Reproduction

Total mark – 19

Q1.

Potato blight is a disease of potato plants.

Potato blight is caused by the fungus *Phytophthora infestans*.

(a) What is the genus of the fungus that causes potato blight?

Tick (✓) **one** box.

Infestans	☐
Phytophthora	☐
Phytophthora infestans	☐

(1)

(b) The fungus grows near the surface of the potato.

How does growing near the surface help the fungus to respire?

Tick (✓) **one** box.

The fungus can get nitrogen from the soil.	☐
The fungus can get oxygen from the air.	☐
The fungus can get water from the potato.	☐

(1)

A farmer sprays his potato plants with a pesticide.

The pesticide kills the fungus that causes potato blight.

Spraying the crop with a pesticide could decrease biodiversity in a river flowing through his farm.

(c) What does 'biodiversity in a river' mean?

Tick (✓) **one** box.

- The variety of species of animals in the river. ☐
- The variety of species of organisms in the river. ☐
- The variety of species of plants in the river. ☐

(1)

(d) The farmer sprayed pesticide on his potato plants. The next day it rained heavily.

Explain why the biodiversity in the river decreased.

_____

_____

_____

_____

(2)

Another method of preventing potato blight is to breed potatoes that are resistant to blight.

Resistance to potato blight is controlled by two alleles:

R = a dominant allele for having resistance to blight.
r = a recessive allele for **not** having resistance to blight.

A scientist crosses two potato plants. Each plant has the genotype **Rr**.

(e) Complete the diagram below to show the possible genotypes of the offspring produced.

Male gametes

Female gametes	R	r
R	RR	
r		

(2)

(f) Draw a ring around **one** of the homozygous genotypes in the diagram above.

(1)

(g) What percentage of the offspring in the diagram will be resistant to potato blight?

Tick (✓) **one** box.

25% ☐ 50% ☐ 75% ☐ 100% ☐

(1)

(h) Potatoes can also reproduce asexually.

Potatoes from one plant can be planted in the ground to produce new potato plants.

All the new plants from a parent plant that is resistant to blight will also be resistant to blight.

Explain why.

_____

_____

(2)

Mark Scheme

Q1.

(a) *Phytophthora*

1

(b) the fungus can get oxygen from the air

1

(c) the variety of species of organisms in the river

1

(d) pesticide washed into river

allow spray drift
allow reference to run-off
allow carried by rainfall

1

pesticide kills (some) organisms / plants / animals in river

1

(e)

	R	r
R	RR	**Rr**
r	**Rr**	**rr**

*all 3 correct = **2** marks*
*2 correct = **1** mark*
*0 or 1 correct = **0** marks*

2

(f) ring drawn around **RR** / **rr** in the diagram

*allow around both **RR** and **rr***

1

(g) 75%

percentage must match student's answer in the diagram

*allow 75% if no answer to question **(e)***

1

(h) no fusion of gametes

or

(asexual reproduction involves) mitosis

allow no fertilisation

1

(so) offspring are genetically identical (to parent plant)

allow offspring are a clone

allow offspring have same DNA

allow no mixing of genes / DNA

allow no mixing of genetic material

*allow all offspring inherit **R***

1

Q2.

The nucleus of a cell contains DNA.

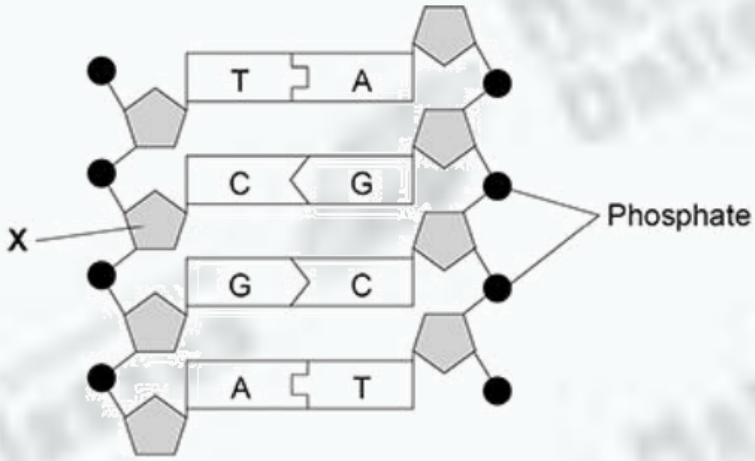
(a) Name the structures inside the cell nucleus that contain DNA.

_____

(1)

Figure 1 shows part of a DNA molecule.

Figure 1



(b) Name the part of the DNA molecule labelled **X**.

_____

(1)

