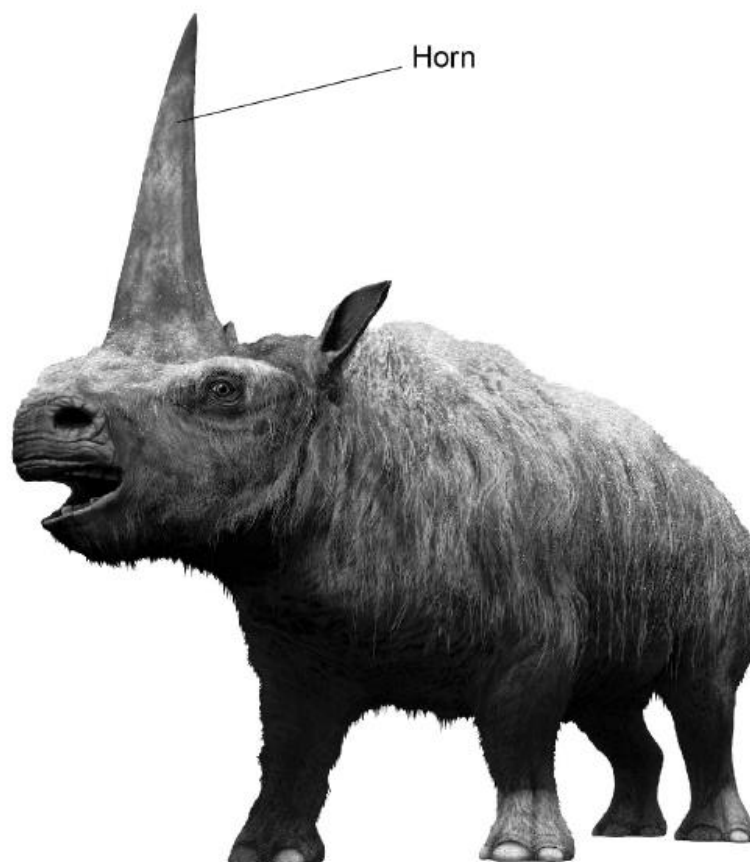


AQA - Variation and evolution – GCSE Biology

1. June/2020/Paper_2F/No.6

Figure 8 shows what the extinct Siberian rhinoceros (*Elasmotherium sibiricum*) might have looked like.

Figure 8

0 6 . 1

What is the genus of the Siberian rhinoceros?

[1 mark]

Tick (✓) one box.

Elasmotherium☐*Elasmotherium sibiricum*☐*sibiricum*☐

The 'three-domain system' of classification places all living organisms in one of three domains.

0 6 . 2

Which domain was the Siberian rhinoceros in?

[1 mark]

Tick (✓) **one** box.

Archaea

☐

Eukaryota

☐

Prokaryota

☐

0 6 . 3

Who developed the 'three-domain system' of classification?

[1 mark]

Tick (✓) **one** box.

Carl Woese

☐

Charles Darwin

☐

Gregor Mendel

☐

0 6 . 4

The horn of the Siberian rhinoceros is estimated to have been 150 cm long.

Suggest **one** advantage of this adaptation to the Siberian rhinoceros.

[1 mark]

0 6 . 5 The only parts of the Siberian rhinoceros that have been found are fossilised bones.

Give **one** reason why **only** the bones of the body of the Siberian rhinoceros became fossils.

