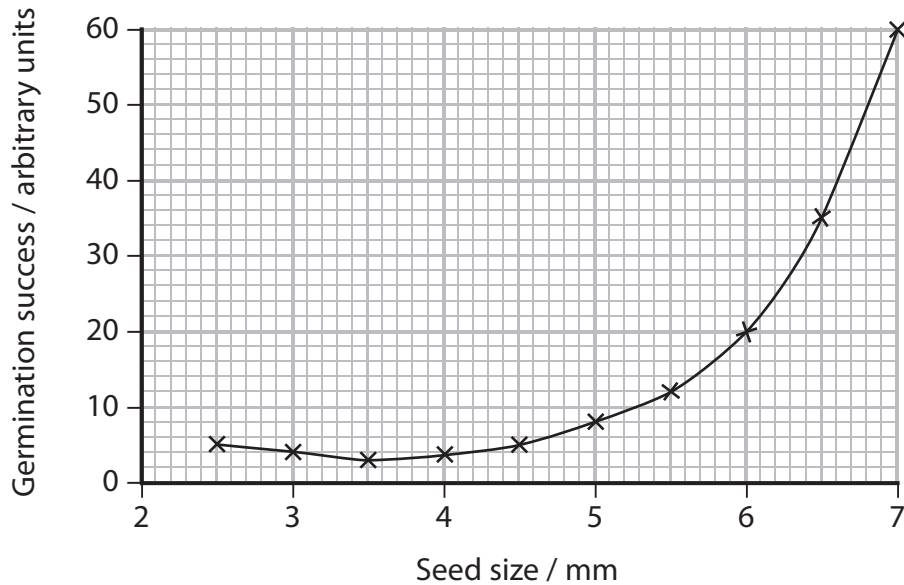


1 Seedbanks help in the long-term conservation of rare plant species by conserving the seeds of these species.

(a) Seedbanks carry out a variety of tests to select the best individual seeds to conserve. The germination success of the seeds is one of the tests that is carried out.

The graph below shows the effect of seed size on germination success for one species of plant.



(i) Using the information in the graph, suggest which seed size would be considered the best for the seedbank to conserve, giving a reason for your answer.

(1)

.....

.....

.....

(ii) Using the information in the graph, calculate the percentage change in germination success when seed size increases from 3 mm to 6 mm. Show your working.

(3)

(iii) Seed size may be determined by the genotype of the seeds.  
Suggest advantages of selecting seeds of different sizes for long-term storage.

(3)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(b) The best seeds will be selected for the seedbank.  
Describe what the seedbank will do with these seeds to ensure the long-term conservation of the species.

(4)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

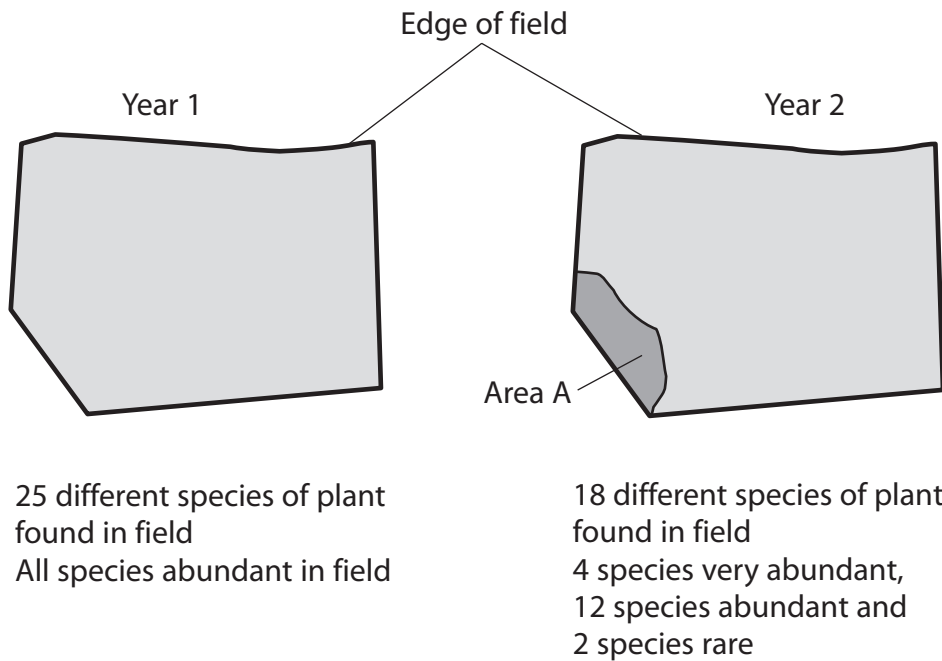
.....

.....

---

**(Total for Question 1 = 11 marks)**

- 2 A student studied one field in two different years.  
She recorded some information, shown in the diagram below.



- (a) Using the information in the diagram, suggest in which year the species richness was greater. Give a reason for your answer.

(2)

.....

.....

.....

.....

- (b) Buttercup plants were found in this field in both years. Buttercup plants can produce new plants by asexual reproduction.

- (i) Name the type of cell division required for asexual reproduction.

