

Name:

Biology Class:

Teacher: Mrs Masters

A-Level Biology

A03 Evaluation

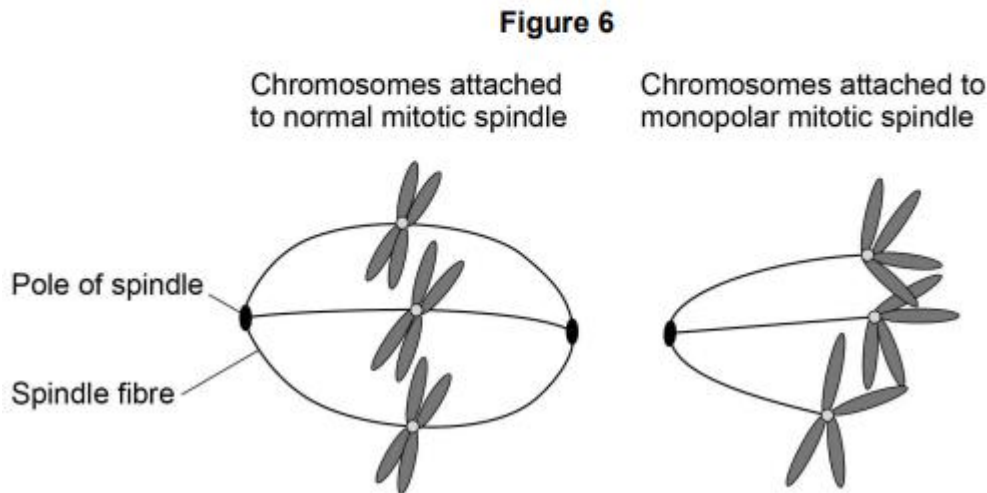
Question Practice



Question 1: AS Paper 1 2016 Q8

Scientists looking for treatments for cancer are investigating the use of substances called kinesin inhibitors (KI). These inhibitors prevent successful mitosis. Some kinesin inhibitors cause the development of a monopolar spindle in mitosis.

Figure 6 shows chromosomes attached to a normal mitotic spindle and to a monopolar mitotic spindle.



Scientists investigated the effect of different concentrations of a kinesin inhibitor (KI) on mitosis of human bone-cancer cells grown in a culture.

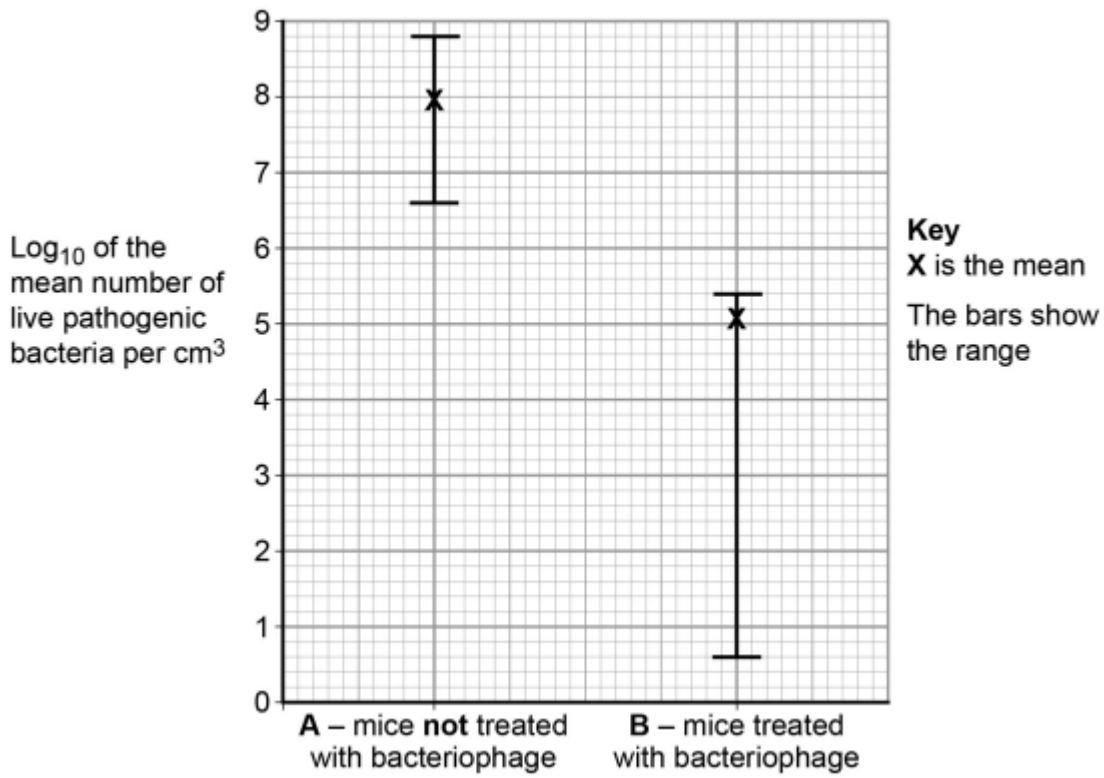
Table 3 shows the scientists' results.