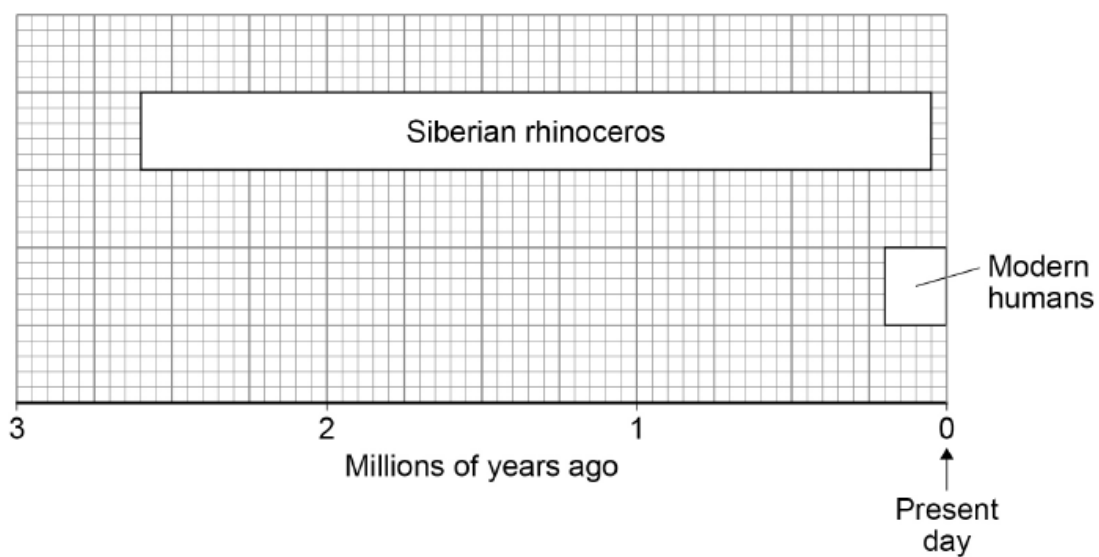
[1 mark]

0 6 . 6 Suggest how scientists can estimate when the Siberian rhinoceros was alive.

[1 mark]

Figure 9 shows when the Siberian rhinoceros existed and when modern humans existed.

Figure 9



06.7 How many million years ago did the Siberian rhinoceros become extinct?

[1 mark]

_____ million years ago

06.8 Determine the time in years when both the Siberian rhinoceros and modern humans existed together.

Use **Figure 9** and your answer to Question 06.7.

[3 marks]

Time = _____ years

06.9 Suggest **two** factors that may have caused the extinction of the Siberian rhinoceros.

[2 marks]

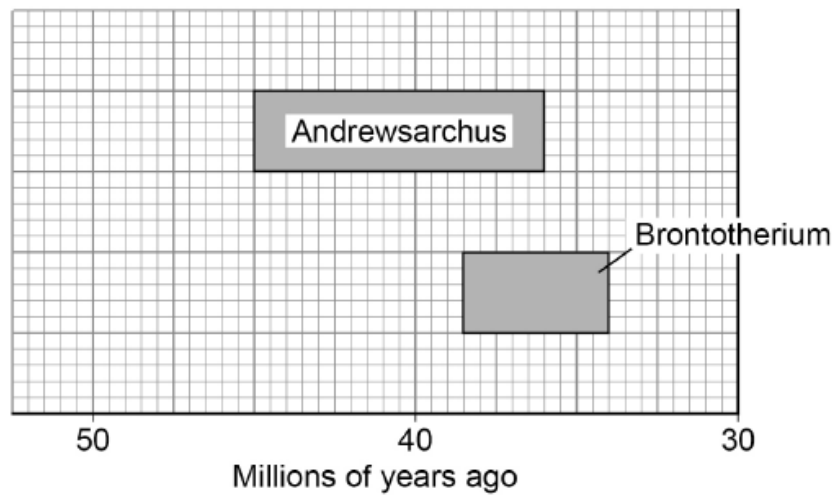
1 _____

2 _____

2. June/2020/Paper_2H/No.8

Figure 8 shows when two mammals existed in Asia.

Figure 8



0 8 . 1

Determine the number of years both Andrewsarchus and Brontotherium existed together.

[2 marks]

Time = _____ years

0 8 . 2 The oldest fossils of human ancestors found in this area are 700 000 years old.

Andrewsarchus was a carnivore and Brontotherium was a herbivore.

