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ST ANDREW'S COLLEGE

St Andrew's College & Diocesan School for Girls
 Life Sciences Grade 12 Standardised Test
 Reproduction in Plants & Animals 8 March 2019

50 Marks

50 minutes

Examiner: P. Gentz

Moderator: LS Dept



Name: _____

Teacher's Initials: _____

- Write your name and teacher's initials in the spaces above.
- This standardised test consists of 10 pages – make sure your test is complete.
- Answer all questions on the sheet and use the mark allocation to guide you.

Question 1

- 1.1 Select the term in Column B that best matches the description in Column A. Write the letter of the term in the corresponding space provided between the brackets. Each letter may be used only once.

Column A

Column B

[] In grafting, the name of the shoot cut from the parent plant.	A	Battery cage system
[] Asexual reproduction in bacteria that involves splitting in two.	B	Dating
[] Type of commercial chicken farming considered to be the most humane.	C	External fertilisation
[] Specialised membranes enclosed in a shell with nutrients for developing embryo.	D	Stock
[] Behaviour of males and/or females just before they mate.	E	Courtship
[] Example of a stem tuber.	F	Internal fertilisation
[] Egg and sperm joining inside the body of the parent.	G	Free-range system
	H	Budding
	I	Binary fission
	J	Potato
	K	Onion
	L	Amniotic egg
	M	Scion

- 1.2 For each of the questions 1.1.1 to 1.1.5 choose the correct answer (A, B, C or D). Only write the letter in the box below.

Question	1.2.1	1.2.2	1.2.3	1.2.4	1.2.5
Answer					

[5]

- 1.2.1 Which line in the table below correctly gives the definition of pollination and fertilisation?

	Pollination	Fertilisation
A	Fusion of gametes of pollen and ovules	Transfer of anther to stigma
B	Transfer of pollen from stigma to ovules	Fusion of gametes
C	Transfer of pollen from anther to stigma	Fusion of male and female gametes
D	Fusion of gametes	Transfer of pollen onto ovum

(1)

- 1.2.2 Which of the following is NOT a function of seed banks?

- A. To provide jobs for people in the Arctic circle.
- B. Seed preservation in case of natural disasters, disease or war.
- C. Seed library containing valuable information about evolution of plants.
- D. Stores seeds to preserve genetic diversity.

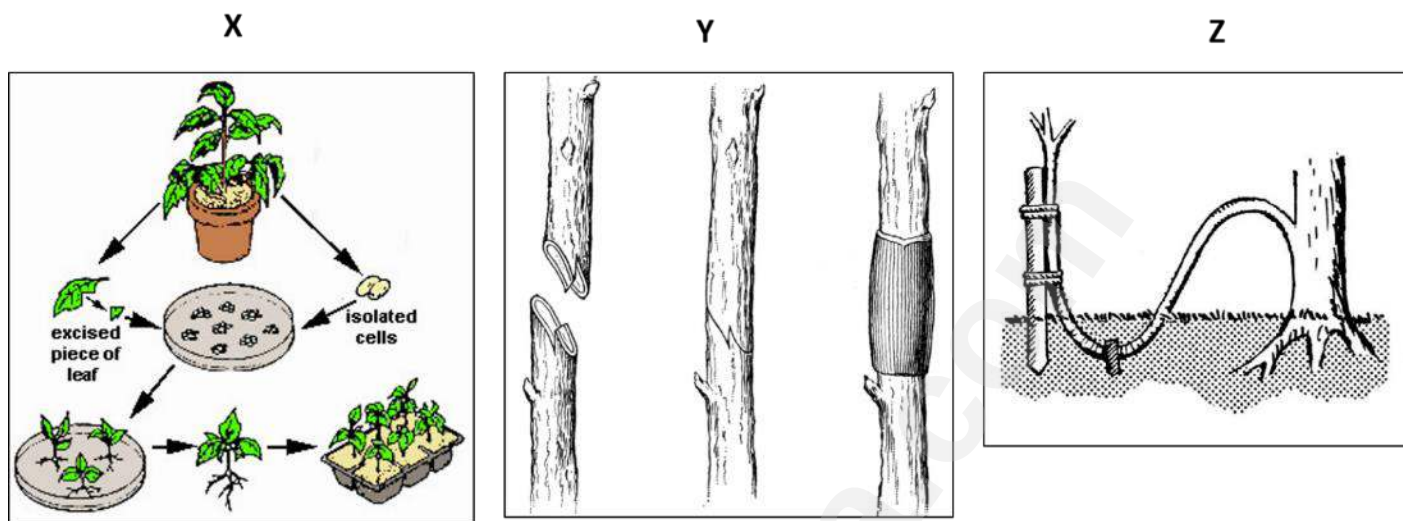
(1)

- 1.2.3 Which of the following is NOT true of precocial development in animals?

