

**A. Cell structure part 1 – Eukaryotes, prokaryotes and animal and plant cells**

1. Describe the similarities and differences between a typical plant and a typical animal cell. (4)

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2. Ribosomes synthesise proteins. Explain what this means. (2)

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3. Explain why the mitochondria in cells are important. (3)

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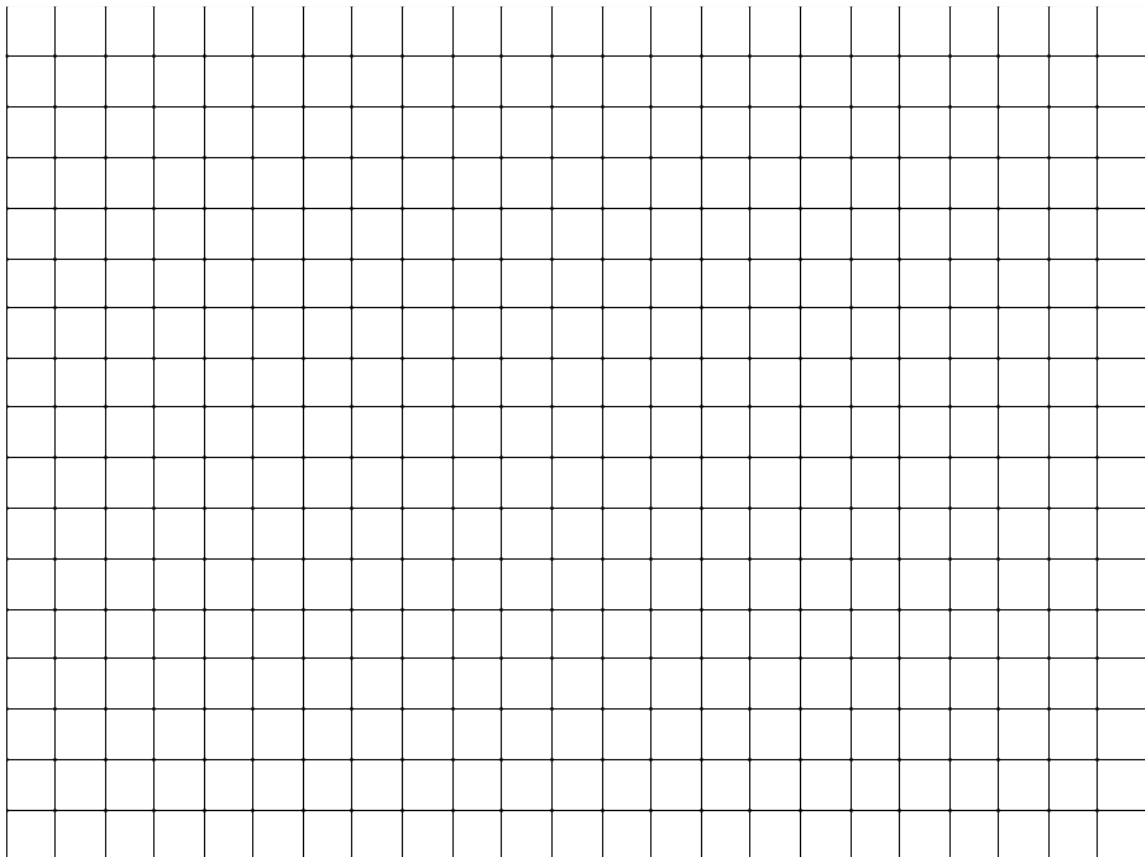
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4. The table below shows the number of mitochondria in different mammalian cells.

