.

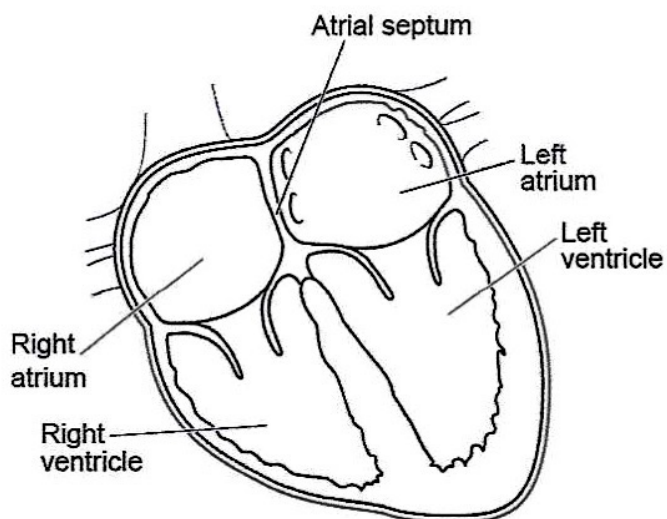


Fig. 1.2

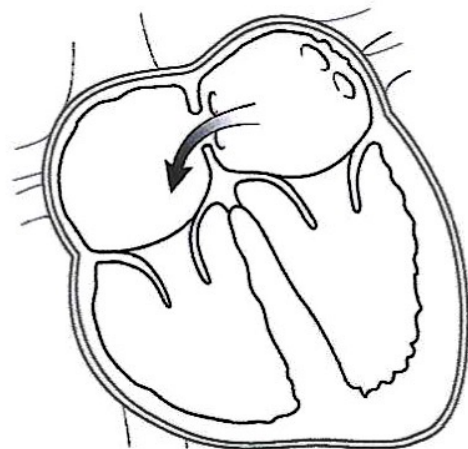


Fig. 1.3

Suggest how the defect in Fig. 1.3 could affect the baby.

.....

.....

..... [1]

C () The human circulatory system has three types of blood vessel.

Draw lines to connect the **blood vessel** to the correct description of its **structure** and the explanation of how its structure allows it to carry out its **function**.

Blood vessel	Structure	Function
Arteries	Very thin walls, one cell thick	To withstand the high blood pressure of blood leaving the heart
Capillaries	Very thick walls containing elastic tissue and muscle	They can be squashed to move blood along; backflow of blood is prevented
Veins	Thin walls containing elastic tissue, also contains valves	Allows diffusion of substances into and out of the vessel quickly and easily

[3]

Turn over

5

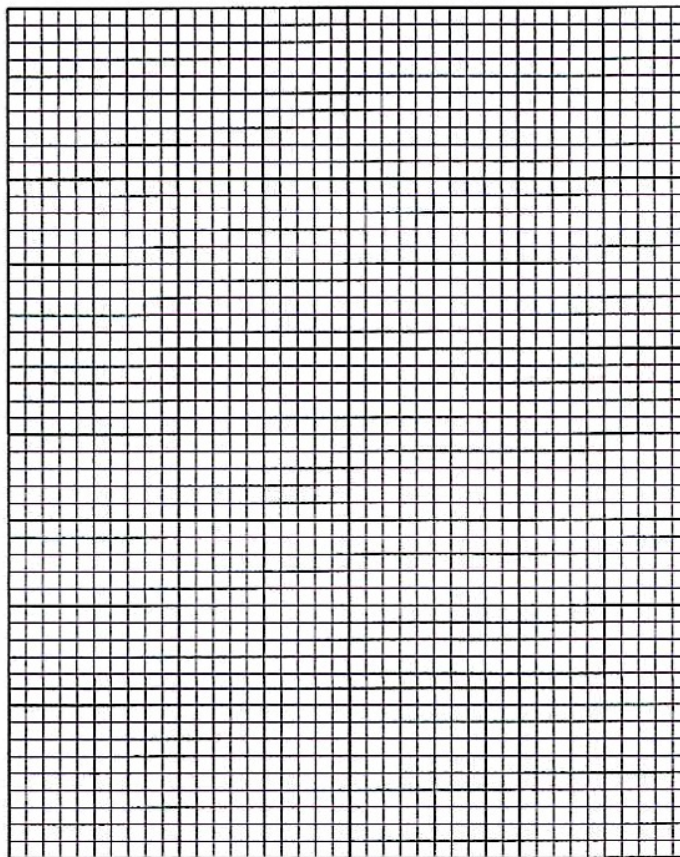
When studying variation, it is sometimes impractical to analyse DNA.

A student was investigating variation between a number of students in their school. They recorded the frequency of students that could and could not roll their tongue.

