1 (a) A student cut a piece of onion and placed it on a microscope slide.

The student then placed this slide on the stage of a light microscope and looked through the eyepiece.

No cells could be seen in the piece of onion.

Explain **two** ways this method could be improved to see details of the onion cells.

(4)

1. .....

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2. .....

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(b) Figure 7 shows mitosis occurring in some plant cells.

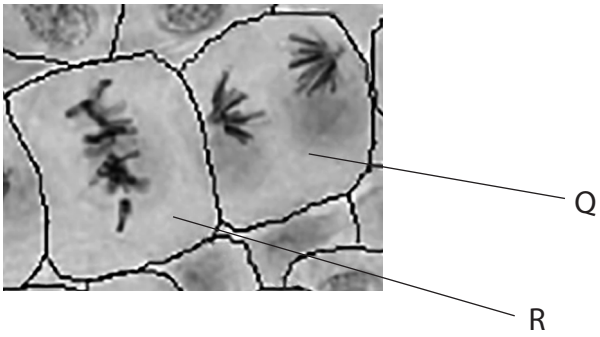

Figure 7

(i) The cells in Figure 7 were taken from a rapidly growing part of a plant.

Which part of a plant has rapidly dividing cells?

(1)

☒ **A** chloroplast

☒ **B** epithelium

☒ **C** meristem

☒ **D** vacuole

(ii) Which stage of mitosis is shown in cell R?

(1)

☒ **A** prophase

☒ **B** metaphase

☒ **C** anaphase

☒ **D** telophase

(iii) Describe **two** genetic similarities of the new cells that would be produced by cell Q in Figure 7.

(2)

1 .....

.....

2 .....

.....

(iv) The cells in Figure 7 were heated in hydrochloric acid.

State **two** safety precautions that should be taken when heating hydrochloric acid.

(2)

1 .....

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2 .....

.....

(c) Explain **one** advantage of using an electron microscope to observe plant cells.

(2)

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(Total for Question 6 = 12 marks)

2 There are many different types of cell in the human body.

(a) Complete the sentence by putting a cross (☒) in the box next to your answer.

An embryonic stem cell can

(1)

- ☒ **A** differentiate into any type of cell
- ☒ **B** differentiate into only one type of cell
- ☒ **C** only be obtained from embryos
- ☒ **D** only produce haploid cells

(b) Describe how the structure of a red blood cell is related to its function.

(3)

(c) Describe the function of platelets.

(2)

*(d) Mitosis and meiosis are types of cell division.

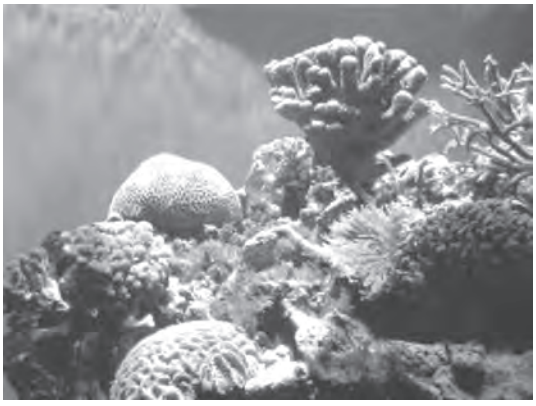
Compare these two types of cell division.

(6)

(Total for Question 1 = 12 marks)

3 Corals are animals that live on the sea bed.

The photograph shows some species of coral.



(a) Corals can reproduce sexually, releasing sperm cells into the water.

The mass of DNA in one sperm cell from a species of coral is 0.5 picogram.

(i) Suggest the mass of DNA that would be present in an unfertilised egg cell of the same species.

(1)

.....

(ii) Complete the sentence by putting a cross (☒) in the box next to your answer.

The term used to describe the number of chromosomes in an egg or sperm cell is

(1)

☒ **A** diploid

☒ **B** gamete

☒ **C** haploid

☒ **D** zygote

(iii) Complete the sentence by putting a cross (☒) in the box next to your answer.

The base pairs in DNA are

(1)

☒ **A** thymine with adenine, cytosine with guanine

☒ **B** thymine with guanine, adenine with cytosine

☒ **C** uracil with adenine, guanine with cytosine

☒ **D** uracil with thymine, guanine with cytosine

(iv) Name the bond that joins the base pairs together.

(1)

.....

(b) After fertilisation, mitosis takes place to form an embryo.

The embryo develops into new coral.

(i) Describe mitosis.

(3)

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(ii) Describe how the embryo develops into new coral.

(3)

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(Total for Question 2 = 10 marks)

4 Some students investigated water movement in plant cells.

They measured the mass of five pieces of potato.

Each piece of potato was put into a different concentration of salt solution.

After one hour the pieces of potato were dried and the mass of each was recorded.

The results are shown in the table.

concentration of salt solution / %	mass / g			percentage change / %
	start	after 1 hour	change	
0	10.2	13.1	+2.9	+28.4
10	9.8	11.4	+1.6	+16.3
20	10.3	9.8	–0.5	
30	10.1	8.9	–1.2	–11.9
40	9.7	7.7	–2.0	–20.6

(a) (i) Calculate the percentage change in the mass of the potato in the 20% salt solution.

(2)

..... %

(ii) Suggest why calculating a percentage change is more useful than calculating the change in mass in this investigation.

(1)

.....

.....

(b) Mitosis occurs in plant cells during growth.

Describe the division of a cell by mitosis.

(3)

*(c) Explain how active transport and diffusion provide a plant with named substances it needs for growth.

(6)

(Total for Question 3 = 12 marks)