Year 10-11 Biology Bridging Work 2026

Name: _____

Form Group:_____

Introduction

Congratulations on completing Year 10 and entering the final stage of your biology journey! This bridging work will help you review and reinforce key ideas from Year 10, ensuring a supported transition into Year 11. If you want to succeed into next year, the hard work starts now.

There are three sections to this booklet. These are:

1. **Part 1:** Required Practical Practice – selected required practical review (this will not be all required practicals and will be practicals that are universal across triple and combined).
2. **Part 2:** Key EBI topics from the End of Year Exams – selected exam question practice on universal topics from triple and combined.
3. **Part 3:** Numeracy and Working Scientifically Skills Quiz on Educake

You also need to complete your exam analysis questions from your end of year exam analysis pink sheet and the relevant follow up questions (make sure this is in purple pen).

Together with this, there will be links to useful videos that directly link to the module/topic in case you need further support. Please also use your CGP and Kerboodle textbooks to support with your revision. Recommended Websites:

- Savemyexams
- Cognito Science
- Classroom42
- BBC Bitesize
- AHammondBiology
- Classroom42
- Educake
- Seneca

This is the first piece of work you will be assessed in September and will set the tone for the rest of the academic year. Your new class teacher will check your work and if it is not done or a part of the work is incomplete, this will be followed up.

Please use the bridging work as an opportunity for you to showcase your knowledge, skills, and growth since Year 10. Work hard, stay focused, and demonstrate what you are capable of achieving.

The Science Department

Part 1: Required Practicals (universal practicals across combined and triple)

Recommended Videos (remember the practical you do in school vs the one in the exam can vary):

1. Microscopy – observing an animal or plant cell using a microscope
    a. Microscopy - Malmesbury Education
2. Food Tests – testing for the presence of fat/lipid, starch, glucose and protein in selected samples
    a. Food Tests - Malmesbury Education
3. Osmosis – measuring mass change of potato discs in different solutions
    a. Osmosis - Malmesbury Education
4. Enzymes – measuring time taken for amylase to digest starch
    a. Enzymes - Malmesbury Education
5. Photosynthesis – measuring the rate of photosynthesis in different light intensities
    a. Photosynthesis - Malmesbury Education
6. Reaction Time – measuring reaction time to stimuli
    a. Reaction Time - Malmesbury Education
7. Distribution – measuring number of plants in different areas (sunny/shaded). *This will be recovered at the start of Year 11 in September 2026.*
    a. Distribution - Malmesbury Education

For any practical activity can students answer these 10 questions?

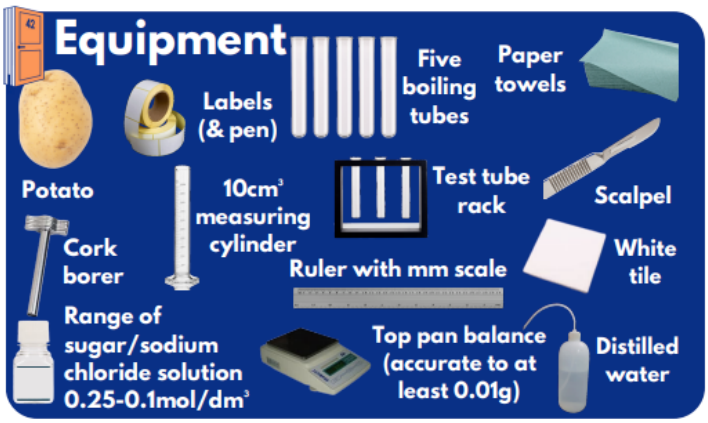
1. What is the dependent variable and the independent variable?
2. Therefore, what other factors could affect the results and need to be controlled (control variables)?
3. What will I measure or record?
4. What would an appropriate experimental control be?
5. How could I improve the accuracy of my experiment/investigation?
6. How could I improve the precision of my experiment/investigation?
7. How could I improve the validity of my experiment/investigation?
8. What else could I do with this experiment? What could I change to investigate something else?
9. What is my greatest source error?
10. What pattern or trend do my results show and how do I explain this?

Please note because not all investigations have all these characteristics, not all of these questions can be answered for all Required Practicals.

Practice on some of the required practicals is now on the next couple of pages

Bentley Wood High School for Girls

Equipment



Math Skills - % Gain/Loss of Mass

Worked example:

Initial mass of potato cylinder in 1 M solution = 13.54g.
Final mass of potato cylinder in 1 M solution = 10.30g.

$$\% \text{ change in mass} = \frac{\text{Final mass} - \text{Initial mass}}{\text{Initial mass}} \times 100$$

$$= \frac{10.30 - 13.54}{13.54} \times 100$$

$$= -23.92\% \text{ (23.92\% lost)}$$

Method:

1) Use the cork borer to cut five potato cylinders of equal diameter. Trim any remaining potato skin.

