

Reproduction – GCSE Biology**1. No.3**

Sperm cells and egg cells are formed by meiosis.

0	3
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1

 During meiosis a cell divides twice.

How many sperm cells are formed when a cell divides by meiosis?

[1 mark]

0	3
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.

2

 Human body cells contain 46 chromosomes.

How many chromosomes are in each human egg cell?

[1 mark]

Dupuytren's is a disorder that affects the hands.

One form of Dupuytren's is caused by a dominant allele (**D**).

The allele for **not** having Dupuytren's is recessive (**d**).

0 3 . 3 What is an allele?

[1 mark]

Tick (✓) **one** box.

A different form of a chromosome

☐

A different form of a gamete

☐

A different form of a gene

☐

0 3 . 4 A man with Dupuytren's has the genotype **Dd**.

Which word describes the man's genotype?

[1 mark]

Tick (✓) **one** box.

Heterozygous

☐

Homozygous

☐

Phenotype

☐

The man with Dupuytren's (**Dd**) and a woman who does **not** have Dupuytren's (**dd**) plan to have a child.

03.5

Complete the genetic diagram in **Figure 4** to show the possible genotypes of the child.

[2 marks]

Figure 4

		Woman	
		d	d
Man	D	Dd	
	d		

03.6

Draw a ring around the genotype of a child in **Figure 4** who will have Dupuytren's.

[1 mark]

03.7

What is the chance of the child having Dupuytren's?

[1 mark]

Tick (✓) **one** box.

25% ☐

50% ☐

75% ☐

100% ☐

03.8

A genetic disorder develops as a result of a change in a gene.

What scientific term describes a change in a gene?

[1 mark]

03.9

People with a family history of some genetic disorders are offered embryo screening.

Suggest **one** way embryo screening can help people with a family history of a genetic disorder.

[1 mark]

2. No.7

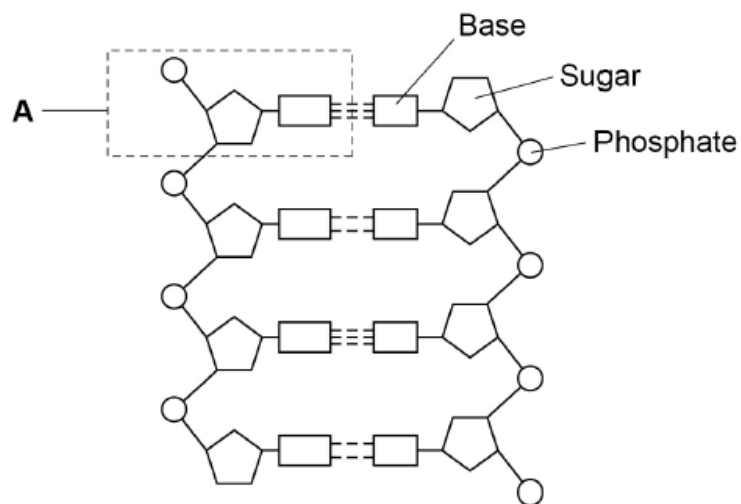
This question is about DNA.

0 7 . 1 Describe the shape of a DNA molecule.

[2 marks]

Figure 10 shows part of a DNA molecule.

Figure 10



0 7 . 2 DNA codes for a sequence of amino acids.

Which part of DNA forms the code for a particular amino acid?

[1 mark]

Tick (✓) **one** box.

Bases

☐

Phosphates

☐

Sugars

☐

07.3

Which substance is produced when amino acids are joined together?

[1 mark]

Tick (✓) **one** box.

Carbohydrate

☐

Fat

☐

Protein

☐

07.4

DNA is made of repeating units. One of the units is labelled **A** in **Figure 10**.What is the name of the repeating unit labelled **A**?

[1 mark]

Tick (✓) **one** box.

Chromosome

☐

Enzyme

☐

Nucleotide

☐

- 07.5** The DNA in one human body cell is the length of 6 000 million repeating units (part A).
Each repeating unit is 0.34 nanometres (nm) long.