Suggest how the extinction of Andrewsarchus could have resulted in the extinction of Brontotherium.

[3 marks]

0 8 . 3 Information about extinct animals is often not clear because the fossil record is incomplete.

Give **three** reasons why the fossil record is **not** clear for older species.

[3 marks]

1

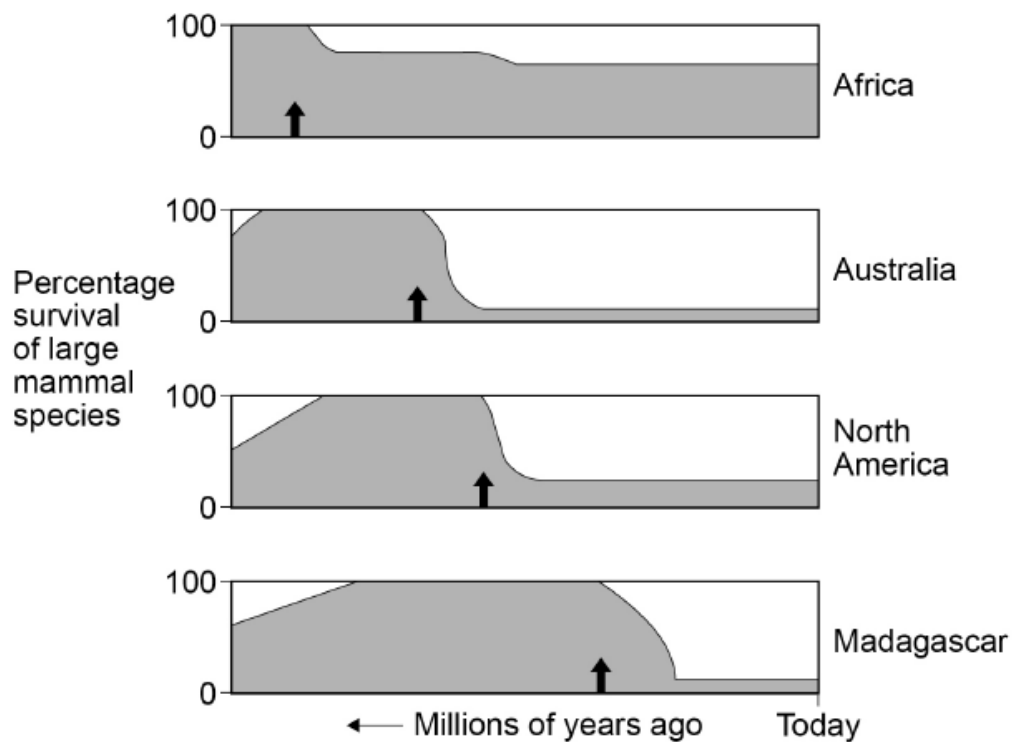
2

3

Figure 9 shows the percentage (%) survival of large mammal species in four areas of the world.

The time at which humans first appeared in each of the four areas is also shown.

Figure 9



Key

↑ Humans first appeared in area

Percentage survival of large mammal species

A mass extinction is a rapid decrease in biodiversity on Earth.

0	8	.	4
---	---	---	---

A student stated:

'The data in **Figure 9** shows that humans caused mass extinctions.'

Evaluate the student's statement.

[6 marks]

[illegible]

0 8 . 5 Give **one** disadvantage and **one** advantage of mass extinction events.

Answer in terms of evolution.

[2 marks]

Disadvantage _____

Advantage _____

3. June/2019/Paper_2F/No.6

Two of the substances the body excretes are urea and carbon dioxide.

06.1 Complete the sentence.

[1 mark]

Choose the answer from the box.

carbohydrate	lipid	protein	salt
--------------	-------	---------	------

A person makes a lot of urea if the person's diet contains

a lot of _____.