The results are shown in the table.

Phenotype	Frequency	
	Females	Males
Tongue-rolling	83	88
Non tongue-rolling	43	34

(i) Represent the data in the table as a bar chart on the grid provided below.



[4]

Marking Points

1 = type, axes + labels

2 = plots

3 = size

4 = bar detail

6 The Atlantic cod, *Gadus morhua*, is a large fish that is often eaten by humans.

(a) The body length of Atlantic cod varies between individuals.

The table below shows some data on the size of cod caught in one area of the Atlantic Ocean during one survey.

Body length (mm)	Frequency
$100 \leq x < 200$	10
$200 \leq x < 300$	48
$300 \leq x < 400$	121
$400 \leq x < 500$	130
$500 \leq x < 600$	119
$600 \leq x < 800$	46

Marking points
1 = axes + labels

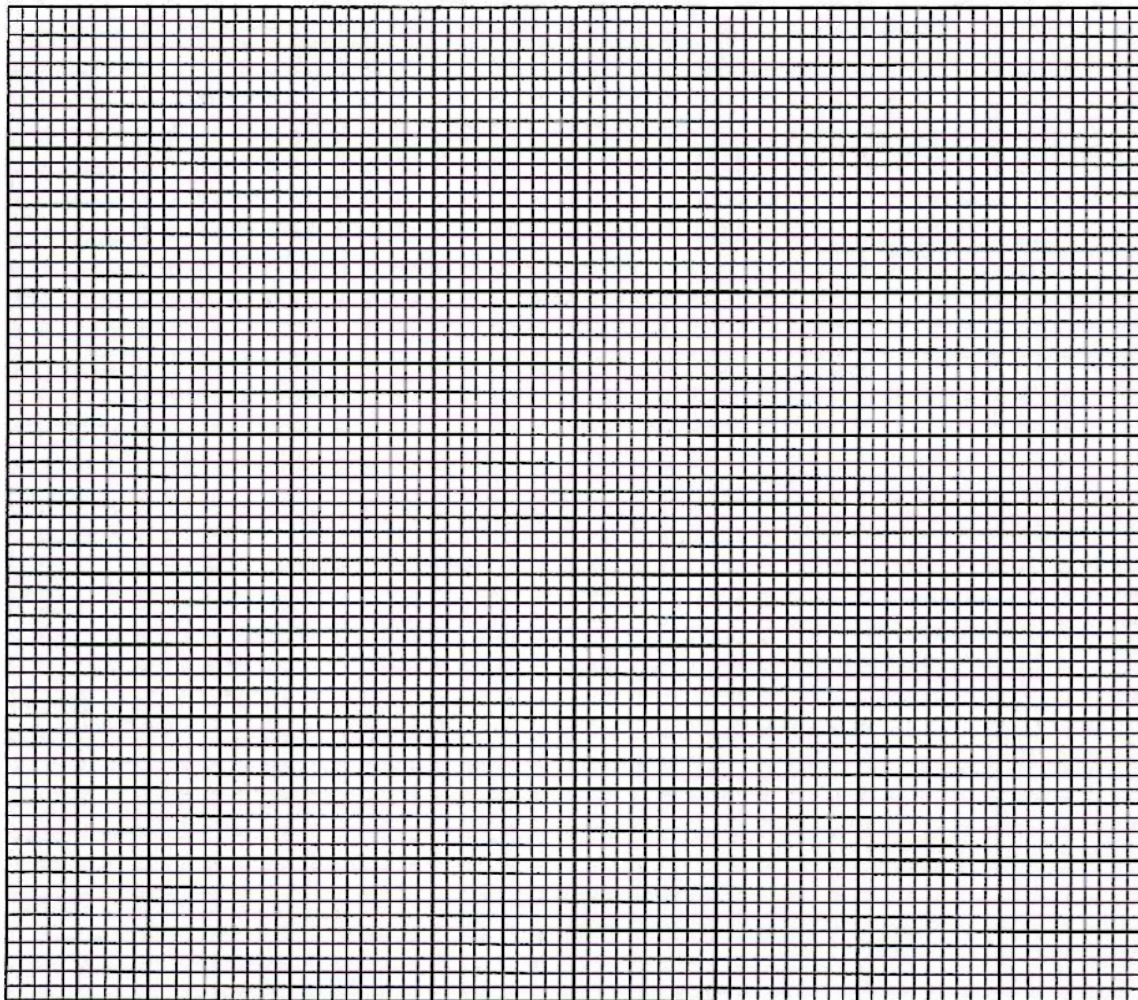
2 = scale + size

3 = type

4 = plots

5 = plots

(i) In the space provided, plot the results from the table as a suitable graph.