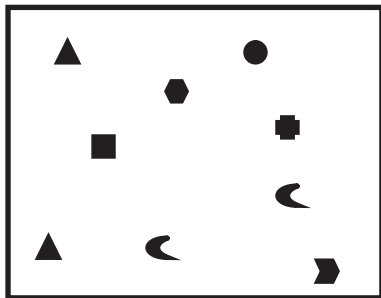
(1)

.....

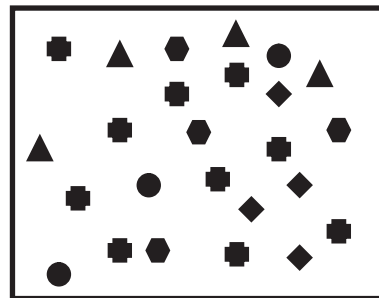


3 Biodiversity is an important concept in conservation.

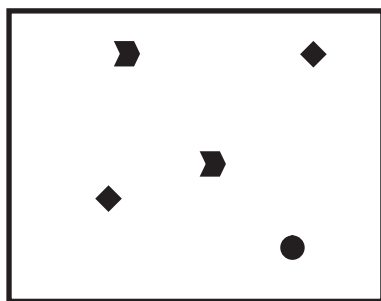
(a) The diagrams below show four identically sized areas A, B, C and D. Different shapes represent different species.



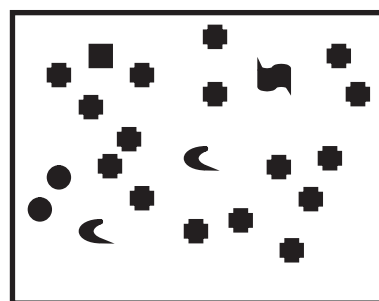
Area A



Area B



Area C



Area D

Place a cross ☒ in the box next to the correct letter to complete each of the following statements.

(i) The area with the highest species richness is

(1)

A    B    C    D

(ii) The area with the lowest species richness is

(1)

A    B    C    D

(iii) State which area contains an endemic species, giving reasons for your answer.

(3)

Area.....

Reasons.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....



4 There are now over 1400 seedbanks in the world and they store plant seeds to maintain genetic diversity. Plant seeds are carefully selected and processed so they can be stored for years in a seedbank.

(a) Give **two** differences between genetic diversity and species richness.

(2)

1 .....

.....

.....

.....

2 .....

.....

.....

.....

(b) (i) Suggest **two** reasons why it is better to store seeds rather than to store whole plants.

(2)

1 .....

.....

.....

.....

2 .....

.....

.....

.....



(ii) Suggest why it is better to store seeds from several individual plants of one species rather than seeds from one individual plant.

(2)

.....

.....

.....

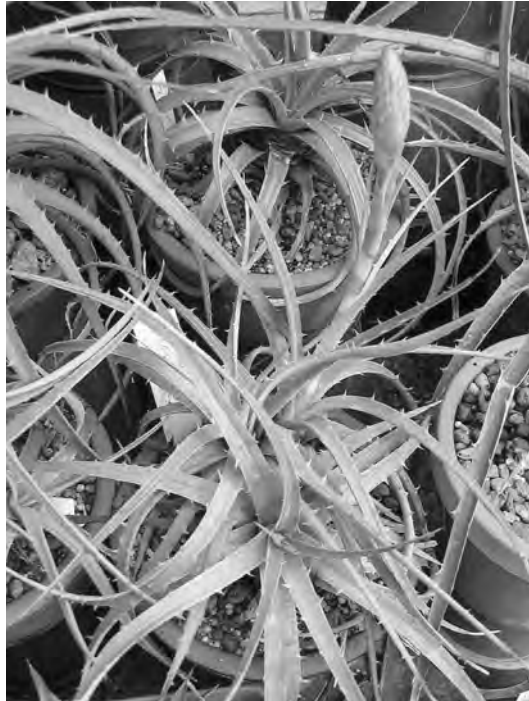
.....

.....

.....

- (c) Seeds that are selected for storage are usually dried to remove most of the water before they are placed in a seedbank.

An investigation was carried out to study the effect of drying on the germination success of seeds from *Encholirium* plants, shown in the photograph below.



Magnification  $\times 0.2$

One hundred seeds were collected from each of four species of *Encholirium*. The seeds from each species were separated into two groups, each containing 50 seeds.

One group of 50 seeds was planted immediately after collection. The other group of 50 seeds was dried after collection and then planted. Germination success was measured as the number of seeds that germinated out of the 50 seeds planted.

This was repeated several times and the mean germination success was calculated. The results are shown in the table below.

<i>Encholirium</i> species	Mean germination success for 50 seeds	
	Planted immediately	Planted after drying
A	48	45
B	40	23
C	45	45
D	48	37

- (i) Use the data in the table to calculate, for *Encholirium* species A, the percentage decrease in mean germination success for dried seeds compared with seeds planted immediately. Show your working.

(2)

Answer ..... %

- (ii) Using the data in the table, suggest which of the four species is **least** likely to survive storage in a seedbank. Give reasons for your answer.

(3)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

- (iii) Suggest how seeds from these *Encholirium* species may need to be treated to ensure their long term survival in a seedbank.

(2)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

**(Total for Question 4 = 13 marks)**