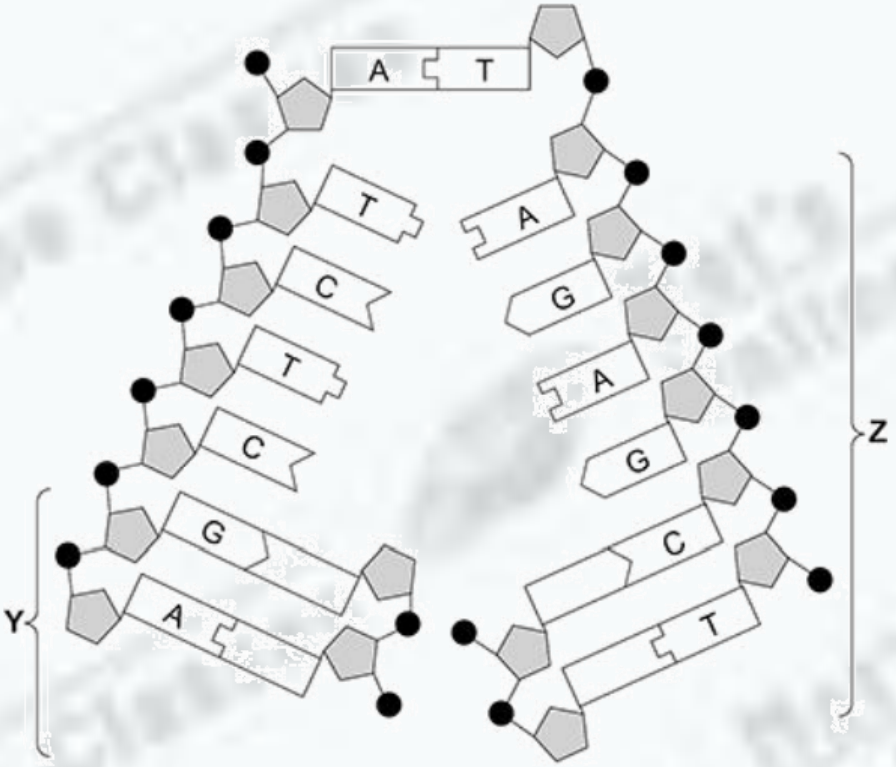
(c) What type of substances are labelled **A**, **C**, **G** and **T** in **Figure 1**?

_____

(1)

Figure 2 shows another section of a DNA molecule.

Figure 2



(d) Four of the substances you named in part (c) are **not** labelled in part **Y** of **Figure 2**.

Label each of these substances with the correct letter, **A**, **C**, **G** or **T**.

Use information from other parts of **Figure 2** to help you.

(1)

(e) What is happening to the DNA in part **Z** of **Figure 2**?

Tick (✓) **one** box.

Differentiation ☐

Evolution ☐

Fertilisation ☐

Replication ☐

(1)

(f) A gene is a length of DNA.

What type of substance does a gene code for?

_____

(1)

(g) Most human body cells contain 6×10^{-12} grams of DNA.

What mass of DNA will a human sperm cell contain?

Tick (✓) **one** box.

6×10^{-6} grams ☐

6×10^{-12} grams ☐

3×10^{-6} grams ☐

3×10^{-12} grams ☐

(1)

(h) What is the name of the type of cell division that produces sperm cells?

Tick (✓) **one** box.

Binary fission	☐
Differentiation	☐
Meiosis	☐
Mitosis	☐

(1)

Mark Scheme

Q2.

(a) chromosome(s)

allow chromatid(s) / gene(s) / allele(s)

1

(b) sugar

allow deoxyribose

allow pentose

*do **not** accept ribose*

1

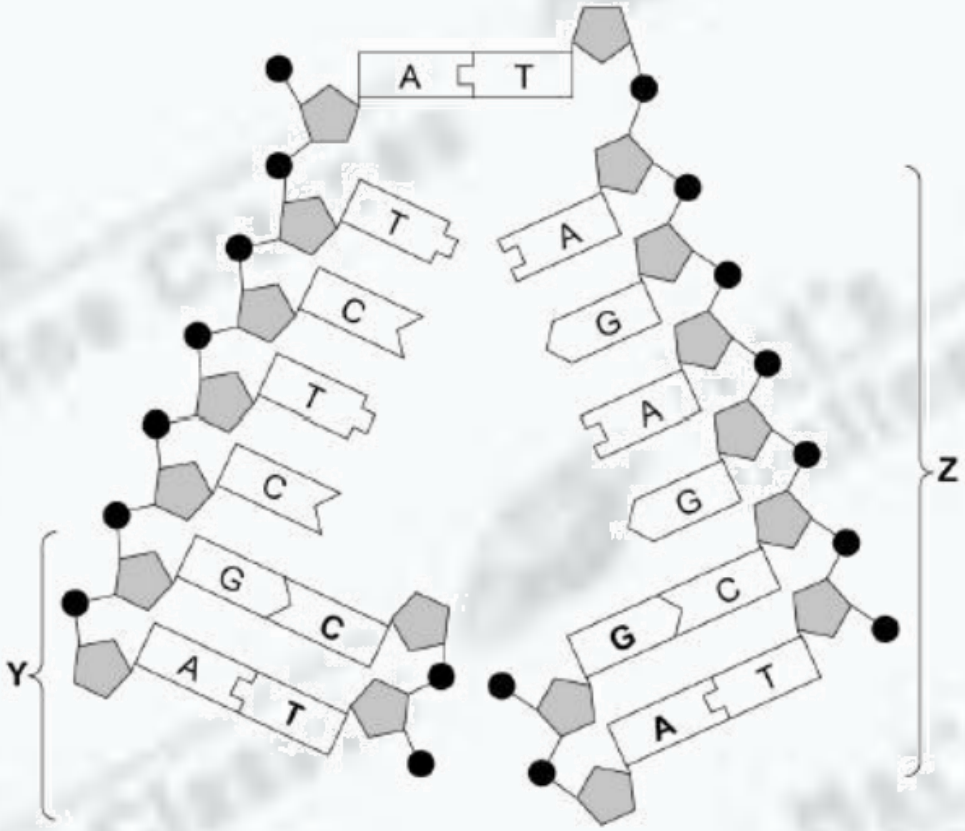
(c) base(s)

allow nitrogenous base(s)

*allow adenine **and** cytosine **and** guanine **and** thymine*

1

(d)



all four required for the mark

1

(e) replication

1

(f) protein

allow polypeptide

1

(g) 3×10^{-12} grams

1

(h) meiosis

1