Table 3

Concentration of kinesin inhibitor / nmol dm^{-3}	Percentage of dividing human bone-cancer cells showing a monopolar mitotic spindle
0	0
1	0
10	8
100	93
1000	100
10 000	100

A student who saw these results concluded that in any future trials of this kinesin inhibitor with people, a concentration of 100 nmol dm^{-3} would be most appropriate to use.

Figure 3



Using only **Figure 3**, what can you conclude from these data about the effectiveness of the bacteriophage in treating this lung infection in mice?

Do **not** consider statistical analyses in your answer.

[3 marks]

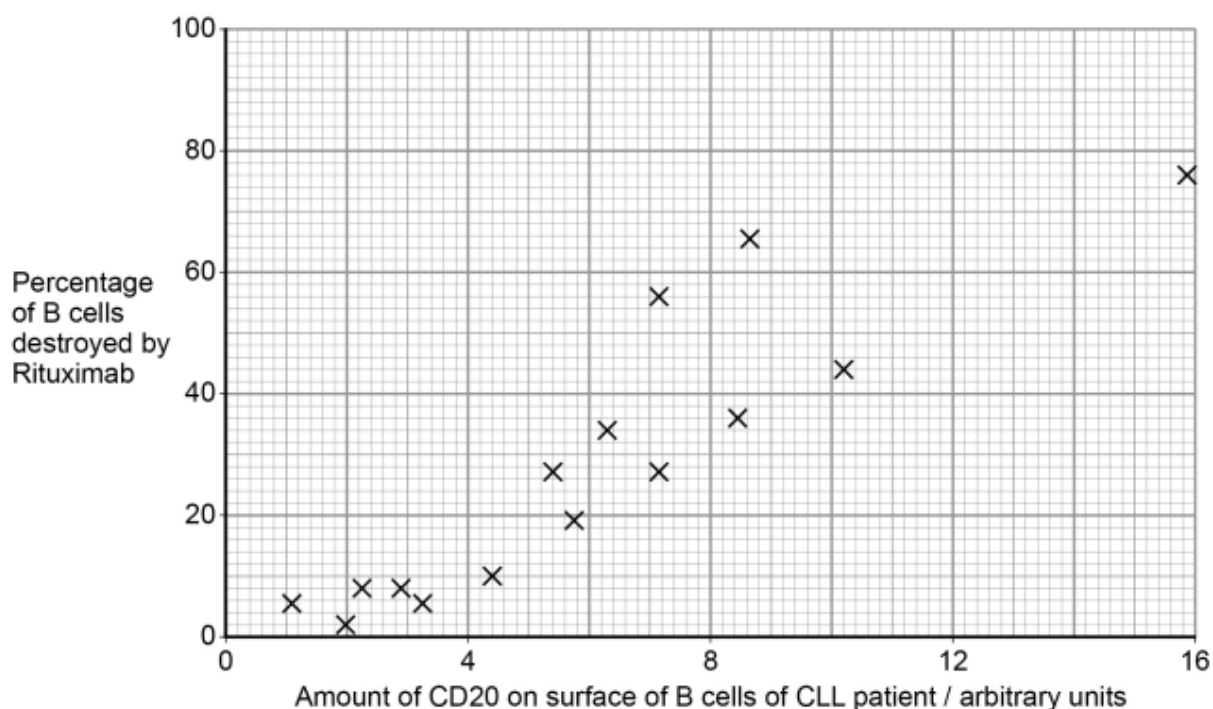
Question 3: A-Level Paper 3 2018 Q2.2

Chronic lymphocytic leukaemia (CLL) is a cancer that affects some B cells of a person's immune system.