Type of mammalian cell	Number of mitochondria per cell			Mean number of mitochondria
	1	2	3	
Stomach lining	1720	1850	1680	
Liver	2095	2210	1995	
Skin	290	315	295	
Large intestine lining	1295	1429	1476	
Muscle	1853	1746	1801	
Kidney	1450	1650	1400	

a. Calculate the mean number of mitochondria in each cell and write these in the table. (6)

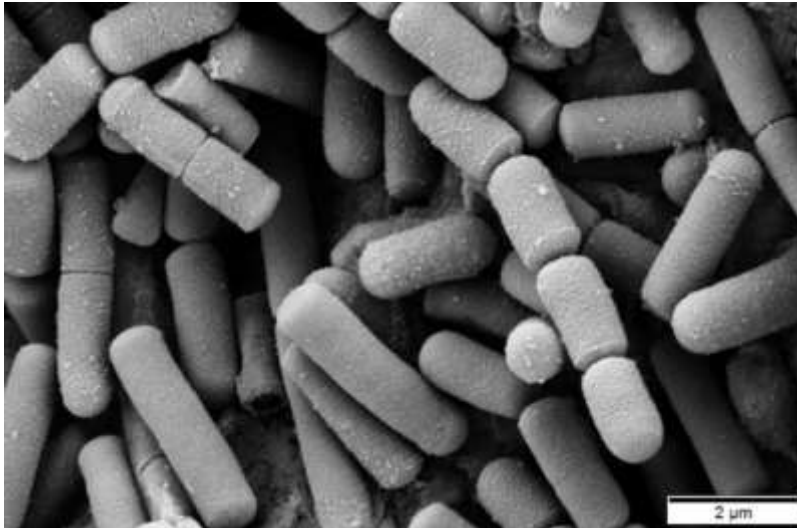
b. Use the graph paper and a suitable method to display the data from the table. (4)  
*(Remember to add labels)*



## 5. Extended response question:

The image below shows a type of bacteria called *Bacillus cereus*. It can cause food poisoning by releasing toxins that can make you vomit.

Bacteria are prokaryotic cells.



Recall the typical structures in a prokaryotic cell and describe the function of each of the structures.

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**B. Cell structure part 2 - Cell specialisation and cell differentiation**

1. Eukaryotic cells can undergo differentiation. What does the term differentiation mean?

(2)

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2. Explain how animal stem cells are different from plant stem cells. (3)

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**3. Extended response question:**

Compare and contrast the structure and function of sperm cells and nerve cells. (6)

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**C. Cell structure part 3 – Microscopy and (culturing microorganisms bio only)**

1. Describe some advantages and disadvantages of the light microscope. (4)

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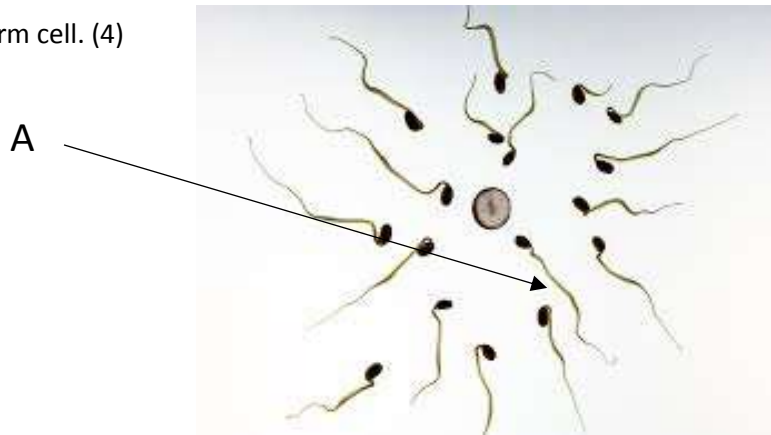
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2. The diagram below shows sperm cells travelling towards an egg cell.

The actual length of the sperm cell labelled A is 42  $\mu\text{m}$ .