06.2 Why must urea be excreted from the body?

[1 mark]

06.3 A person produces more carbon dioxide during exercise than when resting.

Complete the sentences.

[2 marks]

Choose answers from the box.

breathing	digestion	egestion
osmosis	respiration	

The process that makes carbon dioxide is _____.

During exercise, extra carbon dioxide can be removed from the body by increasing the rate of _____.

0 6 . 4 Excess water must also be removed from the body.

If a person sweats a lot, less water will be excreted in the urine.

A healthy person did the same amount of exercise on each of 3 days.

Table 2 shows information for the 3 days.

Table 2

Day	Air temperature in °C	Volume of water consumed in cm ³	Relative amount of urine produced by the kidneys
1	30	1500	
2	20	1500	
3	15	2000	

Complete **Table 2**.

[2 marks]

Choose answers from the box.

least	medium	most
-------	--------	------

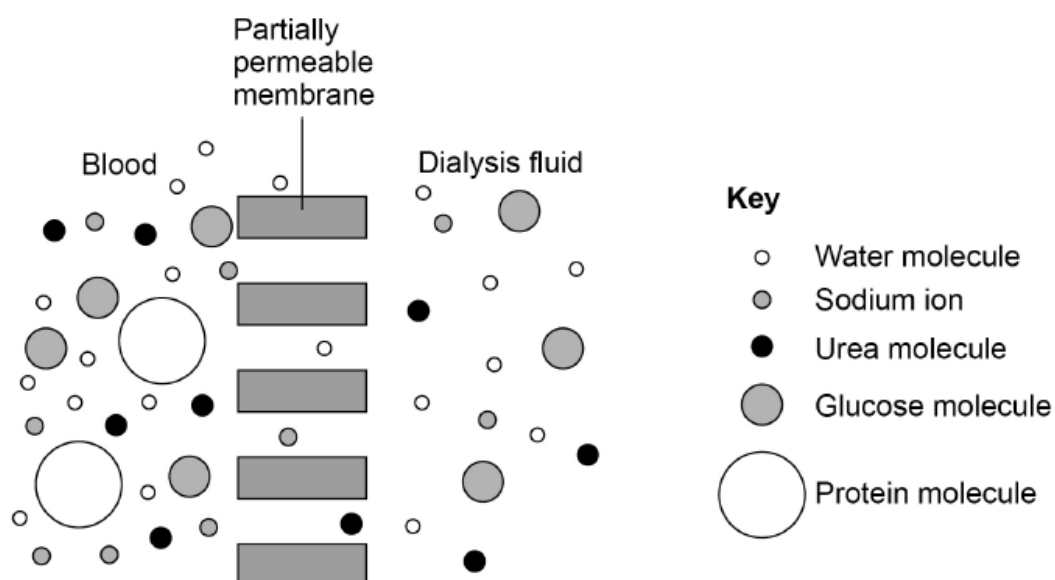
Some people have kidney disease.

Kidney disease may be treated by dialysis or by having a kidney transplant operation.

- During dialysis, a person is connected to a machine that filters the blood.
- Each dialysis session lasts about 6 hours.
- The person has several dialysis sessions each week.

Figure 12 shows how dialysis works.

Figure 12



0 6 . 5 How does urea move out of the blood during dialysis?

[1 mark]

Tick (✓) **one** box.

Diffusion

☐

Digestion

☐

Osmosis

☐

Respiration

☐

0	6	.	6
---	---	---	---

Which substance in **Figure 12** does **not** pass from the blood into the dialysis fluid?

Give the reason for your answer.