2) Trim all cylinders to same length (around 3cm). Accurately measure length and mass of each cylinder. Record in your table.

Label clearly

3) Measure 10cm³ of each concentration of sugar or salt solution and put into boiling tubes.

4) Measure 10cm³ of the distilled water and put into the fifth boiling tube.

5) Add one potato cylinder to each boiling tube.

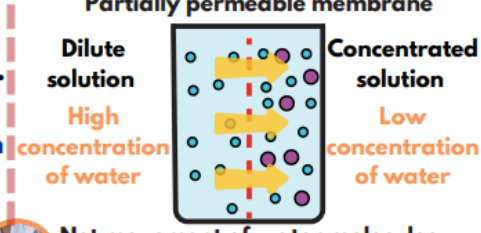
6) Leave potato cylinders in the boiling tubes for a pre-determined time.

At least 30 minutes

7) Remove potato cylinders and blot them dry with paper towels.

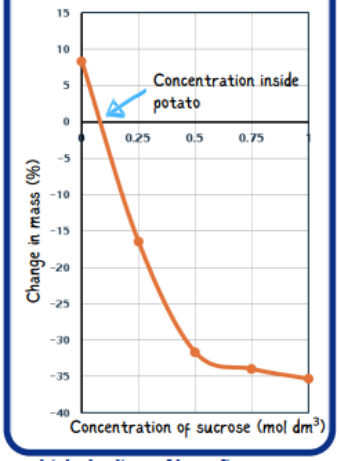
Blotting reduces surface water, increasing accuracy and repeatability

8) Measure the new mass and length of each potato cylinder again. Record in your table.

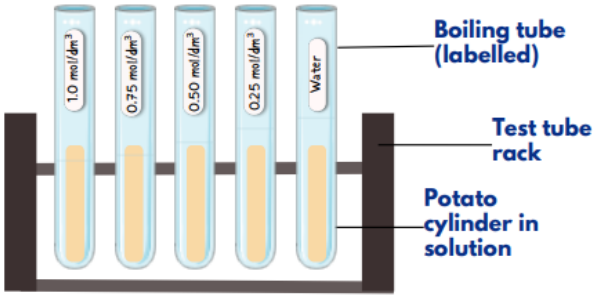


REQUIRED PRACTICAL 3
OSMOSIS

Graphical Representation of Results



Point at which the line of best fit crosses the x axis represents the concentration inside the potato (no change in mass)



Results Table

	1.0mol/dm³ sugar solution	0.75mol/dm³ sugar solution	0.5mol/dm³ sugar solution	0.25mol/dm³ sugar solution	Distilled water
Initial length (cm)	3.10	3.20	3.15	3.00	3.30
Final length (cm)	2.43	2.61	2.64	3.12	3.80
Change in length (cm)	-0.67	-0.59	-0.51	+0.12	+0.50
% change in length (%)	-21.61	-18.44	-16.19	+4.00	+15.15
Initial mass (g)	6.12	5.98	5.97	6.11	5.95
Final mass (g)	3.96	3.95	4.08	5.10	6.44
Change in mass (g)	-2.16	-2.03	-1.89	-1.01	+0.49
% change in mass (%)	-35.29	-33.95	-31.66	-16.53	+8.24

Increasing reliability of results - collect sets of results from at least two other groups allows you to get a mean of results.

Analysis of Results

1. Calculate change in mass (initial - final length)
2. Calculate % change in mass (see Math skills)
3. Write a concluding statement about what happened. Relate this to the theory of osmosis:

"The results show that when the solution concentration is low, water enters the potato cells. This is due to osmosis as the solute concentration of the potato cells is greater than the surrounding solution. In contrast, when the solute concentration of solution is higher than the potato cells, osmosis results in water moving from the potato to the surrounding solution."

Exam Style Questions - Osmosis

1. A student investigated the effect of different salt concentrations on chicken eggs. They followed the following protocol:

- Dissolved the shells from the chicken eggs in acid overnight.
- Blotted the eggs dry for 1 minute and weighed each egg.
- Placed each group in salt solution of different concentrations (ranging from 1-5 arbitrary units)
- Left them in the solutions for 24 hours
- Removed the eggs blotted them dry for 1 minute before re-weighing each egg.
- Calculated change in mass and percentage change in eggs.

a) Suggest why they blotted the eggs for 1 minute before weighing and how this may have caused errors in the results? (2 marks)

b) Suggest one improvement the student could make to their investigation. (1 mark)

The table below shows the students' results.

