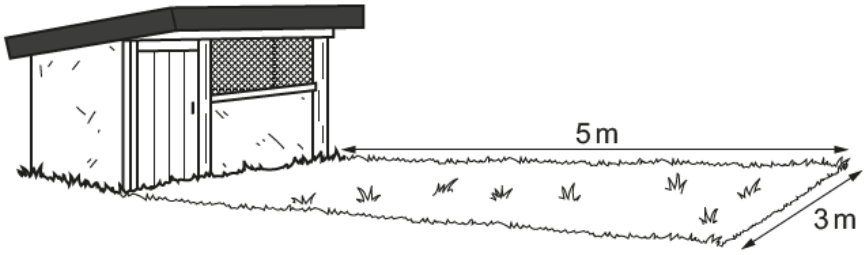
Practical Skills – 2022 GCSE Gateway Biology Combined Science A

1. May/2022/Paper_J250/08/No.11

Two students investigate the population of daisies in a lawn. The diagram shows the lawn in front of a shed.



(a) (i) Complete these sentences about the method the students use to find the population of daisies.

Use the words in the list.

pooter	**quadrat**	**random**	**square**

The lawn is sampled using a square frame called a ..... .

Drop the square frame over one shoulder to provide a ..... sample.

Count and record the number of daisy plants present in the square grid.

Repeat this process in 10 different areas of the lawn.

[2]

(ii) **Table 11.1** shows their results.

Table 11.1

Square frame	1	2	3	4	5	6	7	8	9	10	**Total**
Number of daisies counted	14	3	8	10	16	15	11	10	11	12	110

Estimate the population of daisies in the lawn.

- The students used a 0.5 m × 0.5 m frame to sample the lawn.
- The lawn size is 5 m × 3 m.

Estimate of population of daisies in the lawn = ... **[3]**

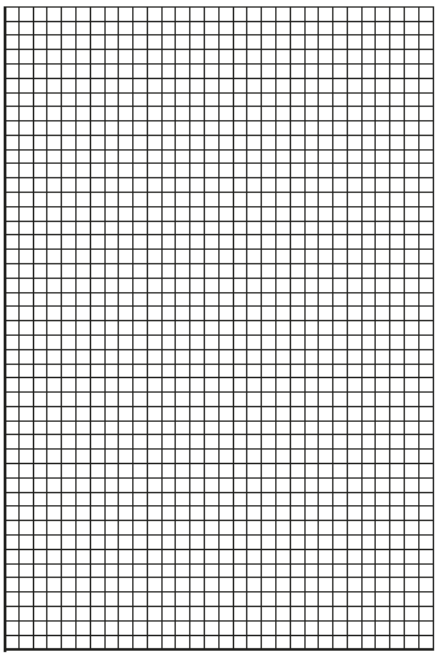
(b) The students develop their investigation to show how the shed affects where daisies grow in the lawn.

Table 11.2 shows the results.

Table 11.2

Distance from shed (m)	Number of daisies
1.0	0
1.5	2
2.0	4
2.5	6
3.0	8
3.5	10
4.0	12
4.5	14
5.0	16

(i) Plot a line graph of the results from **Table 11.2**. Draw a straight line of best fit.



[4]

(ii) Use the graph to determine the slope of the line.

Slope = ... **[1]**

(iii) Daisy plants require lots of light.

Explain the effect of the shed on the growth of daisies in the lawn.

.....

.....

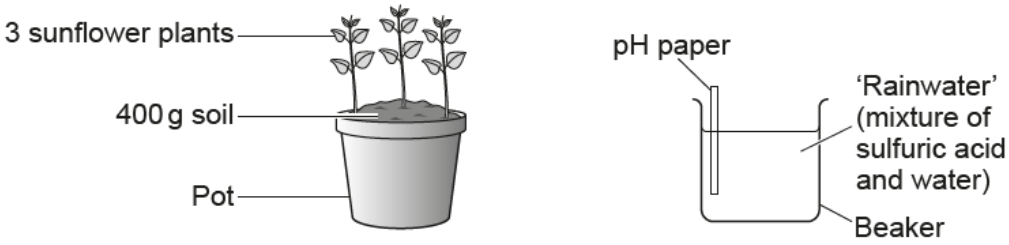
.....

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

2. May/2022/Paper_J250/08/No.13

(a) A science club set up an experiment looking at the effect of acid rain on the growth of sunflower plants.

The diagram shows the apparatus they use.



This is the method they then used.

- Prepare 5 plant pots with 5 beakers of the 'rainwater' with varying pH values as shown in the table.

Pot with 3 sunflower plants	Beaker of 'rainwater'	pH Value
A	**A**	6.0
B	**B**	5.0
C	**C**	4.0
D	**D**	3.0
E	**E**	2.0

- Water each pot twice a day from its corresponding beaker with similar amounts of 'rainwater'.
- Leave the pots in the same place with the same growing conditions for 14 days.
- Measure the height of each sunflower every other day. Record the mean height of the 3 sunflowers in each pot.

(i) What is the **independent** variable in this investigation?

Put a tick (✓) in the correct box.

Amount of light sunflowers receive	
Height of sunflowers	
Number of sunflowers	
pH of acid rainwater	
Volume of rainwater added to sunflowers	

[1]

(ii) Write down **two** changes that would improve the **accuracy** of these acid rainwater measurements.

1 .....

.....

2 .....

.....

