Question 24 (7 marks)

A researcher conducted a field experiment to determine the effects of planting density on the yield of cauliflowers.

Three planting densities were used:

Treatment A – 20 cm spacing between plants

Treatment B – 50 cm spacing between plants

Treatment C – 80 cm spacing between plants

The researcher prepared 36 trial plots of equal size. Mean yields (grams/cauliflower) for each of the treatments and the position of each plot are shown. The soil texture trend and gradient of the field are also shown.

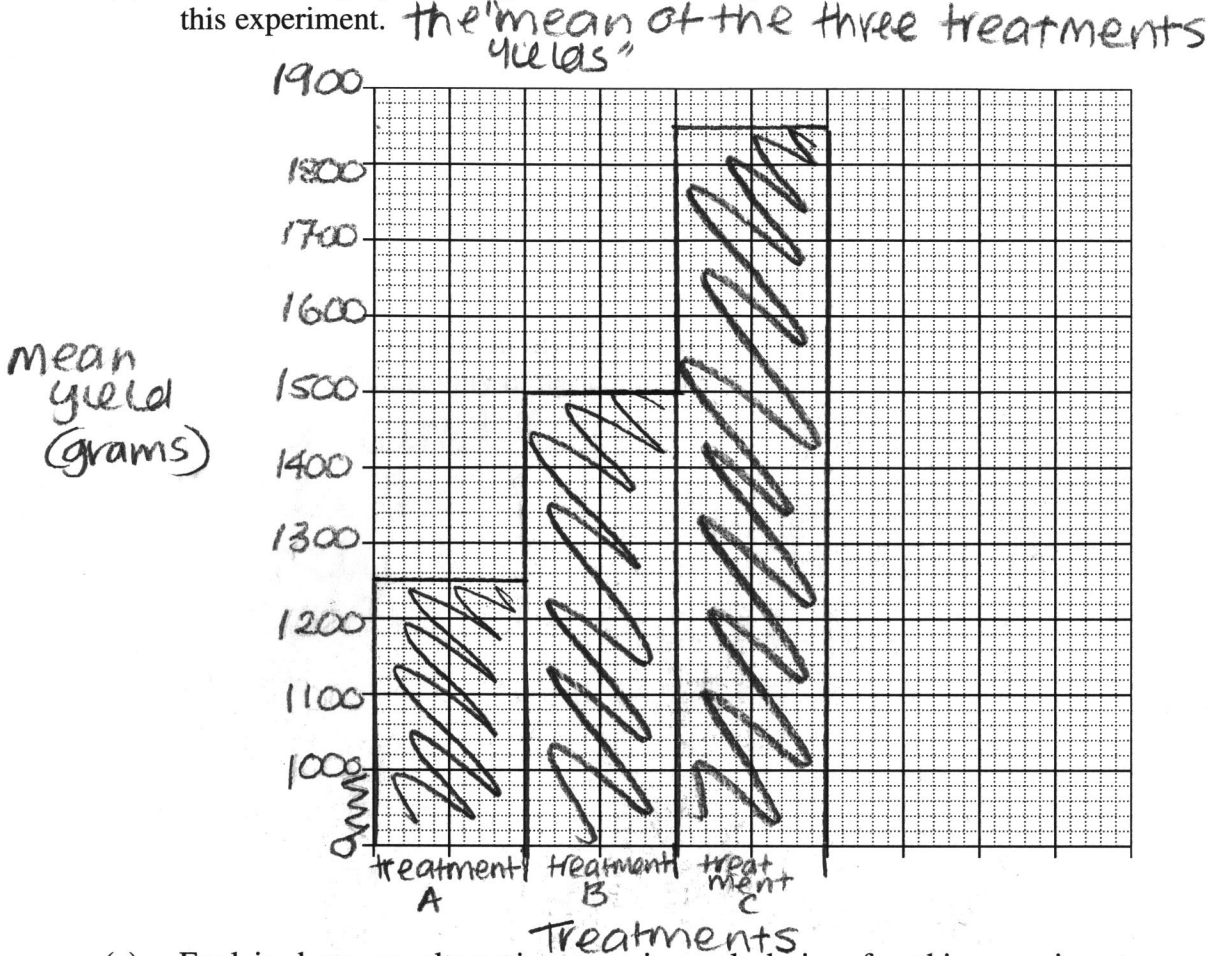| Gradient								Soil texture	
	A	A	A	A	A	A			Mean yield treatment A
Top of slope								Sandy loam	$\bar{x}$ = 1250 g
↓	A	A	A	A	A	A			
	B	B	B	B	B	B			Mean yield treatment B
Mid–slope								Clay loam	$\bar{x}$ = 1500 g
↓	B	B	B	B	B	B		↓	
	C	C	C	C	C	C			Mean yield treatment C
Bottom of slope								Clay	$\bar{x}$ = 1850 g
↓	C	C	C	C	C	C			

(a) Which treatment in this experiment is most likely to produce the greatest number of cauliflowers? **1**

Treatment A as the smaller space between plants would allow a larger total to be planted.

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Question 24 (continued)

(b) Construct a graph that represents the mean yields of the THREE treatments in this experiment. **3**

the "mean of the three treatments yields"

mean yield (grams)

1900
1800
1700
1600
1500
1400
1300
1200
1100
1000

treatment A   Treatment B   treatment C

Treatments

(c) Explain how an alternative experimental design for this experiment may improve the validity of the results. **3**

By randomising the position of the treatment plots the validity of the results would be greatly improved. The slope also would have an impact as nutrients from the top would get washed down to the bottom in rainfall events therefore a standardised test with all plots being on a flat surface, along with the random allocation would also im- **End of Question 24** prove the validity of the results.

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