Calculate the length of the DNA in the cell in millions of nanometres.

[2 marks]

Length = _____ million nm

- 07.6** Give your answer to Question 07.5 in metres.

1 metre = 1×10^9 nanometres

[1 mark]

Length = _____ m

- 07.7** DNA analysis can show people which alleles they have.

Patients who have certain types of cancer can be offered DNA analysis.

The family of the patient can also be offered DNA analysis.

Suggest **one** advantage of having DNA analysis.

[1 mark]

3. No.4

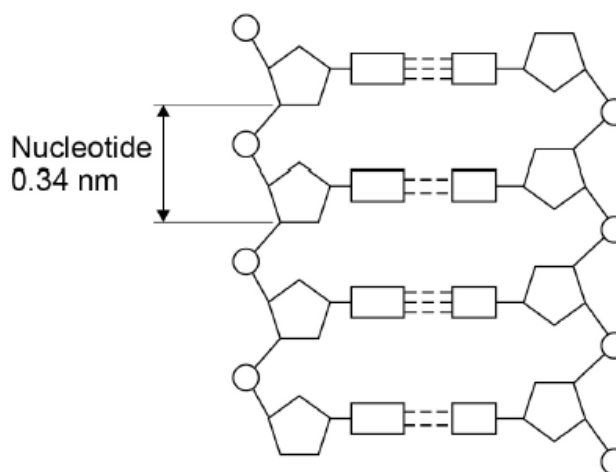
DNA is a polymer of nucleotides.

0 4 . 1 Why is DNA described as a polymer?

[1 mark]

Figure 5 shows part of a DNA molecule.

Figure 5



0 4 . 2 Describe the structure of a nucleotide.

[4 marks]

0 4 . 3 The length of a DNA double helix increases by 0.34 nm for every pair of nucleotides.

The total number of nucleotides in a human body cell is 1.2×10^{10} .

Calculate the total length of double helix in a human body cell.

Give your answer in metres. Use information from **Figure 5**.

[5 marks]

Total length = _____ m

0 4 . 4 Some parts of DNA do **not** code for proteins.

Describe how non-coding parts of DNA can affect the expression of genes.

[1 mark]

4. No.5

A new dog food has been developed that does **not** contain meat from cows, sheep or chickens.

The new dog food contains insects.

The insects in the dog food factory are fed on waste vegetables.

0 7 . 1

Sketch the pyramid of biomass for the food chain that produces food for dogs from insects.

Label the pyramid.

[2 marks]

0 7 . 2

Describe **two** reasons why the biomass of the insects eaten by dogs does **not** all become biomass of the dogs.

[2 marks]

1 _____

2 _____

07.3

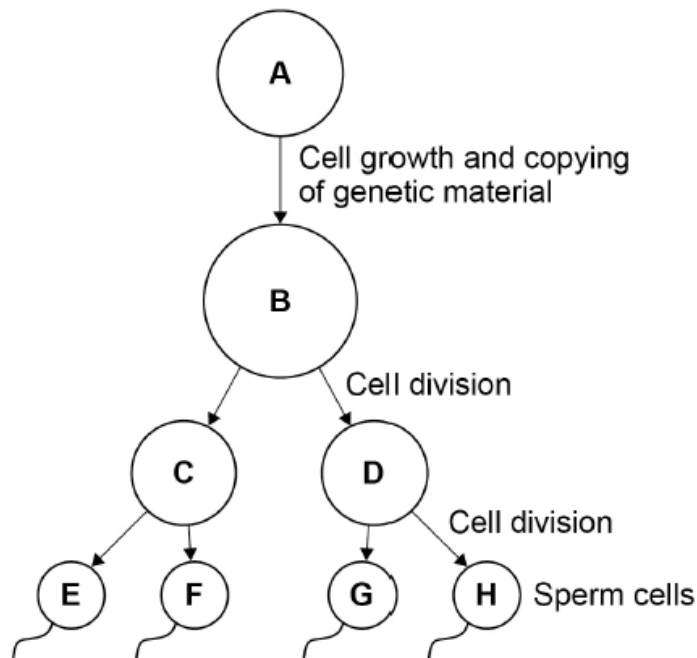
Explain how making dog food from insects could improve **human** food security in the future.

