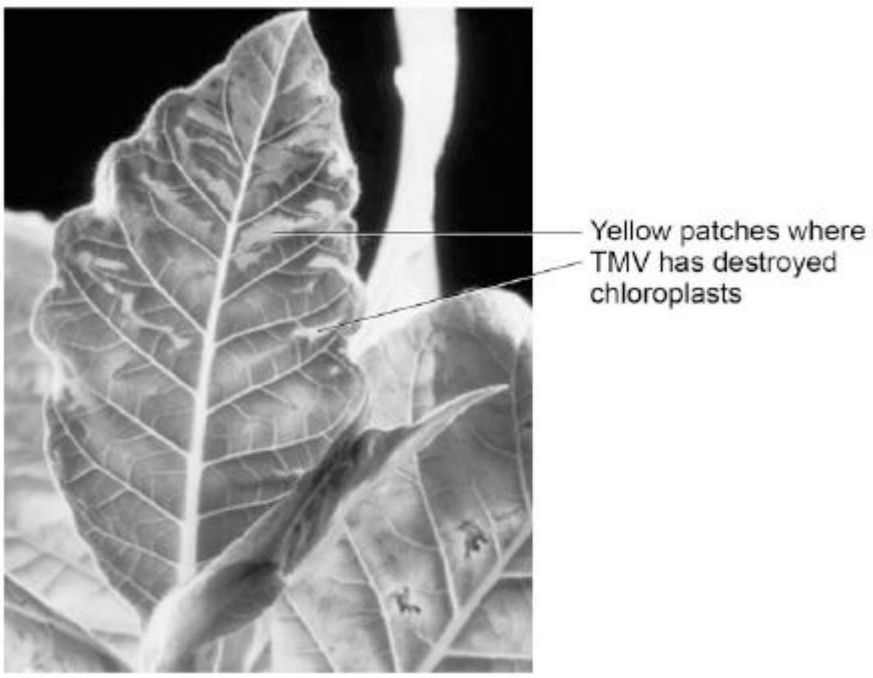
Q1. Tobacco mosaic virus (TMV) is a disease affecting plants.

The diagram below shows a leaf infected with TMV.



© Nigel Cattlin/Visuals Unlimited/Getty Images

(a) All tools should be washed in disinfectant after using them on plants infected with TMV.

Suggest why.

.....

.....

(1)

(b) Scientists produced a single plant that contained a TMV-resistant gene.

Suggest how scientists can use this plant to produce **many** plants with the TMV-resistant gene.

.....

.....

(1)

(c) Some plants produce fruits which contain glucose.

Describe how you would test for the presence of glucose in fruit.

.....

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.....

.....

(2)

(d) TMV can cause plants to produce less chlorophyll.

This causes leaf discoloration.

Explain why plants with TMV have stunted growth.

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(4)
(Total 8 marks)

Q2.(a) In humans there are two types of cell division: **mitosis** and **meiosis.**

The table below gives statements about cell division.

Tick (✓) **one** box in each row to show if the statement is true for mitosis only, for meiosis only, or for both mitosis **and** meiosis.

The first row has been done for you.

Statement	**Mitosis only**	**Meiosis only**	**Both mitosis and meiosis**
How cells are replaced	✓		
How gametes are made			
How a fertilised egg undergoes cell division			
How copies of the genetic information are made			
How genetically identical cells are produced			

(4)

(b) Stem cells can be taken from human embryos.

In therapeutic cloning, an embryo is produced that has the same genes as the patient.

(i) Name **one** source of human stem cells, other than human embryos.

.....

(1)

(ii) Stem cells from embryos can be transplanted into patients for medical treatment.

Give **one** advantage of using stem cells from embryos, compared with cells from the source you named in part (i).

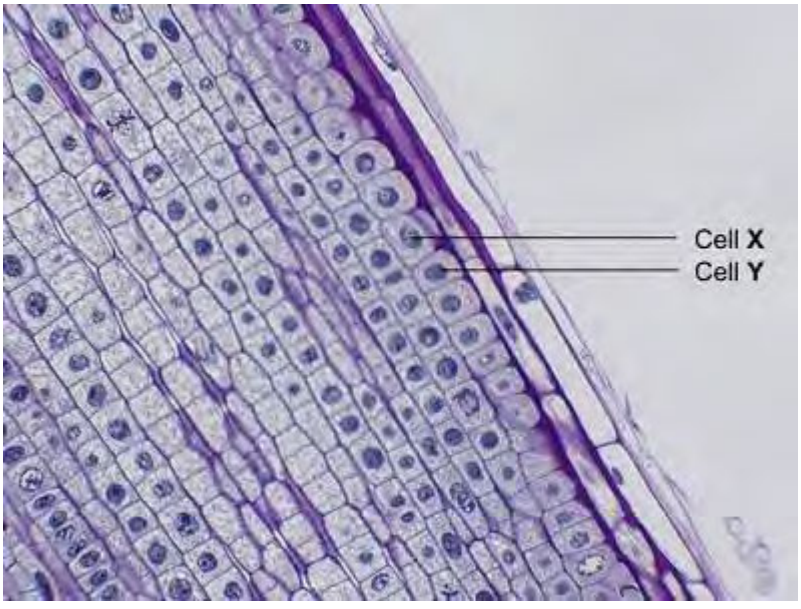
(1)

.....

.....

(Total 6 marks)

Q3. The photograph shows some cells in the root of an onion plant.



By UAF Center for Distance Education [CC BY 2.0], via Flickr

(a) Cells **X** and **Y** have just been produced by cell division.

(i) Name the type of cell division that produced cells **X** and **Y**.

.....

(1)

(ii) What happens to the genetic material before the cell divides?

.....

(1)

(b) A gardener wanted to produce a new variety of onion.

Explain why sexual reproduction could produce a new variety of onion.

.....

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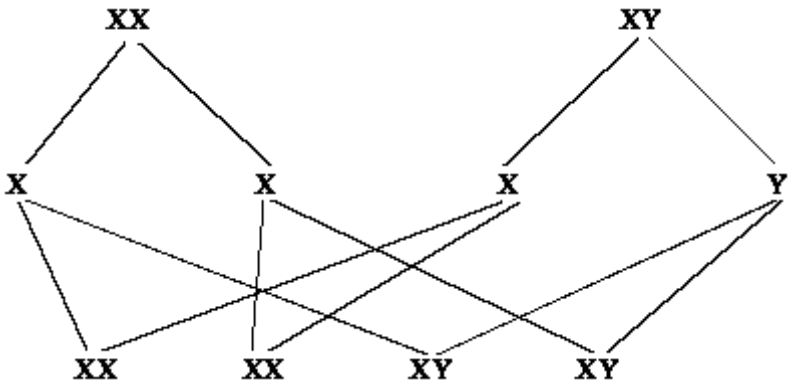
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(3)
(Total 5 marks)

Q4. The genetic diagram shows how the chromosomes divide and combine in human reproduction.



(a) Draw circles around the symbols for the **two** male gametes.

(2)

(b) State the chance of a child being a girl.

.....

(1)

(c) (i) How many pairs of chromosomes are there in a human body cell?

.....

(1)

(ii) How many chromosomes are there in a human egg cell?

.....

(1)

(d) Chromosomes contain genes. From what substance are genes made?

.....

(1)

(e) In the process of mitosis, how do the number of chromosomes in the daughter cells compare to that in the original cell?

.....

(1)

(Total 7 marks)