[2 marks]

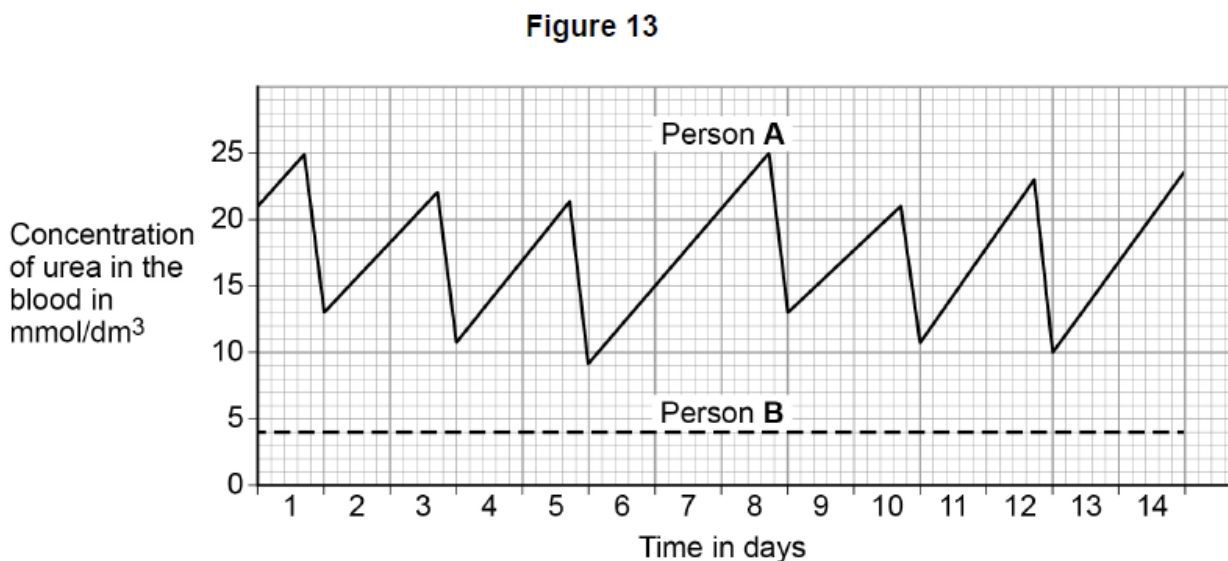
Substance _____

Reason _____

Two people have kidney disease.

- Person **A** is treated by dialysis.
- Person **B** has had a kidney transplant.

Figure 13 shows changes in the urea concentration in the blood of each person over 2 weeks.



0 6 . 7 How many dialysis sessions did person **A** have each week?

[1 mark]

0 6 . 8 What happens to the concentration of urea in the blood between dialysis sessions?

[1 mark]

0 6 . 9 Give **two** reasons why a kidney transplant is a better method for treating kidney disease than dialysis.

[2 marks]

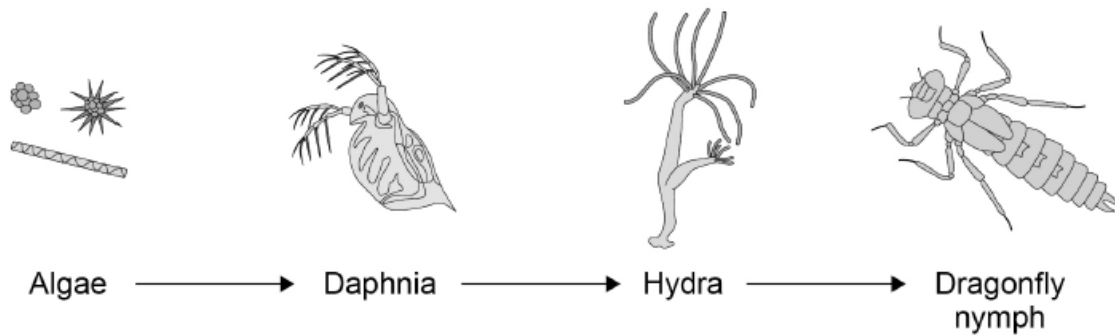
1 _____

2 _____

4. June/2019/Paper_2F/No.7

Figure 14 shows a food chain in a pond.

Figure 14



0	7	.	1
---	---	---	---

 Which term describes the Daphnia in this food chain?