[2]

(iii) Acid rain forms due to the emission of sulfur dioxide and nitrogen oxides when fossil fuels are burnt. These gases react with water, oxygen and other chemicals in the atmosphere.

The science club used sulfuric acid to represent acid rain.

Suggest why this is **not** a true representation of acid rain.

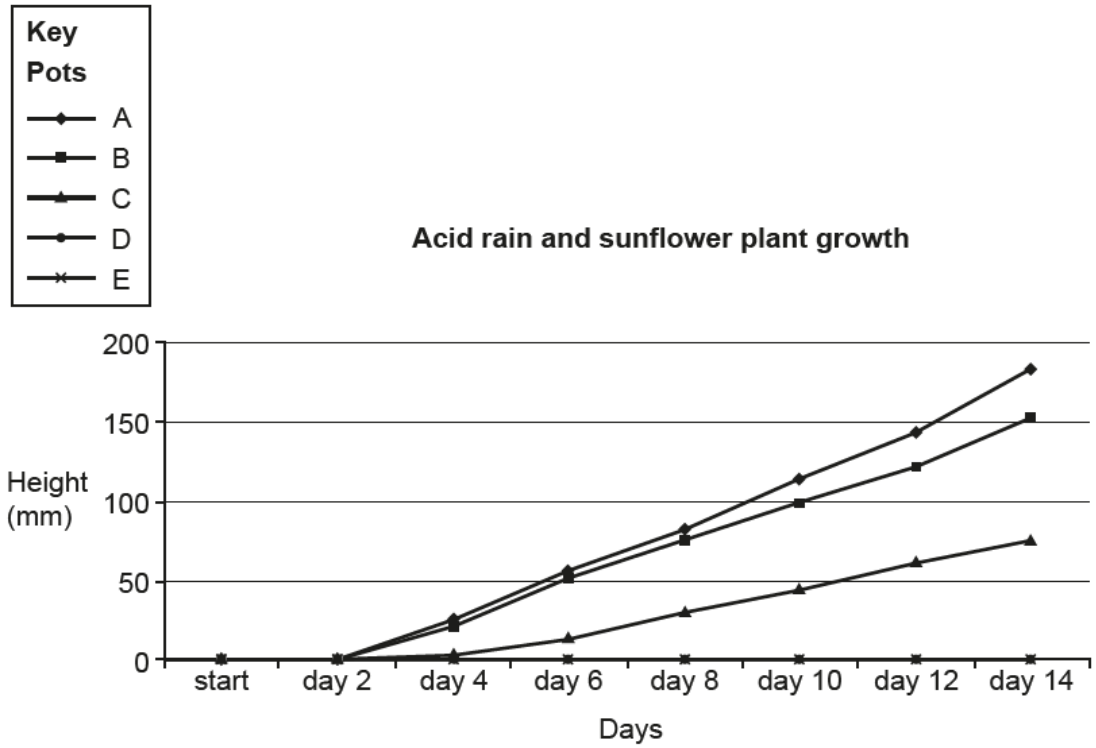
..... **[1]**

(iv) Suggest how the investigation could be developed to better represent acid rain.

.....

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

(b) This is a graph of the results, produced using computer software.



(i) Estimate the range of acidity that by day 14 causes the sunflower plants to be reduced in height by about 50% compared to the sunflower plants in pot **A**.

Put a tick (✓) in the correct box.

pH 2.0–3.6 ☐

pH 3.0–3.6 ☐

pH 4.0–4.6 ☐

pH 5.0–5.6 ☐

[1]

(ii) Describe the impact of acid rain on biomass production.

.....

.....

.....

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

3. May/2022/Paper_J250/02/No.16

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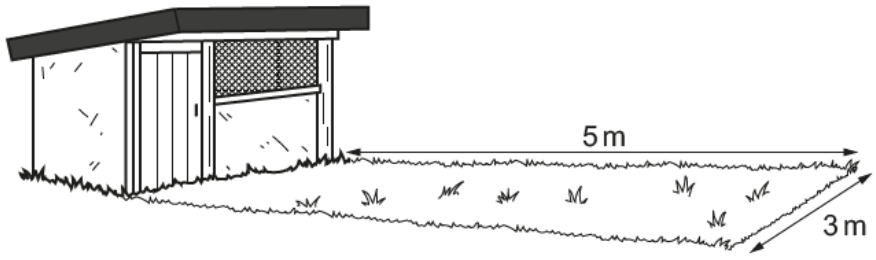

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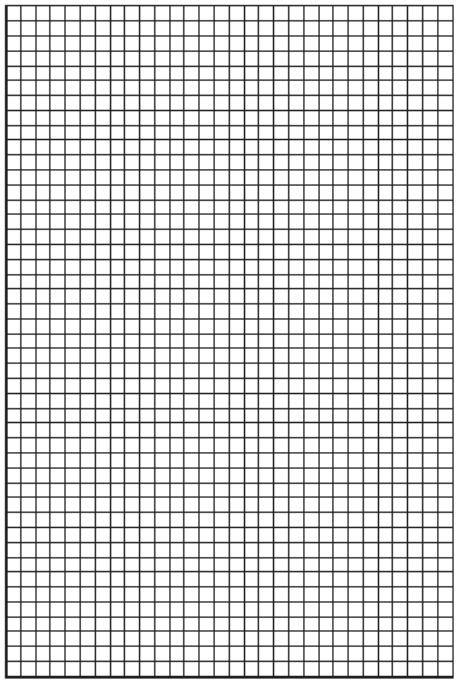

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