[4 marks]

5. No.3

Figure 6 shows the production of sperm cells in humans.

Figure 6



0 3 . 1 Cell A is a normal body cell.

How many chromosomes are there in cell A?

[1 mark]

Tick (✓) one box.

23

☐

46

☐

48

☐

92

☐

0 3 . 2 What is the mass of DNA in cell E?

[1 mark]

Tick (✓) one box.

A quarter of the mass of the DNA in cell A

☐

Half the mass of the DNA in cell A

☐

The same mass as the DNA in cell A

☐

Twice the mass of the DNA in cell A

☐

0 3 . 3 What type of cell division produces sperm cells?

[1 mark]

Tick (✓) **one** box.

Binary fission

☐

Differentiation

☐

Meiosis

☐

0 3 . 4 Sometimes there are errors in copying the genetic material.

What term describes an error in the genetic material?

[1 mark]

Tick (✓) **one** box.

Absorption

☐

Fertilisation

☐

Mitosis

☐

Mutation

☐

0 3 . 5 A woman has three children, aged 4, 6 and 9 years.

Why are the children **not** genetically identical?

[2 marks]

In sexual reproduction, a sperm cell fuses with an egg cell to form a new single cell.

An embryo develops from the single cell.

The cell divides three times to produce the embryo.

0 3 . 6

How many cells are there in the embryo after three cell divisions?

[1 mark]

Tick (✓) **one** box.

3 ☐

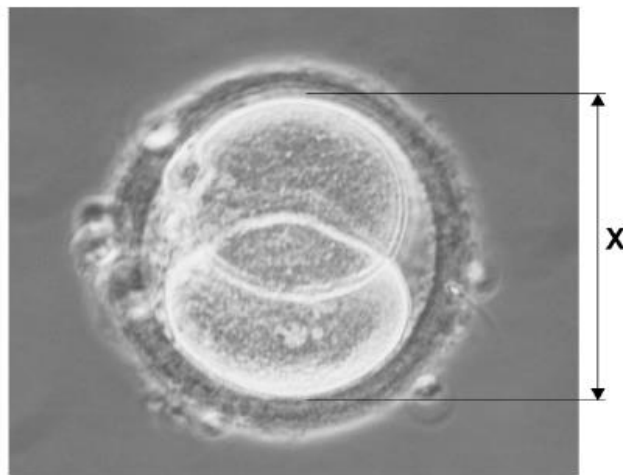
6 ☐

8 ☐

9 ☐

Figure 7 shows a different human embryo.

Figure 7



0 3 . 7

Measure image length **X** on **Figure 7**.

[1 mark]

Give your answer in millimetres (mm).

X = _____ mm

0 3 . 8 The image in **Figure 7** has been magnified $\times 500$

Calculate the real length of the embryo.

Use the equation:

$$\text{real length of the embryo} = \frac{\text{image length}}{\text{magnification}}$$

Give your answer in micrometres (μm).

1 mm = 1000 μm

[3 marks]

Real length of the embryo = _____ μm

0 3 . 9 The embryo may **not** implant in the lining of the uterus.

The embryo will then be lost from the woman's body several days later.

Explain why the woman may **not** notice this has happened.

[2 marks]

6. No.5

Table 2 gives the classification of four plant species.