	Concentration of salt in arbitrary units				
	1.00	2.00	3.00	4.00	5.00
Initial mass of egg (g)	80.20	81.10	80.14	81.22	80.12
Final mass of egg (g)	87.74	84.33	78.32	74.33	69.23
Change in mass (g)	+7.54	+3.23	-1.82	-6.89	-10.89
% change in mass (%)	+9.40%	+3.9%	-2.27%	?	-13.59

c) The student calculated the percentage change in mass at each salt concentration. Why is the percentage change in mass more useful than change in mass in grams? Refer to information from the table in your answer. (2 marks)

d) Calculate the percentage change in mass of the egg in the salt concentration of 4.00 arbitrary units. (2 marks)

e) The mass of the eggs decrease in salt concentrations with a concentration of 3.00+ arbitrary units. Explain what caused this. (3 marks)

Bentley Wood High School for Girls

Aim: Investigate the effect of pH on the rate of reaction of amylase

Equipment

- x 10 test tube
- Thermometer
- x3 labelled buffered solutions at a range of pH values
- Test tube rack
- Glass rods
- Stop clock
- Iodine solution (indicator)
- Water bath
- Pasteur pipettes
- Amylase solution
- Labels
- Starch solution
- Spotting tile
- 5cm³ measuring cylinder

Enzymes

Biological catalysts which speed up chemical reactions in living organisms

Amylase

- Produced in the salivary gland and pancreas

Starch → (Amylase) → Maltose

Iodine

- Iodine is an eye irritant
- Always wear goggles

Independent variable	the pH
Dependent variable	time taken for starch to be digested
Control variables	• Temperature (35°C) • Concentration • Volume of starch and amylase

Method:

Buffer solutions keep the reaction at a fixed pH

35°C is close to body temperature

Preparation

1) Heat water bath to 35°C.

2) Put 2cm³ of each buffered solution into separate test tubes. — Label each tube with the pH value

3) Add 4cm³ of starch solution to 5 different tubes.

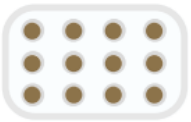
4) Leave a thermometer in one of the starch test tubes to monitor the temperature throughout. — Label each as 'Starch'

5) Add 10cm³ of Amylase solution to one, different test tube. — Label as ''Amylase'

6) Place all tubes into a water bath. Allow all solutions to reach 35°C.

REQUIRED PRACTICAL 5 ENZYMES

7) Meanwhile, put one drop of iodine solution into each spotting tile depression.



'Zero time' mixture. Used as a comparison colour for test buffers

Continuous Sampling

8) Put a drop of starch solution in the first depression of the tile.

9) When at 35°C, add the 2cm³ of your first pH buffered solution to one starch tubes and mix with a glass rod.

11) Use the pipette to add 2cm³ of amylase solution to the mixture. Start the stop clock immediately.

12) Stir continuously for 10 secs then remove one drop of the mixture with the glass rod.

After mixing, the tube must be kept in the water bath

13) Put this drop on the second depression of the tile.

14) Every 10 seconds, use the glass rod to remove one drop and put each on the next depression of the tile.

Rinse glass rod with water between droplets!

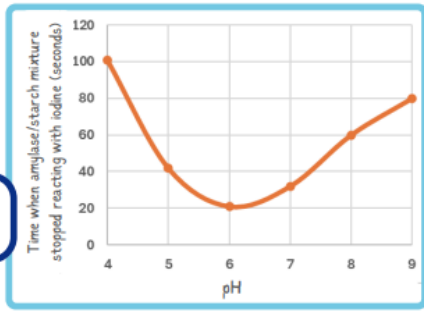
Repeat sampling until the iodine does not change colour.

This indicates all starch has been converted to sugars

Repeat steps 9-14 with the other buffer solutions with new pipettes, glass rods and spotting tiles.

Results (combined with another group)

pH of solution	Time for amylase to completely break down the starch (seconds)
4	101
5	42
6	21
7	32
8	59
9	81



Analysis of Results

"The results show that the time taken for all the starch to be digested by the amylase decreases from ph4 to pH6. and then increases again. Therefore, the optimum pH for this enzyme is pH 6."

Potential improvements?

- Using more accurate measuring apparatus e.g. a calorimeter
- Taking mean of several repeats at each pH
- Using a narrower range of pH

Brown → Blue-black: Starch is present

Brown → Brown: Starch is no longer present

What you might see...

Exam Style Questions - Enzymes

1) Amylase is the enzyme tht controls the breakdown of starch to glucose. Describe how the student could investigate the effect of pH on the breakdown of starch by amylase. (4 marks)

2) Students investigated the effect of bile on the digestion of fat by lipase. They followed the following protocol:

- Mixed milk and bile in a beaker
- Put the pH sensor of a pH meter into the beaker
- Add lipase solution
- Recorded the pH at 2-minute intervals
- Repeated steps 1 to 4, but used water instead of bile.

a) Suggest two variables that the student should have controlled in this investigation. (2 marks)

b) They students found that by the end of each test the beaker with water and bile both had the same pH of 7.6. Suggest a reason for this. (1 mark)

3) A student wanted to investigate the effect of temperature on the activity of amylase. To do this, they timed how to it took for an iodine solution to turn yellow-brown in the presence of starch and amylase at different temperatures.