[1 mark]

Tick (✓) **one** box.

Apex predator

☐

Primary consumer

☐

Producer

☐

Secondary consumer

☐

0	7	.	2
---	---	---	---

Draw a pyramid of biomass for the food chain.

Label each trophic level.

[2 marks]

0	7	.	3
---	---	---	---

Give **one** reason why the total biomass of the Daphnia in the pond is different from the total biomass of the algae.

[1 mark]

Students investigated the size of the population of Daphnia in the pond.

This is the method used.

1. Collect 1 dm³ of pond water from near the edge of the pond.
2. Pour the water through a fine net.
3. Count the number of Daphnia caught in the net.
4. Repeat steps 1–3 four more times.

Table 3 shows the results.

Table 3

Sample number	Number of Daphnia in 1 dm ³ water
1	5
2	21
3	0
4	16
5	28

0 7 . 4

Calculate the mean number of Daphnia in 1 m³ of pond water.

$$1 \text{ m}^3 = 1000 \text{ dm}^3$$

[2 marks]

Mean number of Daphnia in 1 m³ of pond water = _____

07.5 The pond was a rectangular shape, measuring:

- length = 2.5 metres
- width = 1.5 metres
- depth = 0.5 metres.

Calculate the estimated number of Daphnia in the pond.

Use your answer from Question 07.4.

Give your answer in standard form.

[4 marks]

Number of Daphnia in the pond = _____

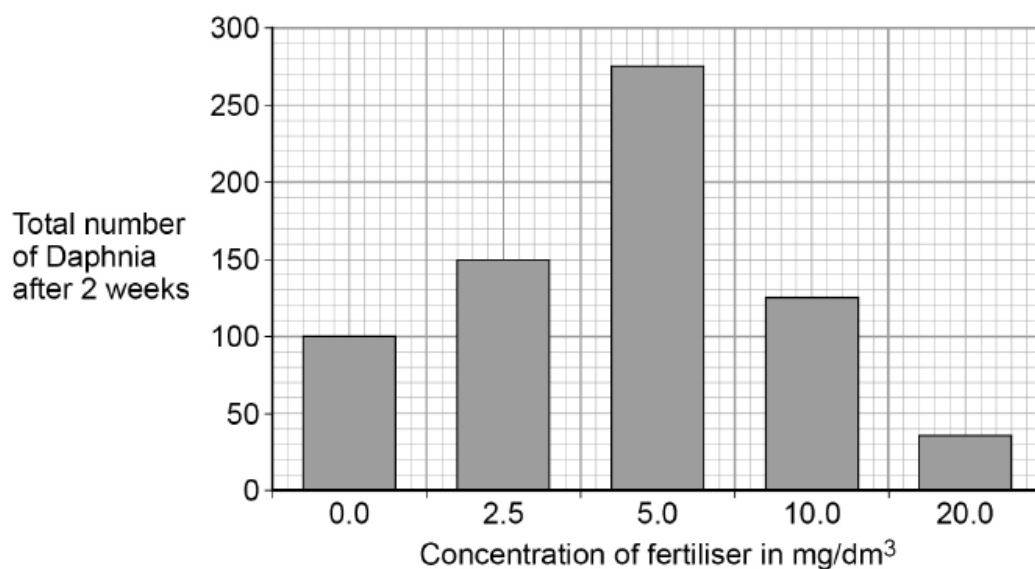
Rainfall can cause fertiliser to be washed from farmland into a pond.

The students investigated the effect of fertiliser on the population of Daphnia in water from the pond.

- The students put 20 Daphnia in each of five different concentrations of fertiliser.
- The students counted the total number of Daphnia in each concentration of fertiliser after 2 weeks.

Figure 15 shows the results.