Table 2

Group	Species 1	Species 2	Species 3	Species 4
Kingdom	<i>Plantae</i>	<i>Plantae</i>	<i>Plantae</i>	<i>Plantae</i>
Phylum	<i>Spermatophyta</i>	<i>Spermatophyta</i>	<i>Spermatophyta</i>	<i>Spermatophyta</i>
Class	<i>Monocotyledonae</i>	<i>Dicotyledonae</i>	<i>Monocotyledonae</i>	<i>Dicotyledonae</i>
Order	<i>Poales</i>	<i>Fabales</i>	<i>Poales</i>	<i>Scrophulariales</i>
Family	<i>Cyperaceae</i>	<i>Fabaceae</i>	<i>Poaceae</i>	<i>Scrophulariaceae</i>
Genus	<i>Eriophorum</i>	<i>Pisum</i>	<i>Poa</i>	<i>Antirrhinum</i>
Species	<i>angustifolium</i>	<i>sativum</i>	<i>annua</i>	<i>majus</i>

0 5 . 1

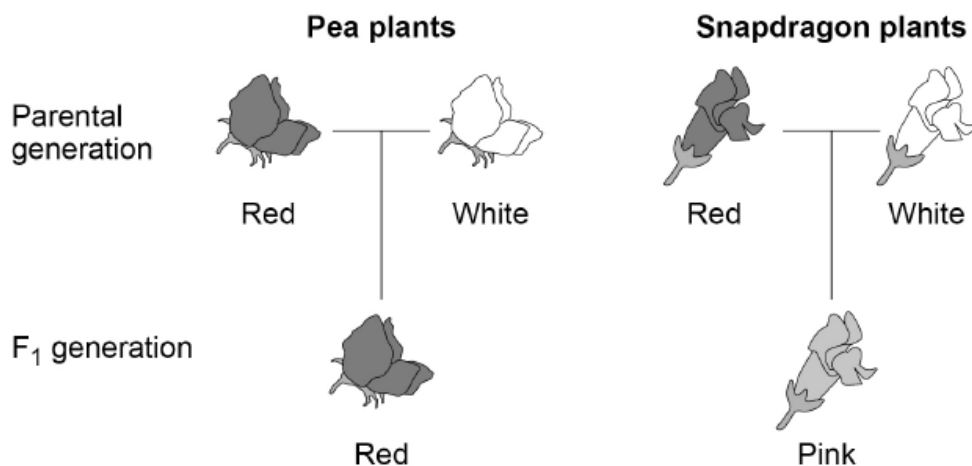
Species 1 and 3 are the most closely related.

What information in **Table 2** gives evidence for this?

[1 mark]

Figure 6 shows the inheritance of flower colour in two species of plant.

Figure 6



- In pea plants and in snapdragon plants, flower colour is controlled by one pair of alleles.
- In **Figure 6** the parental generation plants are homozygous for flower colour.
- In heterozygous **pea** plants, the allele for red flower colour is dominant.
- In heterozygous **snapdragon** plants, the alleles for flower colour are both expressed.

Use the following symbols for alleles in your answers to Questions 05.2 to 05.4:

Pea plants

R = allele for red flowers
r = allele for white flowers

Snapdragon plants

C^R = allele for red flowers
C^W = allele for white flowers

0 5 . 2

What is the genotype of the red-flowered pea plants in the F₁ generation?

[1 mark]

0 5 . 3

What is the genotype of a white-flowered snapdragon plant?

[1 mark]

A gardener crossed two pink-flowered snapdragon plants.

0 5 . 4

Draw a Punnett square diagram to show why only some of the next generation plants had pink flowers.

Identify the phenotypes of all the offspring plants.

[3 marks]

