Question 24 (7 marks)

A researcher conducted a field experiment to determine the effects of planting density on the yield of cauliflowers.
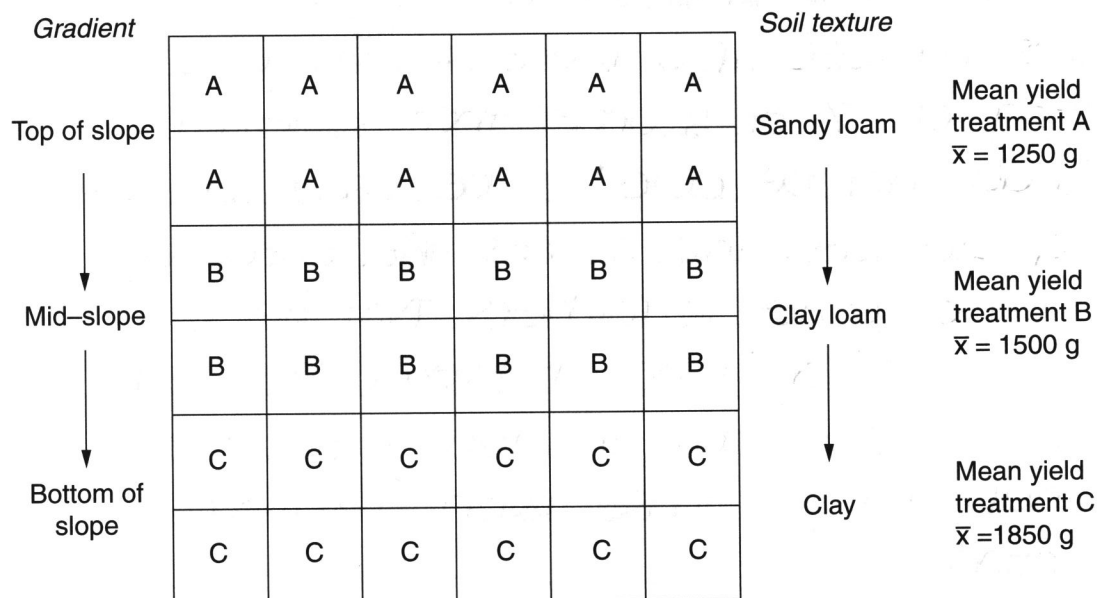
Three planting densities were used:

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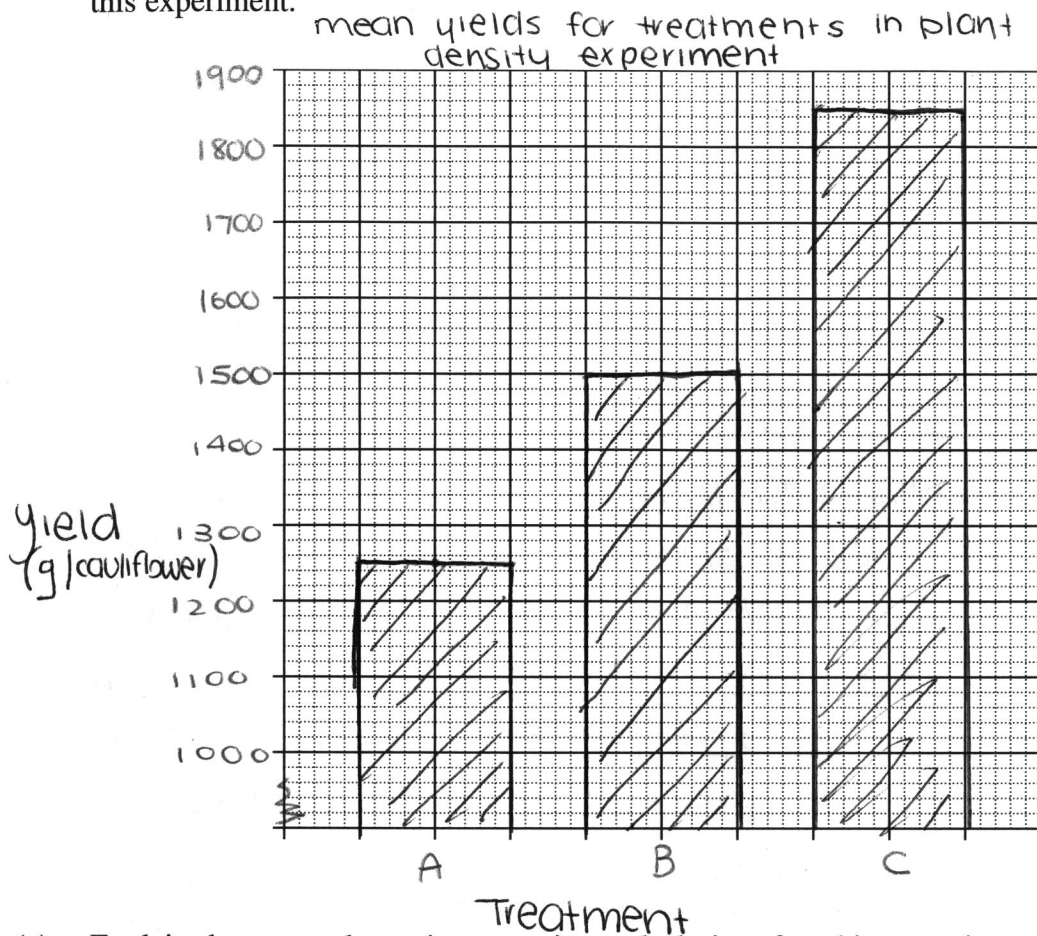
Gradient							Soil texture	
	A	A	A	A	A	A		Mean yield treatment A
Top of slope							Sandy loam	$\bar{x}$ = 1250 g
↓	A	A	A	A	A	A		
	B	B	B	B	B	B	↓	Mean yield treatment B
Mid–slope							Clay loam	$\bar{x}$ = 1500 g
↓	B	B	B	B	B	B		
	C	C	C	C	C	C	↓	Mean yield treatment C
Bottom of slope							Clay	$\bar{x}$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

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Question 24 (continued)

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

mean yields for treatments in plant density experiment

Yield (g/cauliflower) — vertical axis: 1000, 1100, 1200, 1300, 1400, 1500, 1600, 1700, 1800, 1900

Treatment — horizontal axis: A, B, C

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

A Randomised design so that the different treatments were in each of the different soil conditions may improve the validity of the results.

End of Question 24