Table 1 shows the results.

Temperature in °C	Time taken for solution to turn yellow-brown
15	5
30	2
45	7
60	12
75	Remained blue-black

Table 1

a) Explain why the iodine solution remained blue-black in the investigation at 75°C. (2 marks)

b) Explain how amylase breaks down starch. Answer in terms of the 'lock and key theory'. (3 marks)

c) Describe how the student could extend the investigation to determine the ffect of a different factor on amylase activity. (2 marks)

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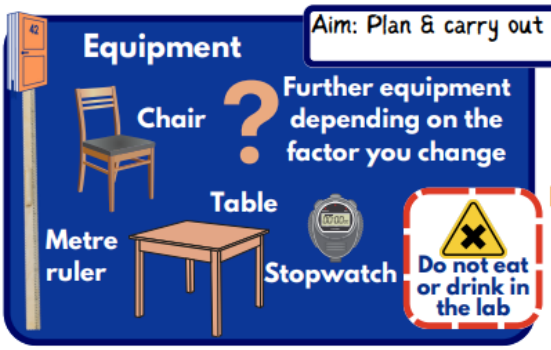
REQUIRED PRACTICAL 7
REACTION TIME

Aim: Plan & carry out an investigation into the effect of a factor on human reaction time.

Equipment



Reaction time is the taken to respond to a visual stimulus

Factors affecting reaction time:

- Age
- Drug use (e.g. caffeine)
- Stress
- Distractions

- Choose a factor to investigate that you believe has an effect on reaction time
- Carry out experiments to measure reaction time

Creating a Hypothesis

A hypothesis predicts a relationship between two variables:

1. Observe which variables might be having an effect on variable.
2. Select a variable to investigate.
3. Create a question you want to answer, followed by a prediction backed by scientific reasoning - this is your hypothesis.

What is happening?

Visual stimulus - Ruler falling → Receptor - Eye (photoreceptors) sees the ruler falling → Sensory neurones send message along the optic nerve from the eye to the brain. Brain processes this information. → Brain sends signal through motor neurones to close the hand.

Independent variables include:

Background noise
1. Perform experiment in silence
1. Repeat experiment with loud background music

Caffeine consumption
1. Carry out experiment
2. Repeat after the person has drank a caffeinated drink

Dependent variable → Distance caught (equates to reaction time)

Control variables include:

- Use of dominant hand
- Height the ruler is dropped from
- Ruler orientation
- Practice time

Method:

Preparation

1) In a pair, decide who is Person 1 and Person 2.

2) Person 1 sits down on a chair and puts the forearm of their dominant arm across the table, with their hand overhanging the edge.

3) Person 2 holds a ruler vertically (from a chair) with the bottom end (0cm mark) between Person 1's thumb and 1st finger.

4) Person 2 tells Person 1 to be ready to catch the ruler.

5) When ready, Person 2 releases the ruler.

6) Person 1 catches the ruler as quickly as possible.

7) Record the number on the ruler level with Person 1's thumb on a table.

8) Repeat steps 2-7 several times with Person 1 catching the ruler.

9) Swap roles, so Person 2 catches the ruler and Person 1 drops it.

10) Use a conversion table to convert ruler measurements into reaction time.

11) Make the necessary changes in order to investigate the chosen variable.

12) Repeat steps 1-10 with the new variable.

Example Results Table (Indepedent variable - noise)

	Ruler measurements in cm				Reaction time in seconds			
Drop test attempt	Person 1 No noise	Person 2 No noise	Person 1 Noise	Person 2 Noise	Person 1 No noise	Person 2 No noise	Person 1 Noise	Person 2 Noise
1	29		52		0.24		0.33	
2	26		42		0.23		0.29	
3	31		45		0.25		0.30	
4	31		25		0.25		0.23	
5	26		39		0.23		0.28	

Repeat as many times as possible

This experiment often results in lots of errors because many factors can affect results.

Analysis of Results

The lower the reaction time, the faster the reaction time. For example in the table above:

"Person 1's reaction time was faster before it was caught with noise. with average time before noise was 0.24 seconds compared to 0.29 seconds. This supports the hypothesis that noise increases the reaction time of Person 1."

Extract from table

Ruler reading (cm)	Reaction Time (s)
1	0.05
2	0.06
3	0.08
4	0.09
5	0.10

Considerations

It is very difficult to control variables.

E.g. Results could show someone is faster after the independent variable was changed but because they have practiced catching the ruler, not because of the independent variable.

Lots of participants and attempts are needed to produce reliable results.

Potential Improvements

Measure reaction time in milliseconds to increase accuracy.

Alternative practical

Use a computer programme.