7 A scientist carried out an investigation into the effect of gibberellin on cabbage plants.

The scientist applied a range of volumes of gibberellin and measured the rate of increase of internodal length over 30 days.

Table 17 shows the scientist's results.

Volume of gibberellin applied ($\times 10^{-3} \text{ cm}^3 \text{ kg}^{-1} \text{ day}^{-1}$)	Rate of increase of internodal length (mm day^{-1})
0.0	1
0.2	1
0.4	2
0.6	4
0.9	22
1.2	47
1.4	48
1.8	49
1.9	50
2.0	50

Table 17

Marking points

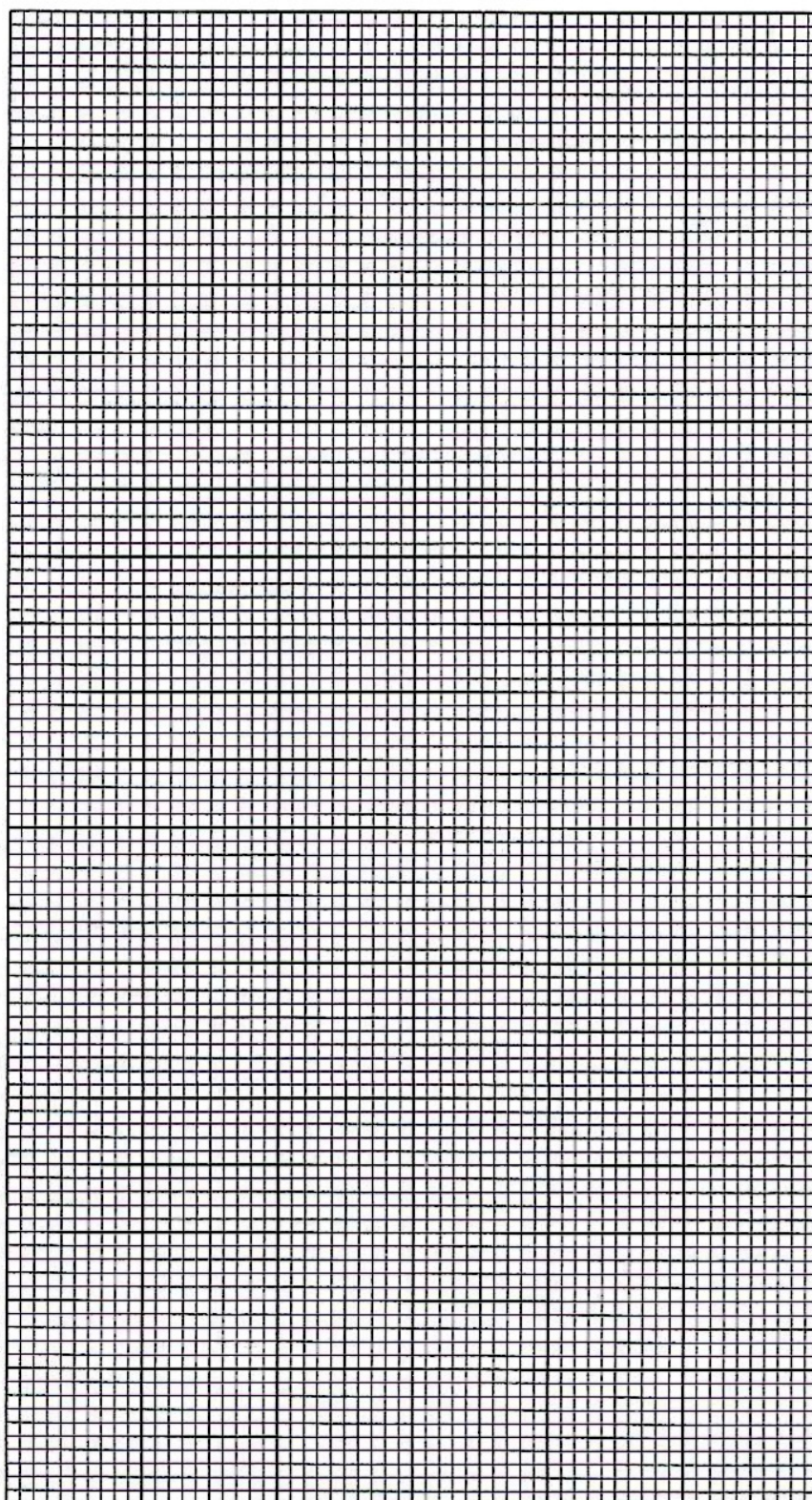
1 = axes + labels

2 = scale + size

3 = type + plots

4 = best fit

- (i) Plot the results from Table 17 as a suitable graph.



[4]

Turn over