Rituximab is a drug used to treat CLL. It binds to a protein called CD20 on the surface of B cells. If enough Rituximab binds to a B cell, it can kill the cell. Rituximab kills **both** healthy **and** cancerous B cells. The body then produces new B cells.

The amount of CD20 on the surface of B cells varies from one person to another. Doctors investigated the relationship between the amount of CD20 on the B cells of a patient and the percentage of B cells destroyed by Rituximab.

Figure 2 shows the doctors' results. Each cross is the result for one patient.



0 2 . 2

From these data, what can you conclude about the effectiveness of Rituximab in treating patients with CLL?

Do **not** include considerations of statistical analyses in your answer.

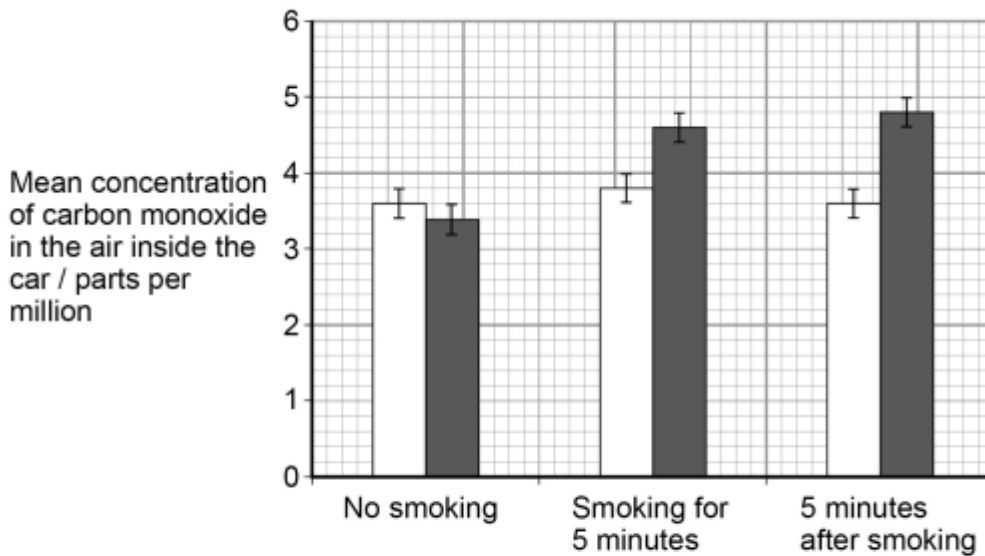
[3 marks]

Question 4: AS Paper 1 2018 Q9.3

Carbon monoxide is a poisonous gas that is present in cigarette smoke. This carbon monoxide can be absorbed into the blood where it binds with haemoglobin.

Scientists investigated the concentration of carbon monoxide in cars in which people were smoking or not smoking. They measured the concentration with the car windows open and closed. **Figure 7** shows the scientists' results as they presented them. A value of ± 2 standard deviations from the mean includes over 95% of the data.

Figure 7



Key

- Open window
- Closed window
- I ± 2 SD

Question 5: A-level Paper 1 2019 Q2

Cell walls make up much of the fibre that people eat.

Scientists investigated the relationship between the mass of fibre people ate each day and their risk of cardiovascular disease (CVD).