Participants click the mouse when the colour on the screen changes

Exam Style Questions - Reaction Time

1) Two students performed a practical to investigate reaction time using the following method:

- **Student 1 sits with their arm resting on the table so that their hand hangs over the edge.**
- **Student 2 holds the ruler so that the 0cm mark is level with student 1's thumb and finger.**
- **Student 2 drops the ruler and student 1 catches as fast as they can.**
- **The distance on the ruler is recorded.**

They followed these steps 9 times before swapping roles and repeating the process.
State three variables the students controlled in this practical. (3 marks)

2) Give two reasons why a computer program to measure reaction time is more likely to be more valid than the the ruler drop method. (2 marks)

3) Table 1 shows the results of an investigation of a group of students investigating the effect of caffeine on reaction time. In their experiment, they completed the ruler drop test before drinking a strong cup of coffee and 15 minutes after drinking the coffee.

Distance ruler fell (cm) Before drinking coffee	Distance ruler fell (cm) After drinking coffee
15	13
19	17
13	11
21	8
18	17
25	10
12	14
21	13
Mean = 18.0	Mean = 12.8

Table 1

a) What do the means suggest about the effect of caffeine on reaction time? (1 mark)

b) Give one reason why a scientist might not accept this conclusion. (1 mark)

4) Two students performed a practical to investigate reaction time using the following method:

- **Student 1 sits with their arm resting on the table so that their hand hangs over the edge.**
- **Student 2 holds the ruler so that the 0cm mark is level with student 1's thumb and finger.**
- **Student 2 drops the ruler and student 1 catches as fast as they can.**
- **The distance on the ruler is recorded.**

They followed these steps 4 more times before swapping roles and repeating the process. Table 2 shows Student 1's result.

Attempt number	Distance ruler dropped in mm
1	109
2	114
3	123
4	125
5	120

Table 2

a) What was the median result?

b) Calculate the mean reaction time to 3sf, using the equation:

$$\text{reaction time in s} = \sqrt{\frac{\text{Mean drop distance (cm)}}{490}}$$

(4 marks)

Part 2: Key EBI topics from the End of Year Exams – selected exam question practice on universal topics from triple and combined.

Q1.

Chickenpox is an infectious disease that affects young children.

(a) One symptom of chickenpox is small blisters on the skin.

Suggest **one** way chickenpox spreads from an infected person to other people.

_____

_____

(1)

(b) Chickenpox is caused by a type of pathogen that **cannot** be treated with antibiotics.

Give the reason why chickenpox **cannot** be treated with antibiotics.

_____

_____

(1)

A vaccine that could be used to protect against chickenpox has been produced.

(c) What does a vaccine contain that causes a person to become immune to a disease?

_____

_____

(1)

(d) Give **three** reasons why a new vaccine must be tested.

1 _____

_____

2 _____

_____

3 _____

_____

(3)

(e) Explain how a vaccine for chickenpox gives immunity against the disease.

You should refer to how the body responds to:

- the vaccine
- chickenpox pathogens that enter the body after vaccination.

(6)

(Total 12 marks)

Q2.

Amylase is an enzyme that digests starch.

(a) Which organs in the human digestive system produce amylase?

Tick (✓) **one** box.

- Liver, small intestine and large intestine ☐
- Salivary glands, stomach and liver ☐
- Salivary glands, pancreas and small intestine ☐
- Stomach, pancreas and large intestine ☐

(1)

A student investigated the effect of pH on the activity of amylase.

This is the method used.

1. Prepare amylase solution at pH 5

2. Mix the amylase solution with starch in a boiling tube.

3. Remove a drop of the amylase-starch mixture every 30 seconds and test it for the presence of starch.

4. Record the time when all the starch has been digested.

5. Repeat steps 1 to 4 using amylase solution prepared at pH 6, then at pH 7 and then at pH 8

(b) What was the independent variable in this investigation?

_____

_____

(1)

(c) Describe how the student would know when all the starch had been digested.