Figure 15



0 7 . 6

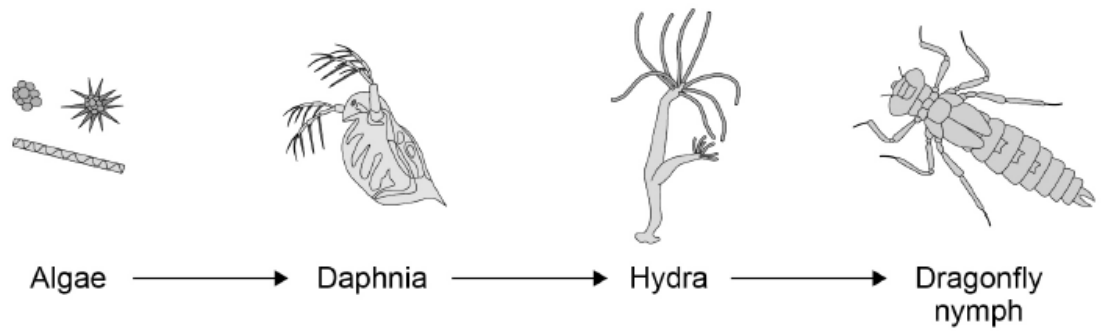
A concentration of 5.0 mg/dm³ of fertiliser caused a large increase in the population of Daphnia.

Explain why.

[2 marks]

0 7 . 7 Figure 14 is repeated below.

Figure 14



The population of **Hydra** will decrease when 20 mg/dm^3 of fertiliser is added to the pond.

Explain why.

[2 marks]

Figure 5 shows how a clear image of a distant object is formed in a person's eye.

A diagram of a human eye in cross-section. Two parallel horizontal lines with arrowheads, representing light rays from a distant object, enter the eye from the left. They pass through the cornea and the lens, which is shown as a biconvex shape. The rays converge and meet at a single point on the back surface of the eye, which is the retina. The text 'Light rays from distant object' is written to the left of the rays.

0	4	.	1
---	---	---	---

[6 marks]

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0	4	.	2
---	---	---	---

Explain why a long-sighted person has difficulty seeing near objects clearly.

[2 marks]

0	4	.	3
---	---	---	---

Long-sightedness can be corrected by wearing spectacles.

Describe how spectacle lenses can correct long-sightedness.

[3 marks]

0	8	.	1
---	---	---	---

[5 marks]

[illegible]

0	8	.	2
---	---	---	---

[3 marks]

Metformin is a drug used for treating people who have Type 2 diabetes.

Scientists investigated the effects of metformin and two other drugs, **A** and **B**.

The scientists wanted to see how the drugs affected the blood glucose concentrations of 220 people with Type 2 diabetes.

This is the method used.

1. Put the 220 people into five groups.
2. Treat each group with a different drug or combination of drugs for several weeks.
3. Give each person a meal high in carbohydrate.
4. Measure the blood glucose concentration of each person 30 minutes after the meal and again 3 hours after the meal.

0 8 . 3

Suggest **three** variables that the scientists should have controlled in the investigation.

[3 marks]

1 _____

2 _____

3 _____

The scientists recorded their results as a mean value for each group.

The scientists calculated the 'standard deviation' for each group's result.

Standard deviation is a measure of the spread of the individual results above or below (\pm) the mean value.

The scientists gave each group's result as:

mean \pm standard deviation

The larger the standard deviation, the greater is the spread of results around the mean.

0 8 . 4 Which of the results is the most precise?

[1 mark]

Tick (\checkmark) **one** box.