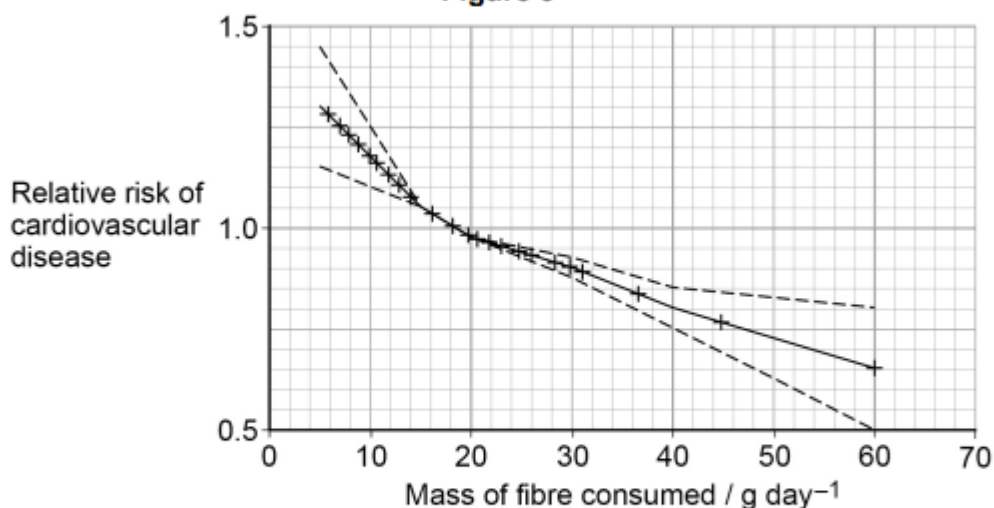
They gathered data from a large sample of people and used this to calculate a relative risk.

- A relative risk of 1 means there is no difference in risk between the sample and the whole population.
- A relative risk of < 1 means CVD is less likely to occur in the sample than in the whole population.
- A relative risk of > 1 means CVD is more likely to occur in the sample than in the whole population.

Their results are shown in **Figure 3**. A value of ± 2 standard deviations from the mean includes over 95% of the data.

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Figure 3



Key

— Mean relative risk

--- Line of best fit showing ± 2 standard deviations from the mean

Each '+' plotted point represents 1000 people

0 2 . 2 A student concluded from **Figure 3** that eating an extra 10 g of fibre per day would significantly lower his risk of cardiovascular disease.

Evaluate his conclusion.

[4 marks]

Question 6: A-Level Paper 2 2019 Q4

Scientists investigated the effect of a decrease in pH on muscle contraction. The scientists did the investigation with four different preparations of isolated muscle tissue: **A**, **B**, **C** and **D**.

A - mouse muscle fibres at typical pH of mouse muscle tissue (control 1).

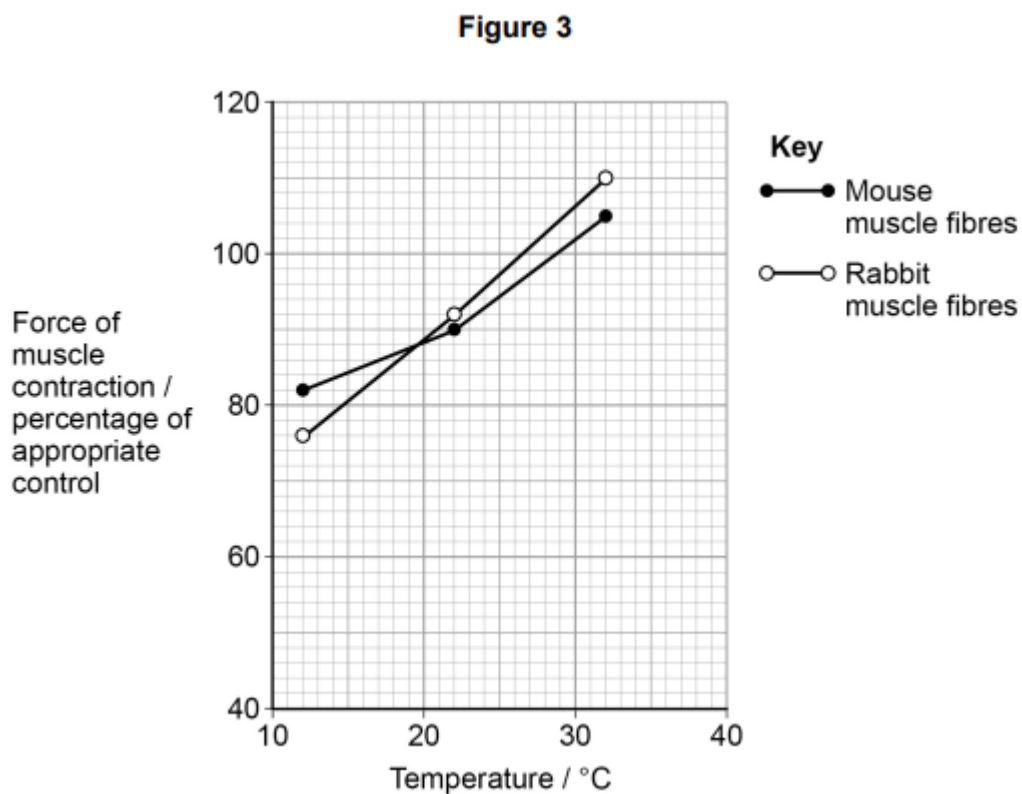
B - mouse muscle fibres at 0.5 pH units below typical pH.