_____

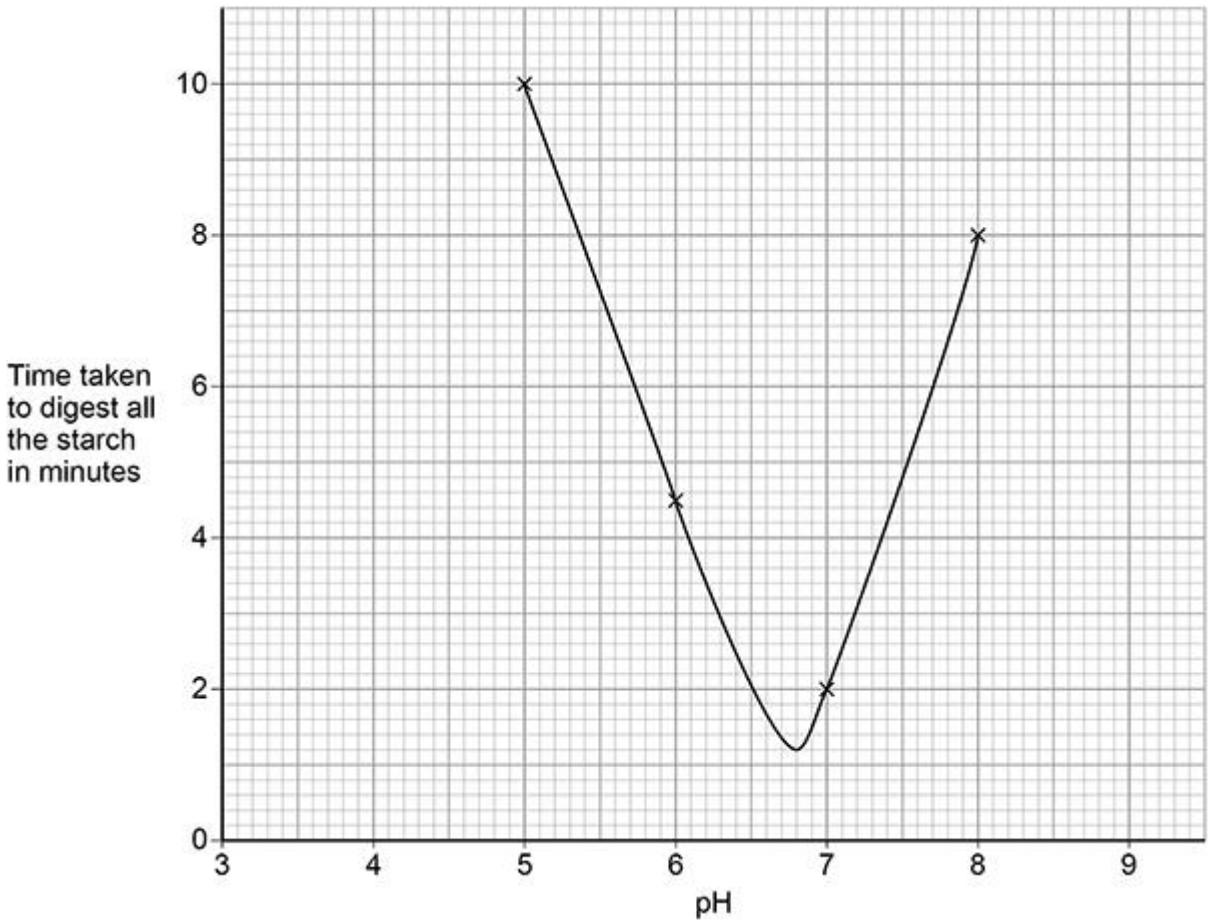
_____

_____

(1)

(d) **Figure 1** shows the student's results.

Figure 1



What was the optimum pH for the amylase?

Use **Figure 1**.

Optimum pH = _____

(1)

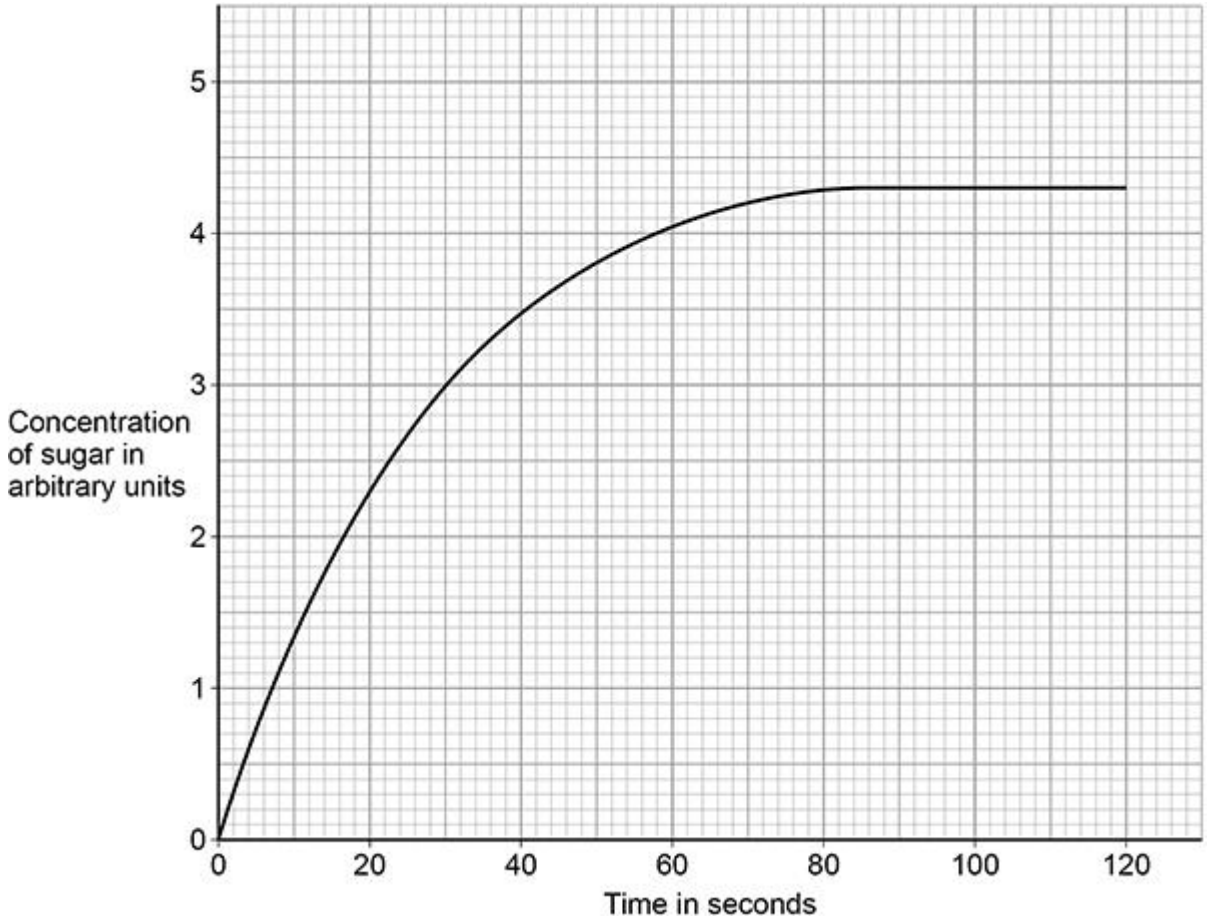
A scientist did a different investigation.

