1. What are the three fundamental statements of *cell theory*?

   i.

   ii.

   iii.

2. When Hooke first observed what he called 'cells' of cork under the microscope, it was the first time that the *cell hypothesis* had been proposed. Soon after, *cell* ***theory*** became more widely accepted. A theory is as close to 'truth' as we expect to find in Science – it must be supported by indisputable evidence. What are some of the scientific advances and discoveries that have helped strengthen belief in cell theory?

3. Some types of cell seem to break the laws of cell theory.

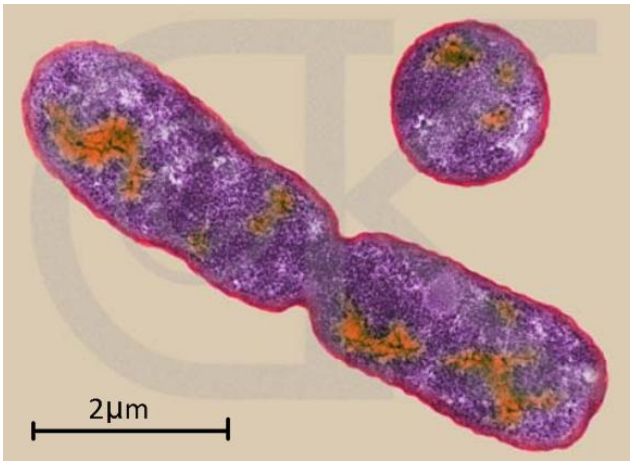
   a. Give two examples of cells which are multinucleated

   b. What is one organism which can be a 'giant' single cell?

   c. Why are viruses often considered 'acellular' or even non-living?

4. The diagram below shows the characteristic rod-shaped structure of E. coli bacteria.

a. What is the magnification of the image?



b. By which method (shown here) do bacteria reproduce?

5. Complete this table of SI units of length:

Unit	Abbreviation	Metric Equivalent	
kilometer	km	1 000 m	10^{3} m
	m	1 m	-
centimeter	cm		10^{-2} m
	mm	0.001 m	10^{-3} m
micrometer	µm	0.000 001 m	
nanometer	nm		10^{-9} m

6. What is the magnification of these images?

a. Scale bar 10µm measures 40mm on the image.

b. Scale bar 5µm measures 25mm on the image.

7. A micrograph has a scale bar of 2µm, which measures 40mm on the image. Measuring the maximum length of the cell in the image, the ruler reads 180mm. How long is the cell?

8. What are the advantages of maximizing the surface area: volume ratio in a cell?

9. As the volume of a cell increases, what happens to…? (increase/ decrease)

a. Production of waste products.

b. Usage of nutrients and oxygen.

c. The surface area: volume ratio.

10. Suggest two things a large cell might do to increase its surface area: volume ratio.

i.

ii.

11. “Unicellular organisms carry out all the functions of life.”

a. Give one example of a unicellular organism.

b. What are 6 ‘functions of life’?

12. “Multicellular organisms show emergent properties”
Explain, in simple terms, the meaning of this statement.

13. What is a stem cell?

14. What type of cell could a liver stem cell become?

15. Give three examples of specialized cells in multicellular organisms.
Describe how their structure relates to their function.

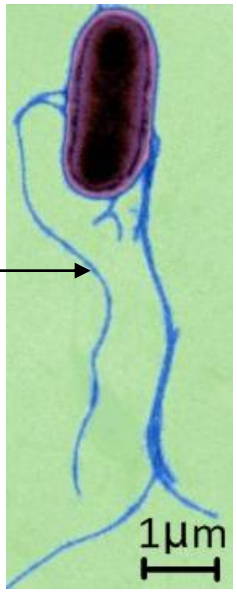
i.

ii.

iii.

16. Explain briefly how cell differentiation occurs. Refer to ‘genes’ in your answer.

17. This is an electronmicrograph of the bacterium *Salmonella typhi*.



a. What is the maximum length of the main body of the cell?

b. What are the name and function of this structure?

c. *S typhi* and *E. coli* are examples of prokaryotes.
What does the term ‘prokaryote’ literally mean?

Reference form Bandung International School