C - rabbit muscle fibres at typical pH of rabbit muscle tissue (control 2).

D - rabbit muscle fibres at 0.5 pH units below typical pH.

They measured the force of muscle contraction of the muscle fibres at 12 °C, 22 °C and 32 °C

Figure 3 shows the results the scientists obtained for **B** and **D** compared with the appropriate control.



0 5 . 1 State a null hypothesis the marine biologists tested in this investigation.

[1 mark]

0 5 . 2 The natural habitat of COTS is coral reefs of tropical oceans.

Suggest **two** factors that should be kept constant in the choice chambers so that COTS display normal behaviour.

[1 mark]

1 _____

2 _____

0 5 . 3 A journalist studying **Table 1** suggested that **either** type of light could be used to cause COTS to move away from coral reefs.

Evaluate the journalist's suggestion.

[3 marks]

Question 8: Alevel 2019 Paper 3

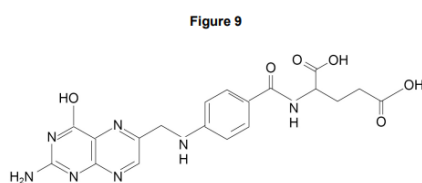
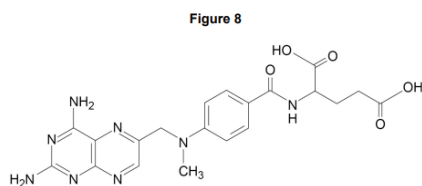
Trexall is a drug that can be used to slow the development of various forms of cancer.

Trexall slows cell division by interacting with an enzyme called dihydrofolate reductase (DR).

DR is involved in making nucleotides; the substrate for DR is folic acid.

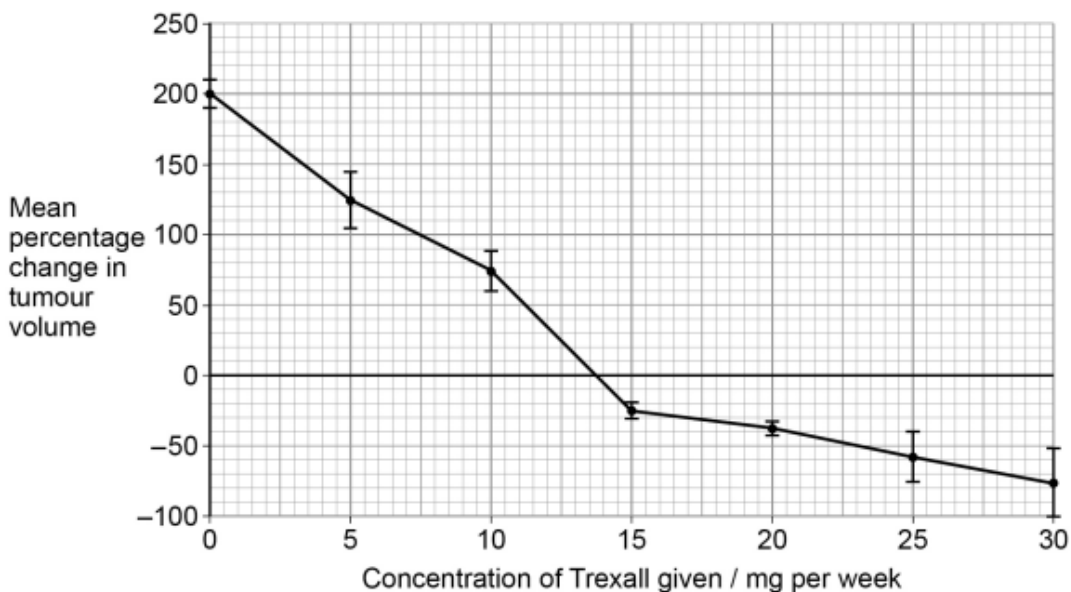
Figure 8 shows the chemical structure of Trexall.

