

Adaptation, Interdependence and Competition

Total mark - 13

Q1.

The growth of daisy plants on a lawn is affected by biotic factors and by abiotic factors.

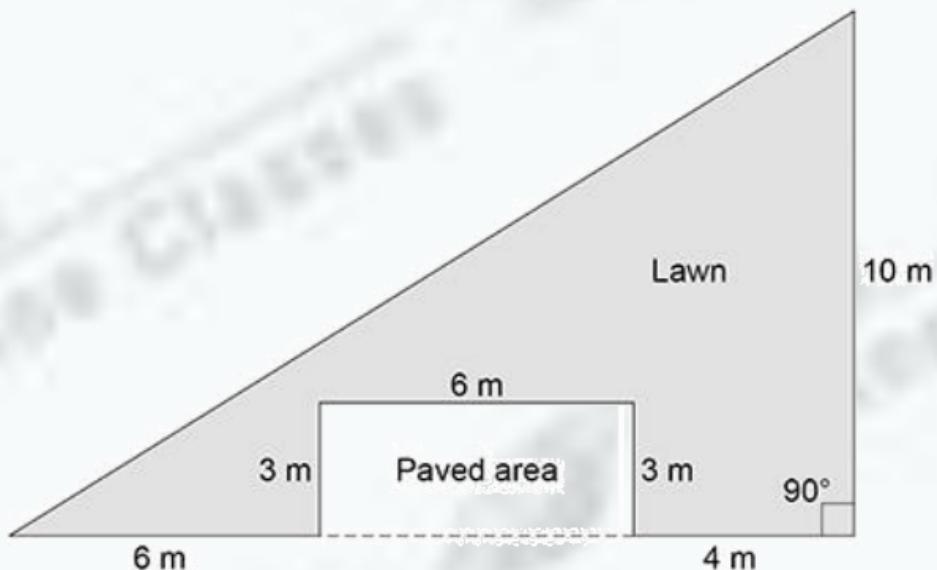
(a) The table below shows six factors.

Tick (\checkmark) **one** box in each row to show whether the factor is biotic or abiotic.

Factor	Biotic	Abiotic
Nitrates in the soil		
Rabbits eating the plants		
Shading by a building		
Soil pH		
Temperature		
Trampling by people		

(3)

The figure below shows a plan of a garden.



A student estimates the number of daisy plants growing on the lawn.

The student places a quadrat at 10 different positions on the lawn.

The quadrat measures $50\text{ cm} \times 50\text{ cm}$.

The student counts the number of daisy plants in each quadrat.

(b) How should the student decide where to place the quadrat?

Give the reason for your answer.

(2)

(c) The mean number of daisy plants in each quadrat is 6.

Calculate the number of daisy plants on the lawn.

Give your answer to 3 significant figures.

Number of daisy plants on the lawn = _____

(6)

(d) Using the mean from this investigation to calculate the number of daisy plants on the lawn may **not** be accurate.

Give **two** reasons why.

1 _____

2 _____

(2)

Mark Scheme

Q1.

(a)

Factor	Biotic	Abiotic
Nitrates in the soil		✓
Rabbits eating the plants	✓	
Shading by a building		✓
Soil pH		✓
Temperature		✓
Trampling by people	✓	

all 6 correct = **3** marks

4 or 5 correct = **2** marks

2 or 3 correct = **1** mark

0 or 1 correct = **0** marks

(b) (grid and) coordinates

1

to achieve randomness

ignore throwing quadrat

allow random coordinates for 2 marks

if no other mark awarded allow random walk or description of random walk for 1 mark

1

(c) (*mean per m² =*

24 or 6×4

1

(calculation of area of lawn =) $(\frac{1}{2} \times 16 \times 10) - (6 \times 3)$

or $80 - 18$

1

(area of lawn =) 62 m²

allow correct calculation using total area

(of triangle) – area of rectangle

(total number of daisies =)

24×62

allow correct calculation using an

*incorrectly calculated area of the lawn
and / or mean*

1

1488

allow answer based on incorrect area

1

(answer to 3 sig figs =) 1490

*allow student's calculated answer
rounded to 3 sig figs*

1

(d) too few quadrats **or** quadrat too small

allow sample size too small

1

sample may not be representative of the lawn

*allow quadrats may not have been
placed randomly*

1