0 5 . 5

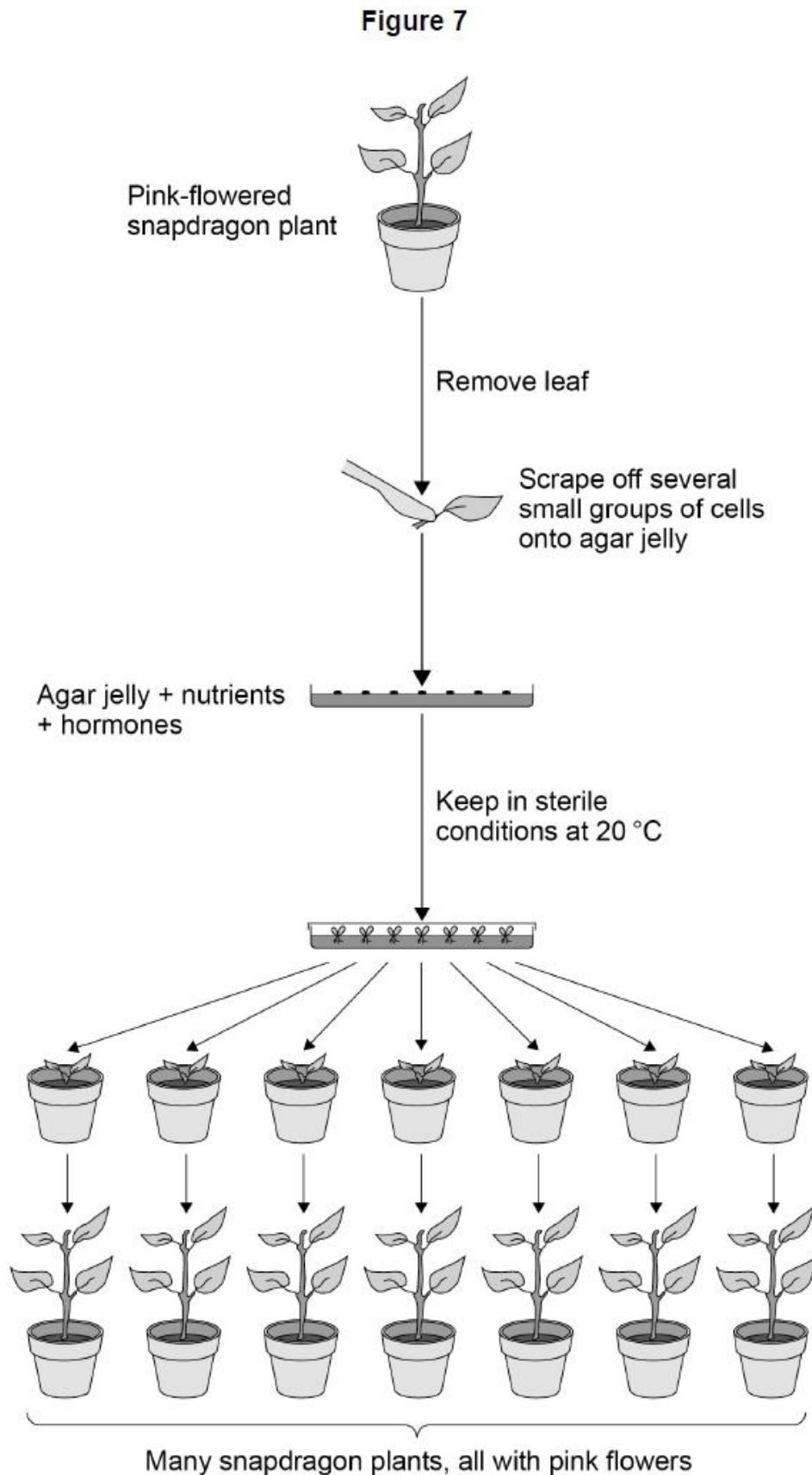
What percentage of the offspring would you expect to have pink flowers?

[1 mark]

Percentage = _____ %

Commercially, hundreds of pink-flowered snapdragon plants can be produced from one pink-flowered plant.

Figure 7 shows a tissue culture technique used for producing many plants from one plant.



0 5 . 6

Give a reason for each of the following steps shown in **Figure 7**.**[5 marks]**

Several groups of cells are scraped off the leaf: _____

Nutrients are added to the agar jelly: _____

Hormones are added to the agar jelly: _____

The plant cells are kept in **sterile** conditions: _____

The plant cells are kept at **20 °C**: _____

0 5 . 7

Explain why the method shown in **Figure 7** produces **only** pink-flowered plants.**[2 marks]**