Figure 9 shows the chemical structure of folic acid.



Doctors investigated how the concentration of Trexall given to patients affected the growth of lung tumours. The doctors measured the volume of tumours at the beginning of the study and after 8 months.

Figure 10 shows the results of this investigation. The bars represent ± 2 standard deviations. A value of ± 2 standard deviations from the mean includes over 95% of the data.

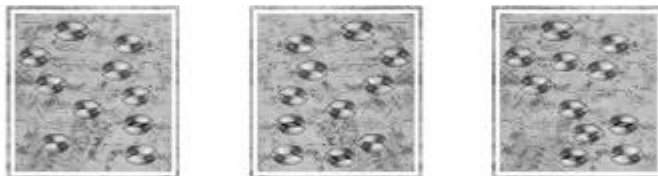


Question 10 Alevel Paper 1 2020 Q9

Scientists investigated stomatal density on leaves of one species of tree.

Figure 9 shows three examples of the square fields of view the scientists used to calculate a mean stomatal density.

Figure 9



Key



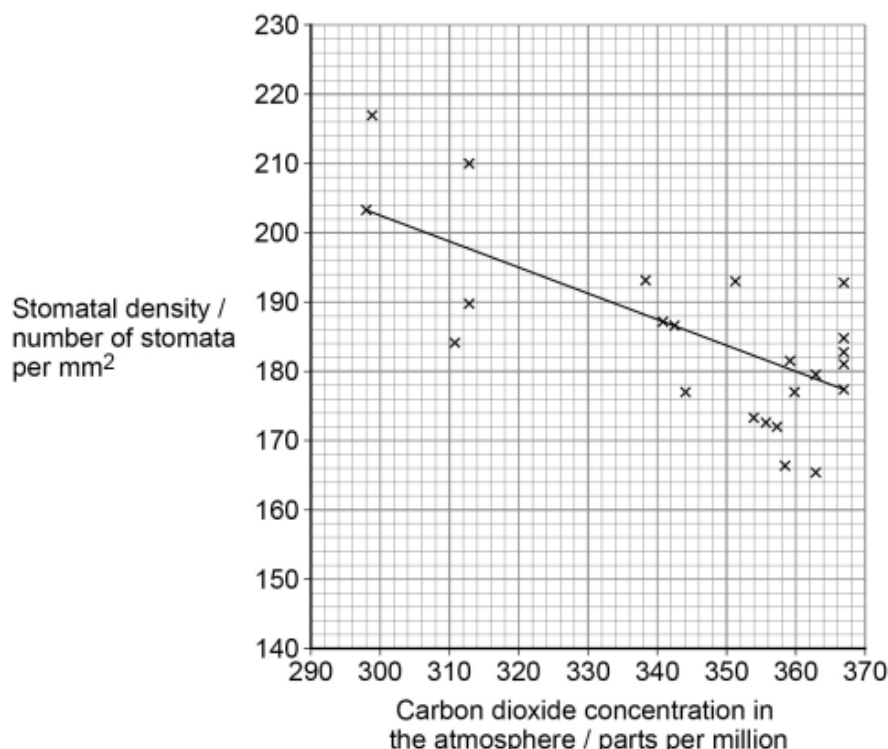
Stomata



White lines show the counting field for stomata
(each edge of white square = 250 μm)

The scientists used leaves from individual trees that had grown in different areas of the world in different years. Each tree had grown in an area and year with known carbon dioxide concentration.

