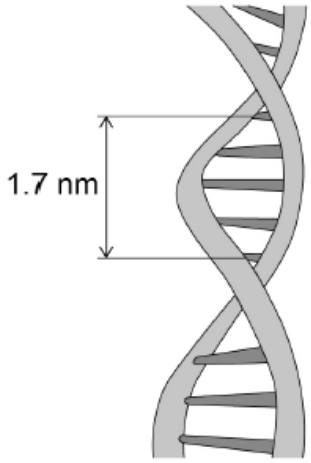
AQA – Genetic information, variation and relationships between organisms – AS Biology P1

1. June/2021/Paper_1/No.1

0 1 **Figure 1** shows part of a DNA molecule.

Figure 1



0 1 . 1 Name the type of bond between:

[2 marks]

complementary base pairs _____

adjacent nucleotides in a DNA strand _____

0 1 . 2 The length of a gene is described as the number of nucleotide base pairs it contains.

Use information in **Figure 1** to calculate the length of a gene containing 4.38×10^3 base pairs.

[2 marks]

Answer _____ nm

0 1 . 3 Describe **two** differences between the structure of a tRNA molecule and the structure of an mRNA molecule.

[2 marks]

1 _____

_____

2 _____

_____

0 1 . 4 In a eukaryotic cell, the structure of the mRNA used in translation is different from the structure of the pre-mRNA produced by transcription.

Describe **and** explain a difference in the structure of these mRNA molecules.

[2 marks]

_____

_____

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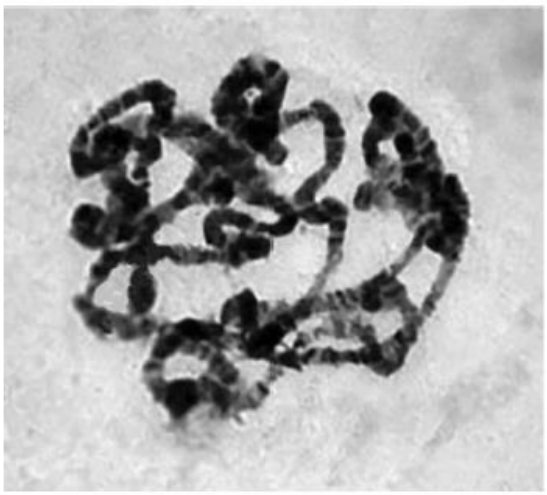
2. June/2021/Paper_1/No.4

0 4 This question is about mitosis in cells.

Figure 4 shows the arrangement of the genetic material in a cell during prophase.

Figure 4



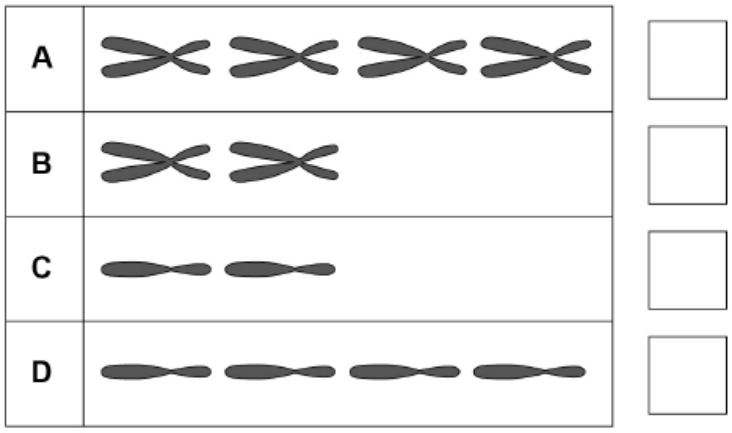
0 4 . 1 Describe and explain the arrangement of the genetic material shown in **Figure 4**.

[2 marks]

0 4 . 2 The diploid number of chromosomes in the body cell of an insect species is four.

Tick (✓) the box next to the diagram **A**, **B**, **C** or **D** that represents the appearance of chromosomes in a cell during metaphase in this species.

[1 mark]



0 4 . 3 Name the fixed position occupied by a gene on a DNA molecule.

[1 mark]

0 4 . 4 Describe how a gene is a code for the production of a polypeptide. Do **not** include information about transcription or translation in your answer.

[3 marks]

3. June/2021/Paper_1/No.7

0 7 A meadow is an area of grassland with a wide range of plant and animal species. A student investigated whether cutting some of the plants in a meadow had any effect on the biodiversity of insects in that meadow.