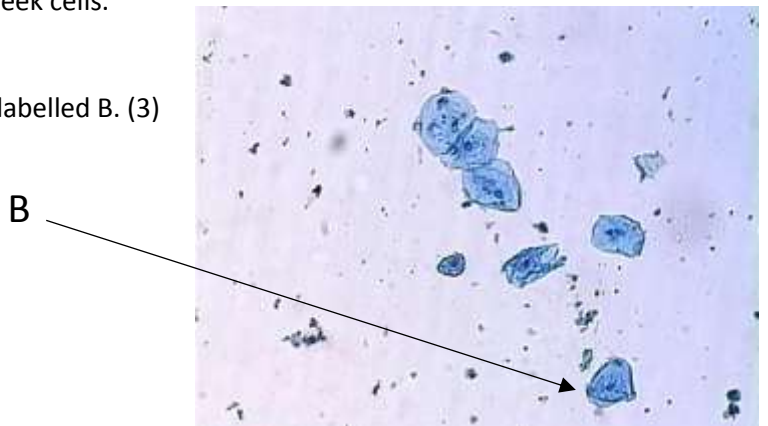
Calculate the magnification of the sperm cell. (4)



3. The diagram shows an image of human cheek cells.

The magnification of the cheek cells is x 100.

Calculate the actual length of the cheek cell labelled B. (3)



## 4. Extended response question:

A student has been asked to observe onion cells under a microscope.

State the equipment they would need and describe the procedure they would use. (6)

*You do not need to discuss the risks.*

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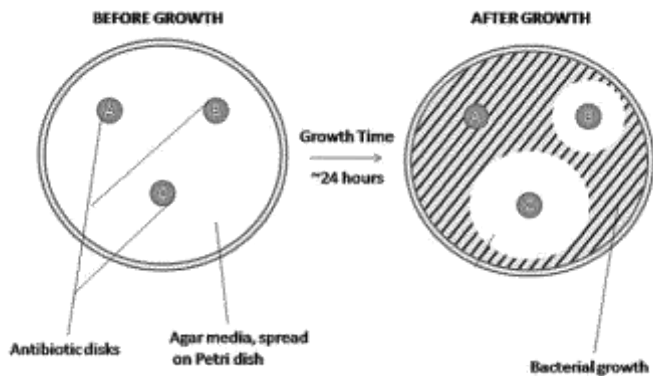
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5. **(Biology only)** The image below shows the results of an experiment on antibiotics.



Bio ONLY: Write a conclusion for this experiment. (4)

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**D. Cell division**

1. Describe the relationship between the cell, genes, DNA and chromosomes.

You may draw a diagram if you wish. (3)

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2. Explain why mitosis is important for multicellular organisms. (3)

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3. Discuss the advantages and disadvantages of the use of plant stem cells. (4)

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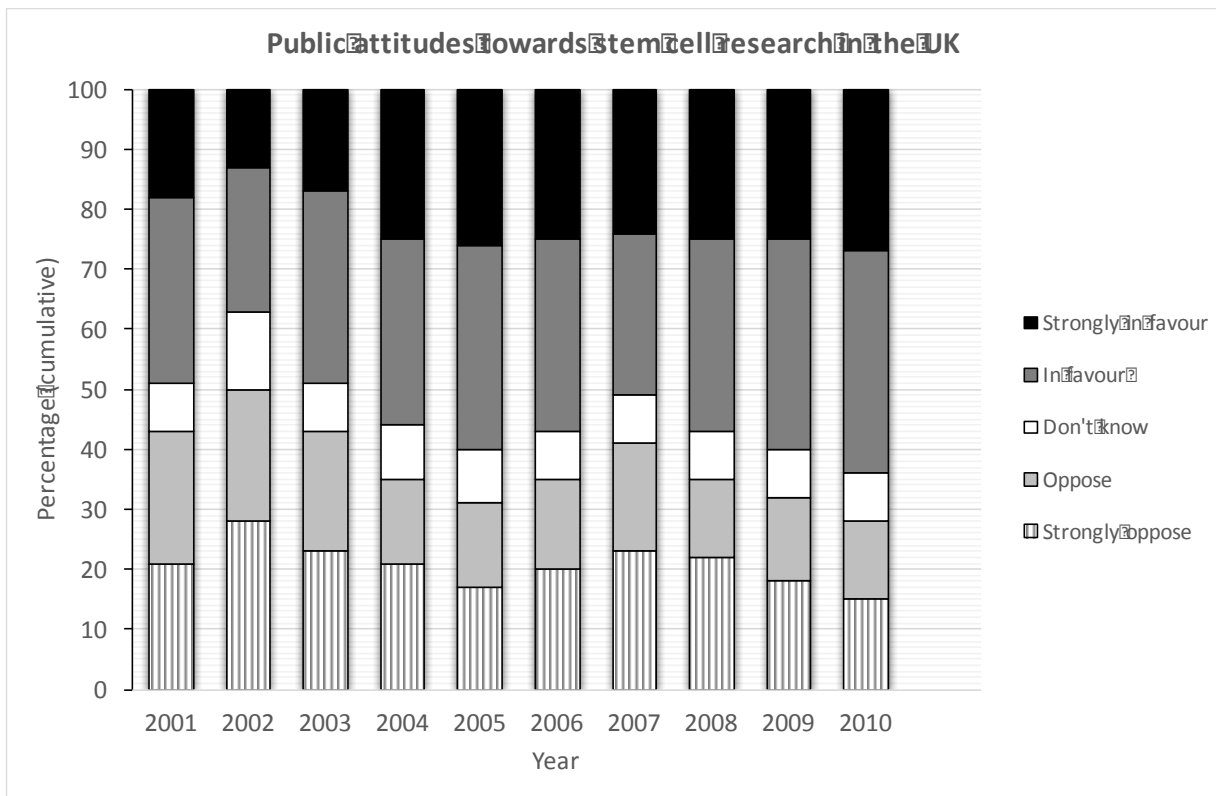
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4. The chart below shows public attitudes towards stem cell research using human embryos.