Their results are shown in **Figure 10**.



Key

Each plotted point represents mean stomatal density from 10 leaves from one tree

Line shows line of best fit, which shows a statistically significant change

0 9 . 2

Give a null hypothesis for this investigation **and** name a statistical test that would be appropriate to test your null hypothesis.

[2 marks]

Null hypothesis _____

Statistical test _____

0 9 . 3

From 1910 to 2000, the carbon dioxide concentration in the atmosphere increased from 300 parts per million to 365 parts per million.

Use **Figure 10** to calculate the mean rate of change in stomatal density from 1910 to 2000.

Give your answer as number of stomata per mm² per 10-year period.

Show your working.

[2 marks]

Number of stomata per mm² per 10-year period _____

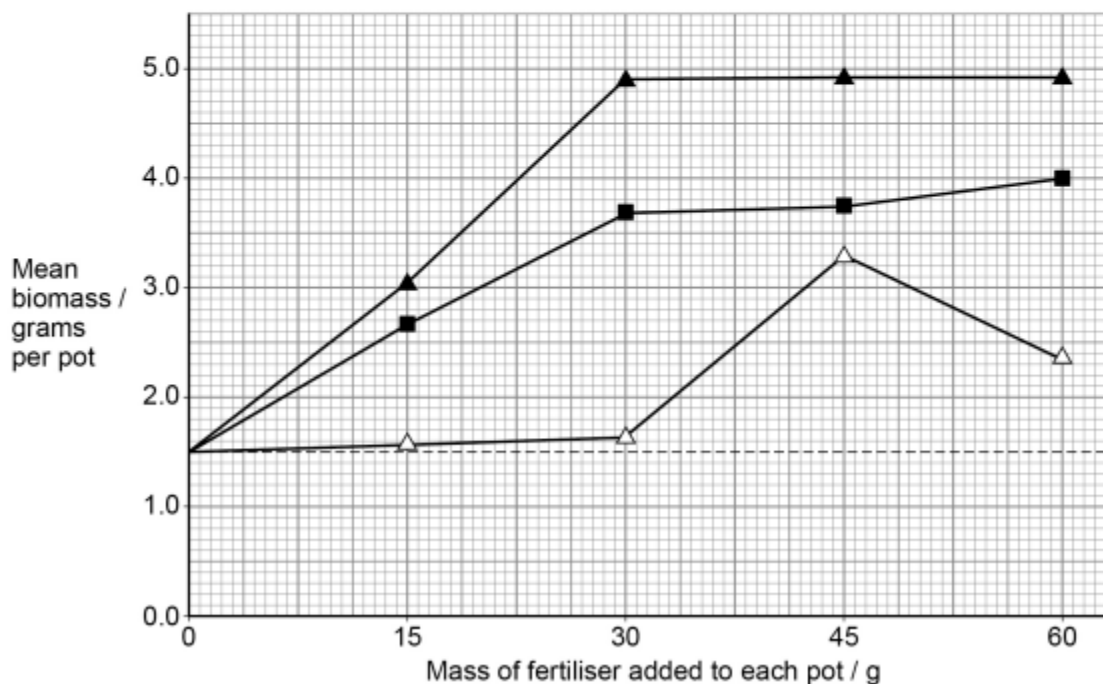
Question 11 A-Level Paper 2 2020 Q7

A scientist investigated the effects of different fertilisers on the growth of spinach plants. The scientist:

- set up a large sample of identical pots of soil
- added different masses of different fertilisers to selected pots
- did not add fertiliser to the control pots
- planted the same number of young spinach plants in each pot
- after 20 days, determined the biomass of spinach plants in each pot.

The results the scientist obtained after 20 days are shown in **Figure 4**.

Figure 4



Key

- ▲ —▲ Potassium nitrate
- —■ Ammonium sulfate
- △ —△ Chicken manure
- Control – no fertiliser added

0 7 . 1

Calculate how many times greater the mean growth rate per day was using 37.5 g potassium nitrate than using 37.5 g ammonium sulfate.

Assume the mean biomass of the spinach plants at the start of the investigation was 0.5 g per pot.

[1 mark]

Answer _____