- A. Usually born with fur and are able to move around.
- B. Dependence on parents for care, food, shelter and protection is limited.
- C. Reach sexual maturity quickly so they can breed.
- D. Offspring numbers are very low.

(1)

1.2.4 Which line in the table below correctly matches the methods of asexual reproduction with the image below?



	X	Y	Z
A	Grafting	Tissue Culture	Layering
B	Tissue culture	Layering	Grafting
C	Layering	Tissue culture	Grafting
D	Tissue culture	Grafting	Layering

(1)

1.2.5 Which method of reproduction will increase genetic diversity, enabling an organism to better adapt to a changing environment?

- A. Asexual reproduction
- B. Sexual reproduction
- C. Budding
- D. Vegetative propagation

(1)

Question 2

2.1 Read the article below and answer the questions that follow.

**World's first genetically modified ants shed light on how complex
insect societies evolved**



Clonal raider ants (*Ooceraea biroi*)

Ant colonies work because cohesive groups work together and sometimes let one or more individuals do all the reproducing. Colonies are sometimes called a “superorganism”. A new study on the world’s first genetically modified (GM) ants finds that ant’s sociality depends on their sense of smell, and provides clues to how social behaviour evolved in these insects.

Social insects are especially hard to genetically modify as “the eggs of ants are very sensitive and difficult to hatch without workers”. As a result, evolutionary biologists have turned to a species called clonal raider ants. These small ants lack queens in their colonies; instead each ant lays unfertilised eggs that develop as clones. That means that researchers can modify an individual ant’s genome and they can quickly breed a genetically modified strain. For the vast majority of ant species, doing real genetics is basically impossible,” because of the complications of dealing with eggs and larvae and that it can take years to get a genetically modified strain going, say the researchers, but because these ants are clones, “this species allows us to take shortcuts.” The researchers disrupted an odour-sensing gene in the ant’s antennae, so that it could no longer use pheromones to communicate with other ants.

Clonal raider ants live in colonies up to several hundred ants, and typically lay six eggs every 2 weeks. The GM ants only laid about one egg in that time period. Egg-laying females, along with workers typically care for the larvae that hatch. In addition, the GM ants tended to die within 2 to 3 months, instead of the usual 6 to 8 months.

Adapted: <https://goo.gl/U3eVqF> and <https://www.pnas.org/content/113/49/14091>

2.1.1 What is the scientific name of the clonal raider ant?

_____ (2)

2.1.2 Explain why clonal raider ants were used for the genetic modification, rather than an ant colony that has an egg-laying queen?

_____ (2)

2.1.3 In the space below, calculate how many eggs a typical clonal raider ant will produce in 6 months. Show all working.

(3)

2.1.4 Study the following table which consists of two items (numbered 1 and 2) in the first column.

Decide which item(s) describes the clonal raider ant. Write down your choice in the space provided in the 'answer' column, making use of the following codes:

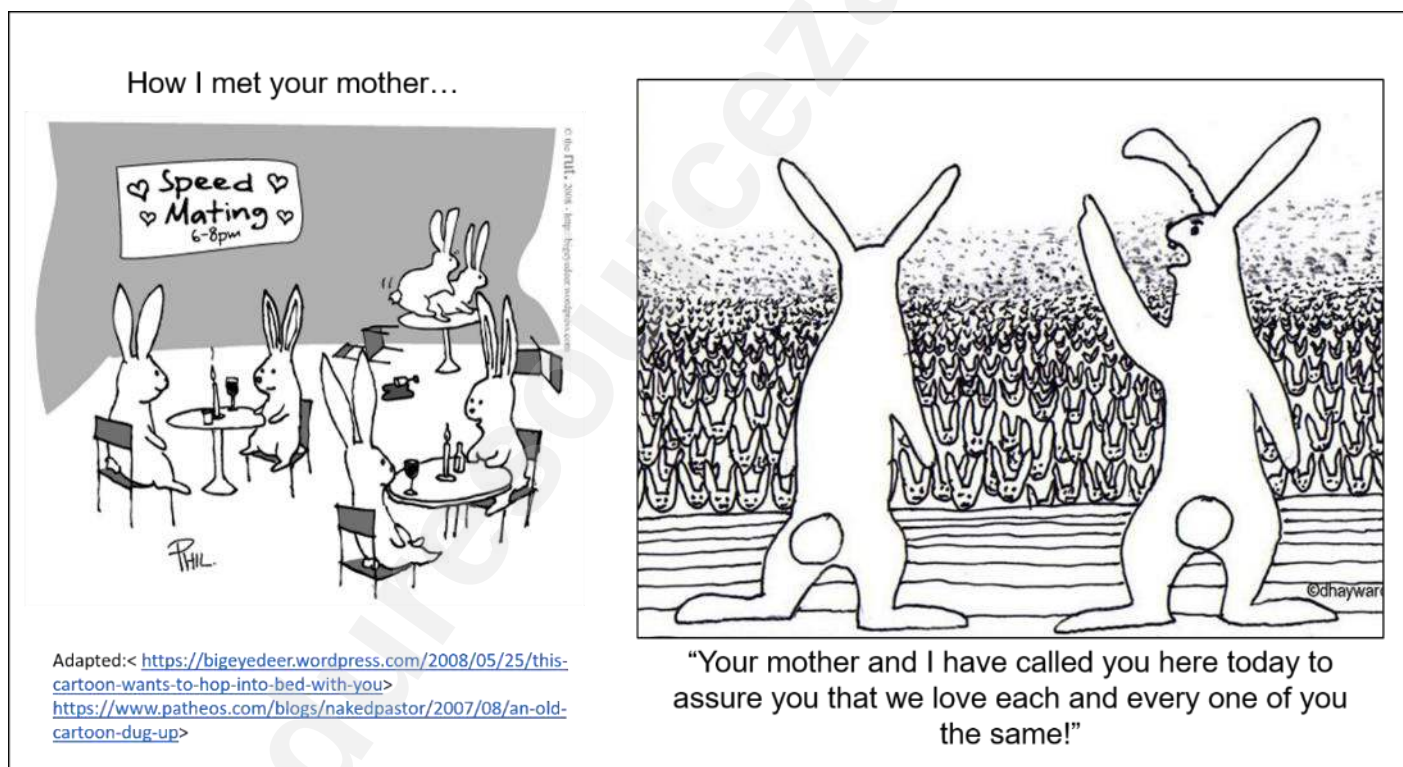
- A Only Item 1 is true of clonal raider ants.
- B Only Item 2 is true of clonal raider ants.
- C Both Items 1 and 2 are true of clonal raider ants.
- D Neither Item 1 or 2 is true of clonal raider ants.

Item	Answer
1. Oviparous 2. Ovoviviparous	
1. Sexual reproduction 2. Asexual reproduction	
1. External fertilisation 2. Internal fertilisation	
1. Courtship behaviour present 2. Courtship behaviour absent	
1. Evidence of parental care 2. No parental care evident	

2.1.5 Scientists agree that the clonal raider ants are both r-strategists and K-strategists. Discuss this statement providing ONE piece of evidence from the text for EACH strategy.

(2)

2.2 r-Strategists and K-strategists exist throughout the animal and plant kingdoms, ensuring the survival of the species from generation to generation. Study the image below and answer the questions that follow:



2.2.1 Are the rabbits illustrated in the image above r-strategists or K-strategists?

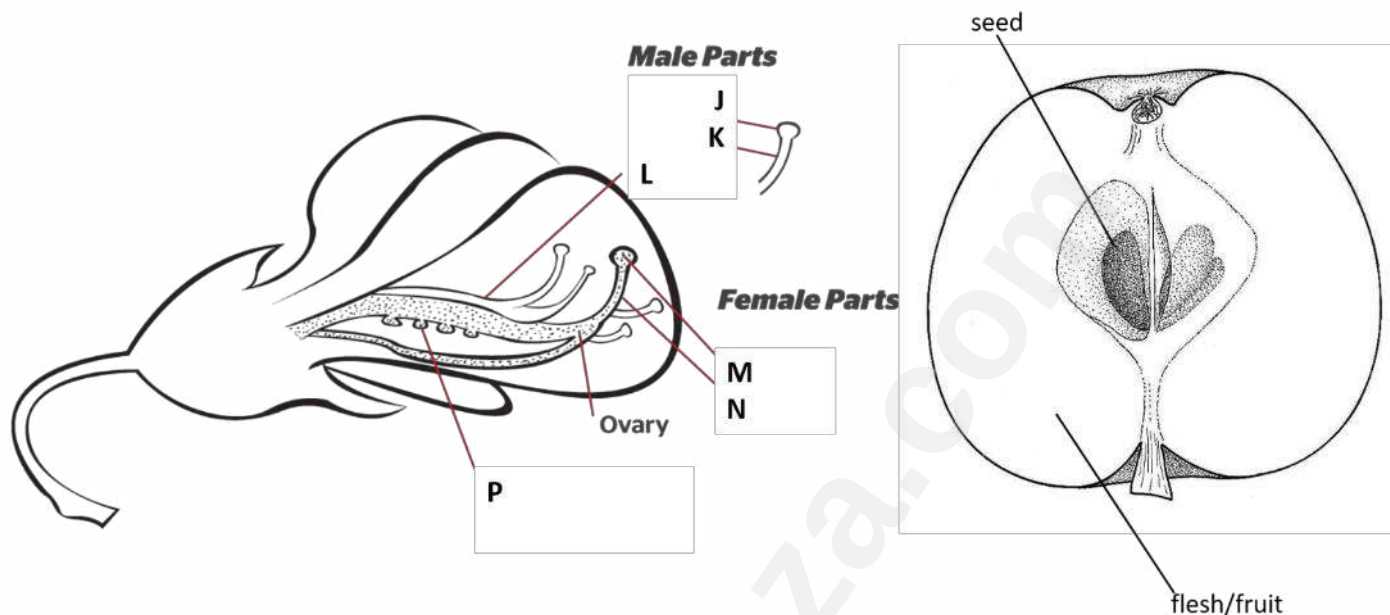
(1)

2.2.2 Discuss the **effectiveness** of this strategy by highlighting TWO advantages of this strategy.

(2)

Question 3

3.1 Study the section of an apple blossom and an apple below.



3.1.1 Identify the following parts of the flower:

M: _____ J: _____ K: _____ (3)

3.1.2 Is the section of the flower a transverse or a longitudinal section?

_____ (1)

3.1.3 Give the name of the part of the flower that develops into the ...

a) fruit: _____ (1)

b) seed: _____ (1)

3.1.4 Infer the method of pollination for the apple blossom e.g. wind, insect, bird etc. Provide a reason for your choice.

 _____ (2)

- 3.2 Read the article below. Use the information in the text and your own knowledge to answer the questions that follow.

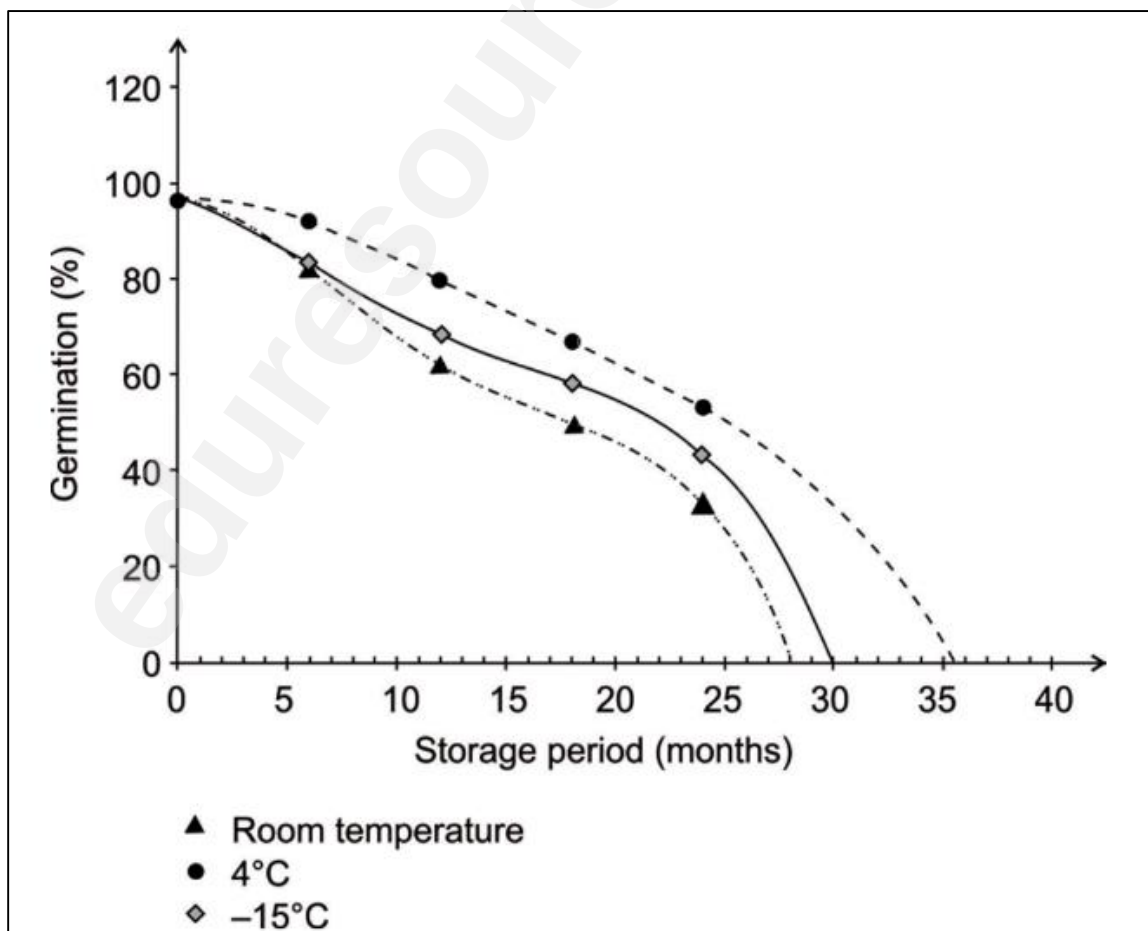
Swertia chirayita is a medicinal herb that grows at high altitudes in India. The herb is used by indigenous population groups in many ways for medicinal purposes, e.g. the treatment of hepatitis, inflammation and digestive diseases. Overuse in traditional medicine has resulted in the plant now being on the verge of extinction in the wild.