a. Describe the trend for 'in favour' and 'strongly in favour' between 2001 and 2010. (3)

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b. Calculate the percentage decrease for 'strongly opposed' at its highest and lowest points. (3)

c. Explain why some people may strongly oppose the use of human embryos in research. (4)

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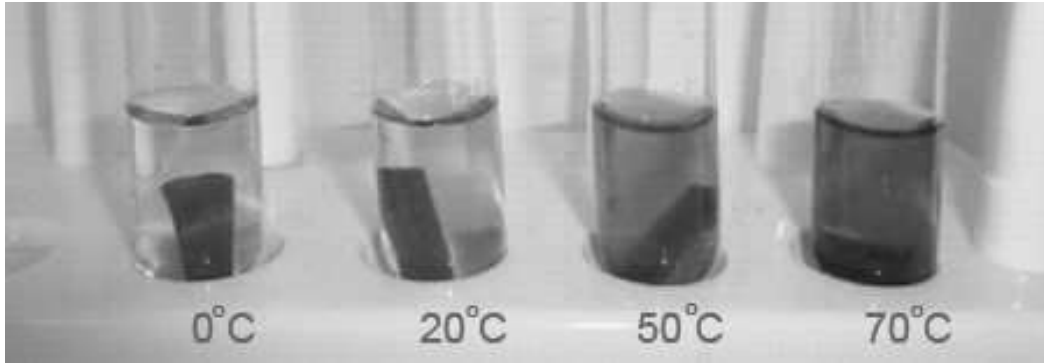
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**E. Transport in cells**

1. The image below shows beetroot in different temperatures of water. The beetroot pieces are all the same size and shape and this is the result after 20 minutes.



Explain the results of this experiment. (4)

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2. Plants and animals have adaptations that allow for efficient transport of substances in and out of cells. One of these adaptations is maintaining the concentration gradient.

a. Explain the importance of maintaining the concentration gradient in diffusion. (2)

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b. Describe the adaptations for transport in cells in plants and in animals. (4)

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### 3. Extended response question:

A student has been given the following equipment and has been asked to investigate the rate of osmosis in potato tissue at different salt concentrations.



Describe how you would use this equipment to investigate the rate of osmosis in potato tissue at different salt concentrations. How will you make it a fair test? (6)

**Not all the equipment you will need is shown here.**

**You will not need to write a risk assessment.**

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