Mean = 171.6 ± 16.3

☐

Mean = 177.2 ± 15.4

☐

Mean = 182.5 ± 18.2

☐

Mean = 205.2 ± 19.4

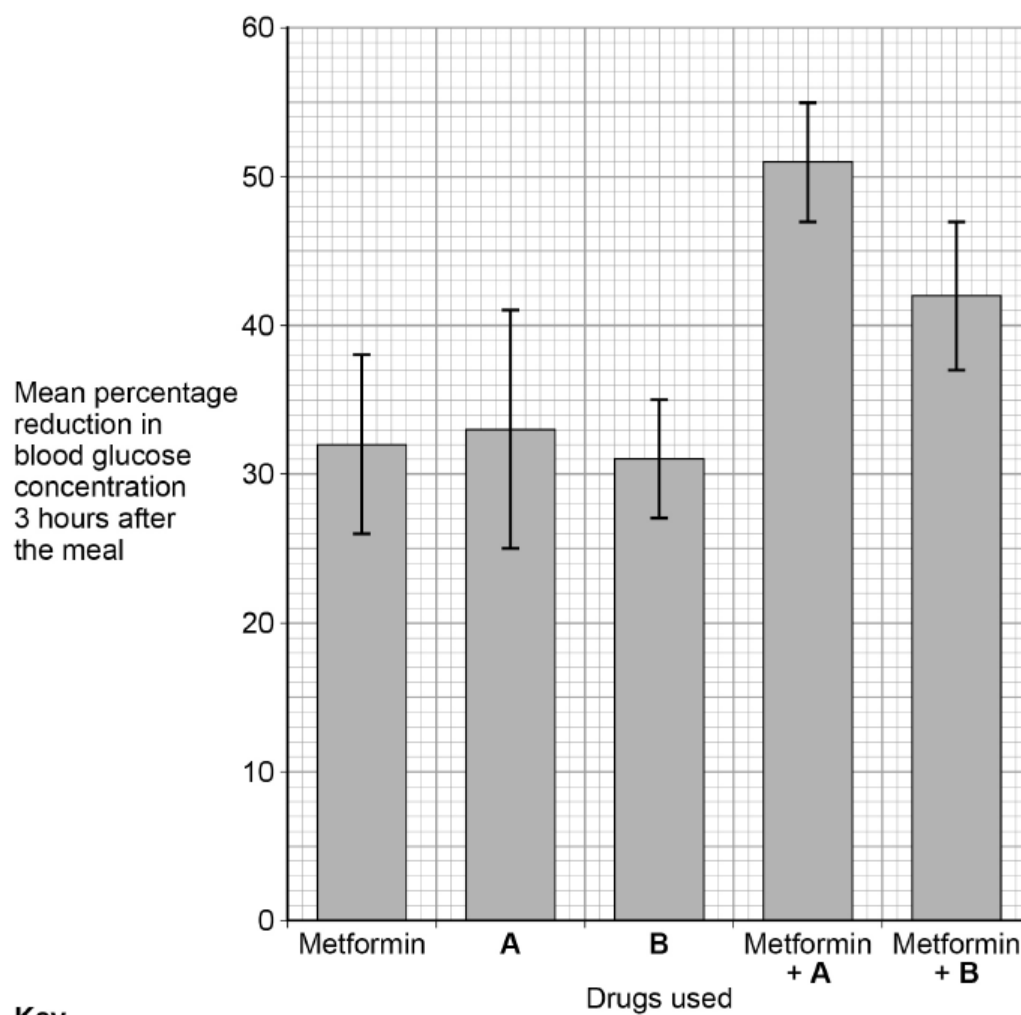
☐

Table 3 and Figure 9 show the scientists' results.

Table 3

Drugs used	Metformin	A	B	Metformin + A	Metformin + B
Number of people	60	40	25	65	30
Mean blood glucose concentration 30 minutes after the meal in $\text{mg}/100 \text{ cm}^3$ \pm standard deviation	177.2 \pm 15.4	182.5 \pm 18.2	171.6 \pm 16.3	205.2 \pm 19.4	206.5 \pm 19.6

Figure 9



Key

\pm standard deviation

- An overlap of standard deviations shows the difference between the means is **not** significant.
- **No** overlap of standard deviations shows a significant difference between the means.

The student stated:

'Metformin works better when used with other drugs.'

Evaluate the student's statement.

[6 marks]

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