Scientists conducted an investigation using the seeds of the herb to determine their suitability for storage in a seed bank. They stored the seeds at three different temperatures: room temperature, 4°C and –15°C.

They also stored the seeds for different lengths of time. Scientists then measured the effect of both temperature and storage time on germination.

The results of the investigation are shown in the graph below.

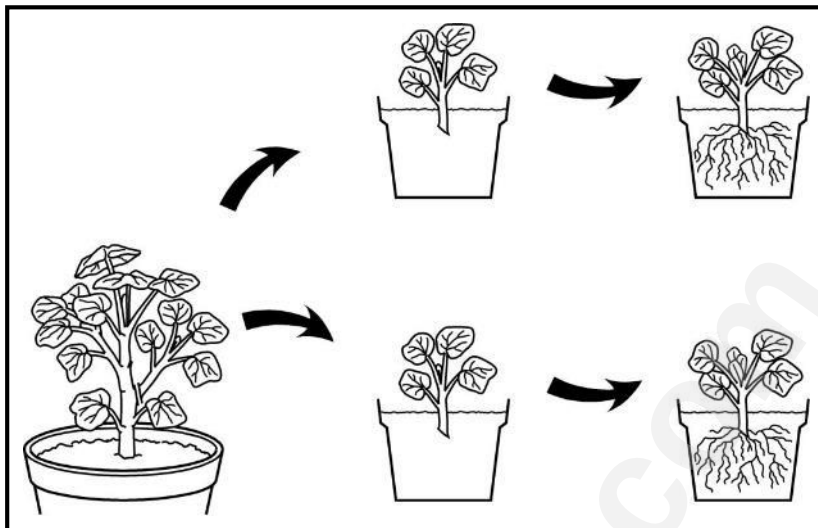
Graph showing the effect of temperature and storage time on the germination of *Swertia chirayita* seeds.



Adapted: <https://www.ncbi.nlm.nih.gov> (IEB 2018 Paper 1)

- 3.2.1 What was the highest percentage germination of the seeds? (1)
- _____
- 3.2.2 For how many months had the seeds been stored at -15°C when germination was at 70%? (2)
- _____
- _____
- 3.2.3 Based on the results shown in this graph, what would be the best temperature for storing the seeds? (2)
- _____
- _____
- 3.2.4 What is a seed bank? (1)
- _____
- _____
- 3.2.5 Using the information provided in the text, give TWO reasons why it is necessary to place the seeds of this herb in a seed bank? (2)
- _____
- _____
- _____
- 3.2.6 Explain the relationship between storage time and germination rate as seen in the graph. (2)
- _____
- _____
- _____

3.3 Examine the diagram below and answer the questions that follow.



3.3.1 What type of reproduction is shown above?

(1)

3.3.2 Give TWO well-explained reasons why this method of propagating plants is useful to horticulturalists (people who grow and sell plants for a living).

(2)

[21]