**12.** A common plant found in chalk grassland communities is bird’s foot trefoil. A group of students used a point quadrat to determine the percentage cover of bird’s foot trefoil in an area of chalk grassland. They placed the point quadrat at one position on the grassland and lowered the metal pins, as shown in the figure below. They recorded the first hit on each species made with each pin. This was repeated at nine other randomly selected locations within the area of grassland. Their results are shown in the following table.



|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  quadrat number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| number of hits on bird’s foot trefoil | 3 | 8 | 7 | 8 | 9 | 3 | 2 | 1 | 2 | 1 |
| number of hits on other species | 16 | 21 | 20 | 13 | 16 | 21 | 24 | 16 | 20 | 28 |

 An estimate of percentage cover for a species can be made by calculating the number of hits as a percentage of the total hits.

(a) Using the results in the table above, calculate the percentage cover for bird’s foot trefoil. Show your working and express your answer to the nearest 0.1%.

Answer = ........................................% [2]

(b) A footpath runs through the area of grassland and one student observed that very few bird’s foot trefoil plants were found on the trampled areas.

 Explain how the students could use a transect to determine whether there is a link between trampling and the abundance of bird’s foot trefoil on this footpath.

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.........................................................................................................................[5] [Total 7 marks]

**21.** The figure below illustrates the profile of a sand dune system, together with kite diagrams of some plant species. This summarises the results of a belt transect carried out over the dunes.



 The results of the transect were initially recorded using the ACFOR scale:

**A** – abundant

**C** – common

**F** – frequent

**O** – occasional

**R** – rare

(a) Outline the advantages and disadvantages of using a scale, such as the ACFOR scale.

advantages .....................................................................................................

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disadvantages .................................................................................................

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......................................................................................................................... [3]

 (b) Explain

(i) how such a transect would have been carried out;

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(ii) how the ACFOR readings would have been converted to kite diagrams. You may use the space below for any diagrams to help your answer.

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(c) The distribution of plant species in sand dunes will be influenced by a number of abiotic factors, such as temperature.

 Explain how to measure, in different parts of the sand dune system, variations in temperature of the sand or soil.

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(d) Sand dune systems are a result of the process of succession. The semi-fixed dunes represent an intermediate sere between yellow and fixed dunes.

 Explain

(i) what is meant by a *sere*;

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(ii) the process of succession in a system of sand dunes, or in an area you have studied.

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................................................................................................................[4] [Total 17 marks]

**12.** (a) 44 / 239 (× 100)
18.4%;;

*award two marks if correct answer (18.4) is given
incorrect answer (or no answer) but correct working = 1 mark*

 *ecf applied for minor addition errors +/- 2* 2

 (b) 1 lay, tape / string, across path; **R** along the path
2 include trampled and non trampled areas in same transect;
3 use of quadrat;
4 ref to how quadrat is placed; **R** random
5 count number of plants / percentage cover of plants;
6 plot a graph;
7 repeat the transect;
8 carry out statistical test (Mann-Whitney / Spearman’s rank);
9 AVP; e.g. detail of sampling technique 5 max [7]

**21.** (a) *advantages (max 2)*

can be used with any species (irrespective of size);

does not require to distinguish one individual from another;

quick to assess; **R** simple

*disadvantages*

subjective / AW;

dominant species may be over-estimated; max 3

(b) (i) line established, from shore to dune slack / from… to…;

quadrat used;

 suitable size / actual size stated (minimum 0.25m2); **R** if no units given

placed continuously / at specified intervals along line;

key to identify species;

abundance recorded in each quadrat;

bare ground recorded; max 4

(ii) **1** ACFOR scale converted to numerical scale;

**2** reading at each site recorded (on graph paper);

**3** width of diagram related to ACFOR (maybe shown on diagram);

**4** points from each site joined together;

**5** repeated for each species found present; max 3

 (c) use of, thermometer / probe;

probe must be calibrated;

pushed into, sand / soil, to same depth each time;

repetitions at each sampling point; max 2

(d) (i) a stage during the process of succession; 1

(ii) sea couch / marram grass, grow in bare sand;

dune builds up / stabilised by grasses;

OR

colonisers established on bare, rock / soil;

example; (if not sand dunes)

ref to pioneer species;

organic matter builds up / humus content increases;

forming soil / depth of soil increases;

 other species take over from grasses; **A** named example from Fig. 1

roots stabilise soil structure;

diversity of species increases;

climax eventually reached;

AVP; e.g. reference to deflected succession, growth of shrubs max 4 [17]