5 A group of students conducted a fieldwork study on the beach shown in Figure 5a. They want to investigate how the sorting process of waves affects the particle size of beach sediment. Table 5b shows the data the students obtained in the field.
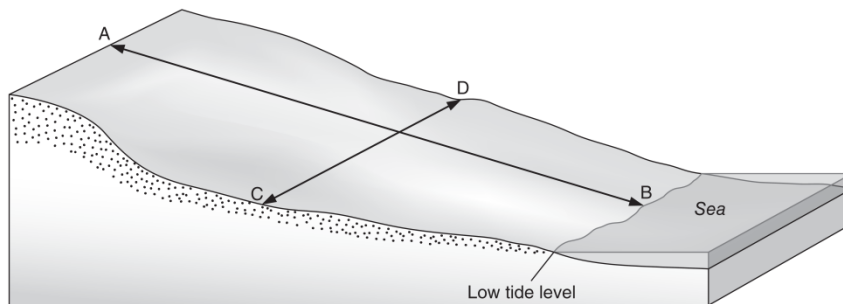

Figure 5a

Table 5b

Sample point	Distance from the sea (m)	Particle size of beach sediment (mm)					Average size of particles (mm)
		1	2	3	4	5	
1	1	1	1	2	1	1	1.2
2	2	3	2	5	3	2	3.0
3	3	3	5	2	4	4	3.6
4	4	5	7	6	4	7	5.8
5	5	7	9	7	5	8	7.2
6	6	8	10	7	7	9	8.2
7	7	9	10	8	8	9	8.8
8	8	10	13	10	10	11	10.8
9	9	12	14	9	10	12	11.4
10	10	15	12	14	13	14	13.6

a   Refer to Figure 5a on p. 141. If the students were to collect beach sediment for sampling purposes, which transect line, A–B or C–D, should they choose? Explain your answer.   (3 marks)

b   Refer to Table 5b (p. 141).

   i   Identify the sampling method used to choose the sample points.   (1 mark)

   ii   Explain the choice of this sampling method.   (2 marks)

c   Refer to Table 5b again.

   i   Draw a scatter diagram and a best fit line to show the relationship between the two variables. *(Note: Use the average values of the variables to plot the graph whenever available.)*   (3 marks)

Tilte: _____

_____
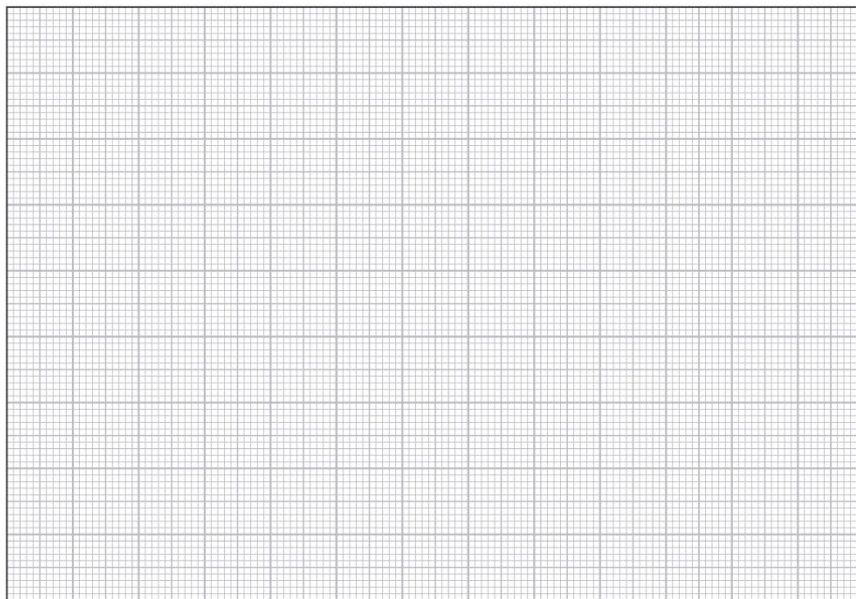
   ii   Describe the relationship shown by the diagram in Question ci.   (3 marks)

d   Suggest and explain how the students can improve the accuracy of the study.   (6 marks)

Answers

Practice question 5 (pp. 141–2)

5	a	•	transect line A–B	1 (1)
		•	perpendicular to the sea/shoreline	1
		•	waves run up the beach and drop their loads when they lose energy	1
		•	this results in a sorting process	1
		•	particle size would change with distance up the beach	1 (2)
	b	i	Systematic sampling	1 (1)
		ii •	easy to manage/straightforward	1
		•	reduces bias on the selection of sample points	1
		•	good coverage of the study area/ represents all distances up the beach	1 (2)

c i

Tilte: <u>**A scatter diagram showing the average size of particles**</u>

<u>**on the beach against the distance from the sea**</u>
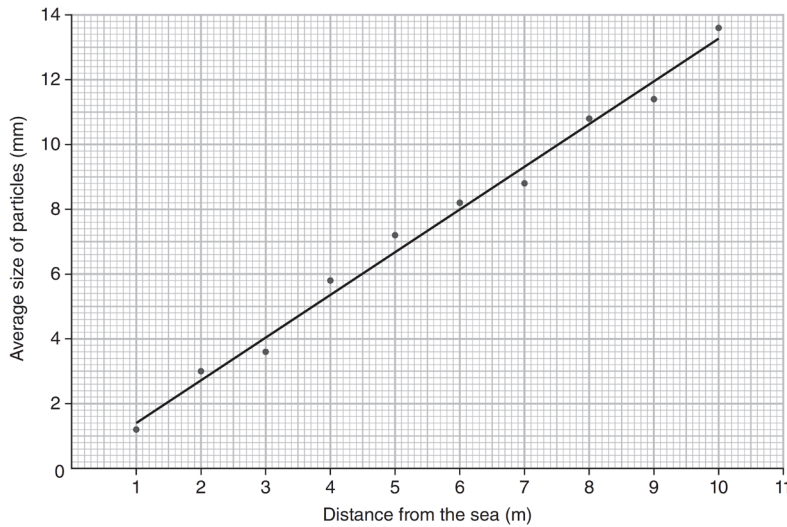
- accuracy   1
- correct labelling and axes (x-axis: distance from the sea; y-axis: particle size)   1
- correct best fit line   1 (3)

ii
- positive relationship   1
- particle size of beach sediment on the beach increases with increasing distance from the sea   1
- upward sloping best fit line   1
- points cluster closely along the best fit line   1
- show strong/clear correlation   1 (3)

d

Suggestion	Explanation
Increase the number of sample points, or take samples along several transects	• To avoid human errors in taking readings
Increase the number of particle collected at each sample point	• To obtain the mean value/avoid occasional extreme values and get a more representative result
Use random sampling method, such as placing a quadrat at the sample points to collect particles	To avoid bias in data collection
Use the same model of instrument/calliper	To avoid any possible discrepancy caused by different models of instrument
Measure the gradient of the beach	To further investigate if these factors affect the sorting process on the beach
Collect secondary data about the beach, such as the direction and strength of prevailing winds and tidal range	
Do not conduct fieldwork after beach nourishment/on an artificial beach	The particle size on the artificial beach is not controlled by natural sorting process
Do not conduct fieldwork after a storm	The sorting process is disrupted by the strong waves during the storm
Do not conduct fieldwork near coastal management structures, e.g. sea wall and groyne	These structures alter the energy and direction of the waves. Such locations cannot reflect the result of natural sorting process

(Arguments should be well-elaborated, with appropriate geographical concepts and terms.)   (Max. 6)