The student created two sample areas, called plots, in the meadow. Each plot measured 10 m × 5 m

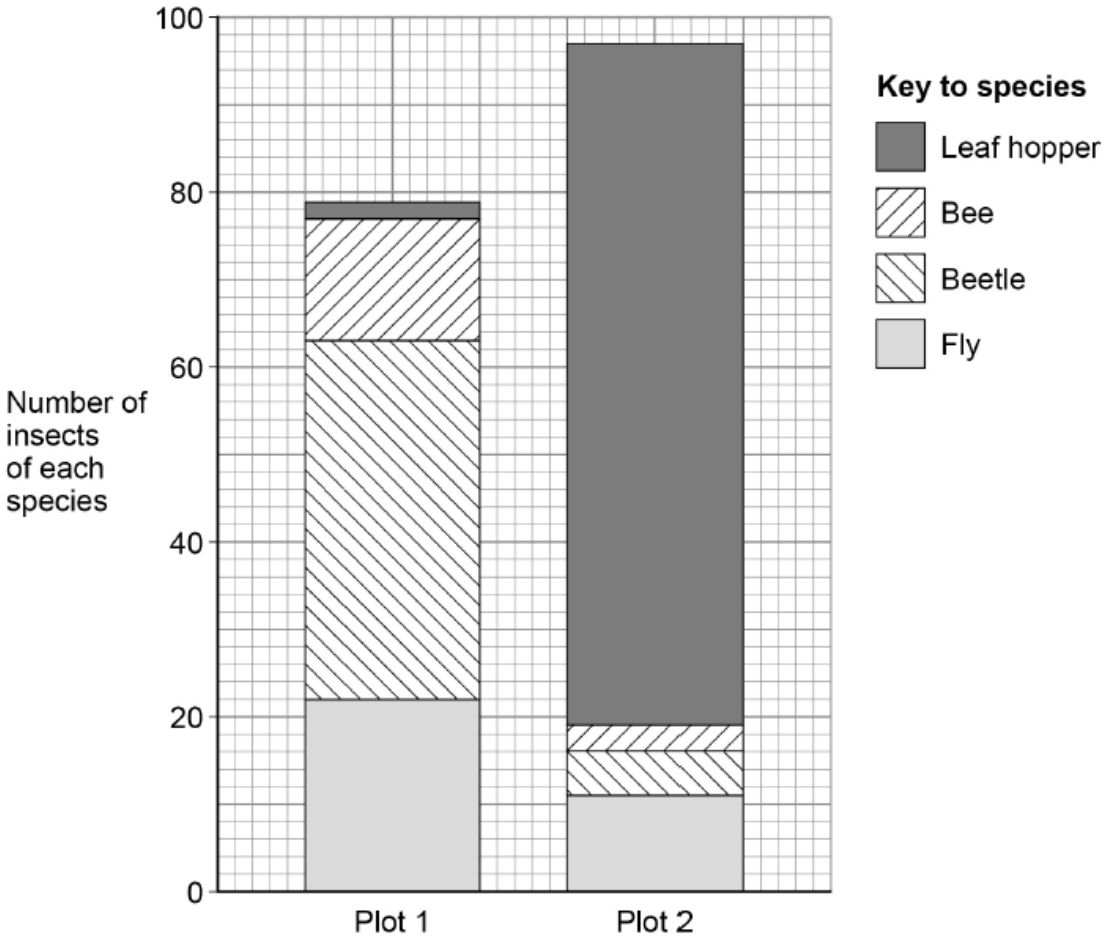
The student:

- did not cut plants in **plot 1**
- cut the plants in **plot 2** with a lawn mower once a week.

After 10 weeks, the student captured all of the organisms of four insect species found in each of these plots.

Figure 7 shows the student's results.

Figure 7



0 7 . 1 Use the information in **Figure 7** to calculate the index of diversity for the insects captured in **plot 1**.

The formula to calculate the index of diversity (d) is

$$d = \frac{N(N-1)}{\Sigma n(n-1)}$$

where N is the total number of insects of all species and n is the total number of insects of each species.

Give the answer to **2** significant figures and show your working.

[2 marks]

d _____

0 7 . 2 The student concluded that cutting plants with a lawn mower increased the species richness of insects in that meadow.

Use information in **Figure 7** to explain why the student's conclusion is incorrect.

[1 mark]

_____

_____

_____

0 7 . 3 The student wanted to use the data from **plot 1** to estimate the total number of the beetle species in the meadow.

Suggest how the student should use the data from **plot 1** and other information provided to estimate the total number of the beetle species in the meadow.

[4 marks]