This is the method used.

1. Prepare amylase solution at the optimum pH.
2. Mix the amylase solution with starch in a boiling tube.
3. Measure the concentration of sugar every 10 seconds for 2 minutes.

Figure 2 shows the scientist's results.

Figure 2



(e) How much time did it take for the amylase to digest all the starch?

Use **Figure 2**.

Time to digest all the starch = _____ seconds

(1)

(f) Determine the rate of sugar production per minute at 40 seconds.

_____

_____

_____

_____

_____

_____

_____

Rate = _____ arbitrary units per minute

(4)

(g) Explain how the structure of enzyme molecules is related to the effect of pH on the activity of amylase.

(6)

(Total 15 marks)

Q3.

This question is about tumours.

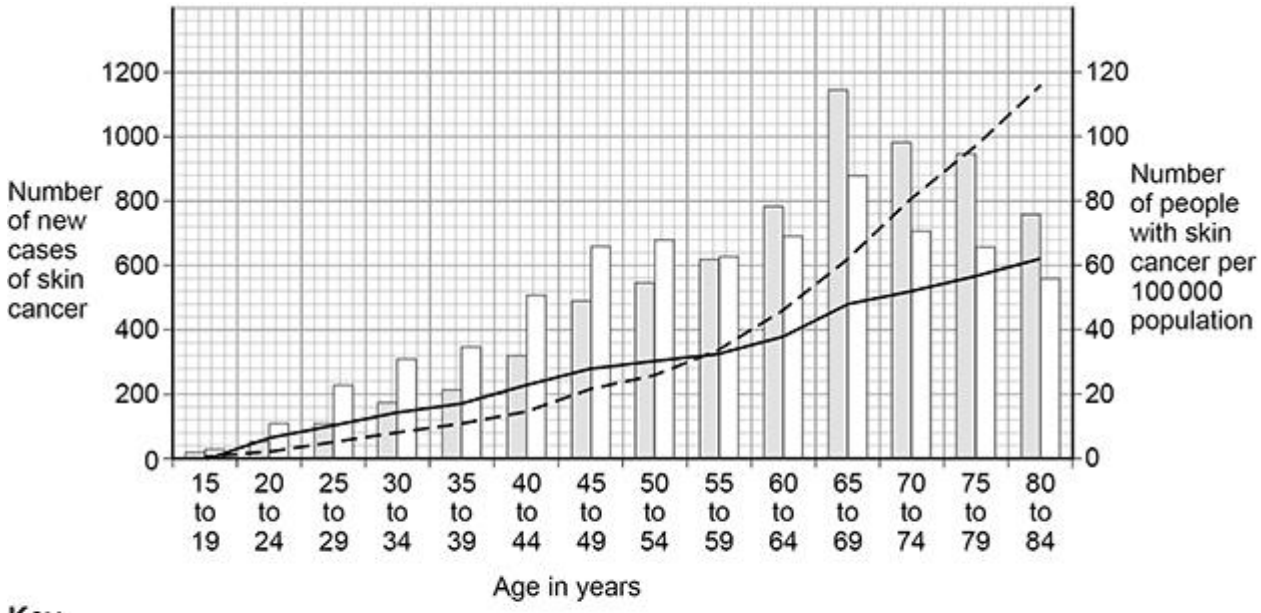
(a) Describe the similarities and differences between benign tumours and malignant tumours.

