

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.

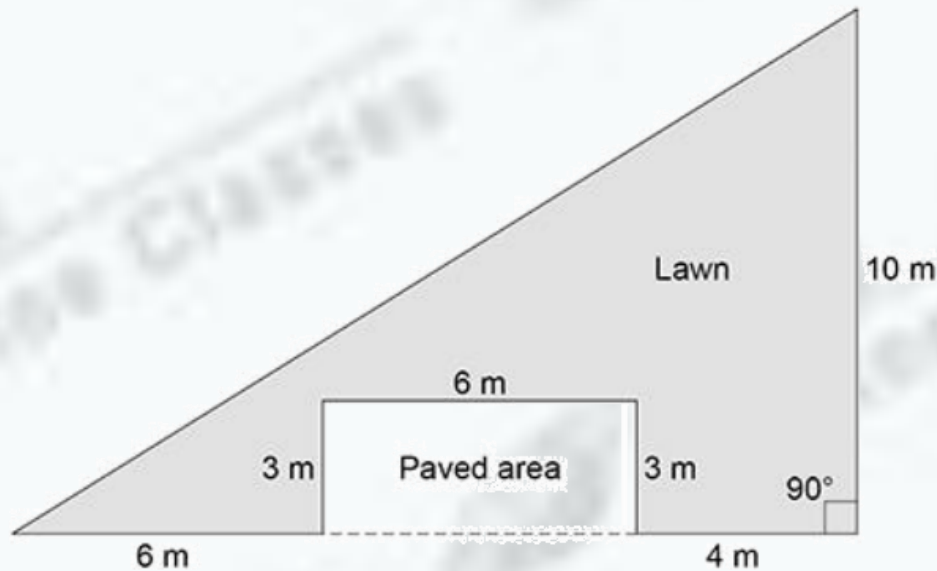
- (a) The table below shows six factors.

Tick (✓) **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 m^2 =)
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 =) $62 m^2$

*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