(4)

The figure below shows data about skin cancer in males and females for different age groups in the UK.

It shows:

- the number of new cases of skin cancer in 1 year
- the number of people with skin cancer per 100 000 population in 1 year.



(b) There are no new cases of skin cancer diagnosed in people younger than 15 years of age.

Explain why.

(2)

(c) Give **two** conclusions about the number of **new cases** of skin cancer.

Use the figure on the previous page.

1 _____

_____

2 _____

_____

(2)

(d) The data for the number of people with skin cancer is given per 100 000 population.

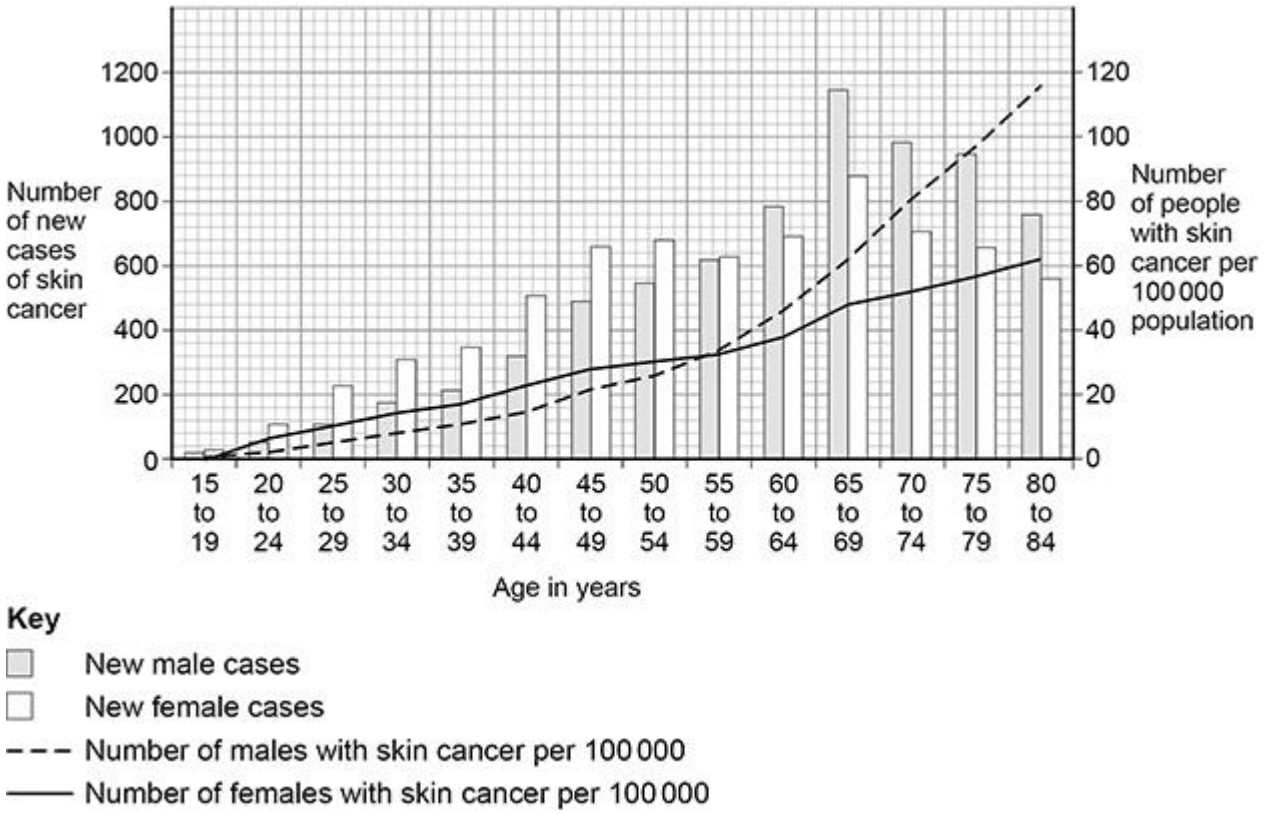
Suggest why the data is **not** given as the total number of people.

_____

_____

(1)

The figure above is repeated below.



(e) Describe **two** trends shown in the figure on the previous page.

Use **only** the data for the number of people with skin cancer per 100 000 population.

1 _____

_____

_____

2 _____

_____

_____

(2)

(f) The estimated population of males aged 80 to 84 years was 694 000

Calculate the number of males aged 80 to 84 years with skin cancer in that year.

Use the figure above.

Give your answer to 3 significant figures.

_____

_____

_____

_____

_____

Number of males with skin cancer (3 significant figures) = _____

(3)

(Total 14 marks)

<u>Part 3:</u> Numeracy and Working Scientifically Skills Quiz on Educake

This quiz is on your Educake dashboard but you can also access it using the link below:

https://my.educake.co.uk/assessment/37487429

It is due by **6th September 2026**.

Good luck!