

Haemocytometer Questions– Worked Examples

Use of haemocytometer to estimate cell numbers per cm^3 in a liquid broth culture.

Step 1 Work out volume of liquid placed in haemocytometer slide in cm^3 .

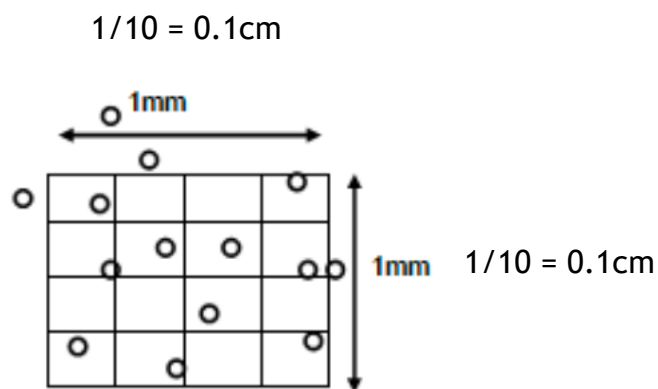
Length x breadth x depth (remember if mm divide by 10)

Step 2 Count number of cell colonies viewed in diagram (microscope).

Step 3 Proportion calculation to scale up per cm^3 .

Q - The diagram below represents red blood cells in a haemocytometer.

The grid is 0.1mm in depth.



A—

1. Work out Depth

$$L \times b \times h = 0.1 \times 0.1 \times 0.01 = \underline{0.0001\text{cm}^3}$$

2. Count Cells

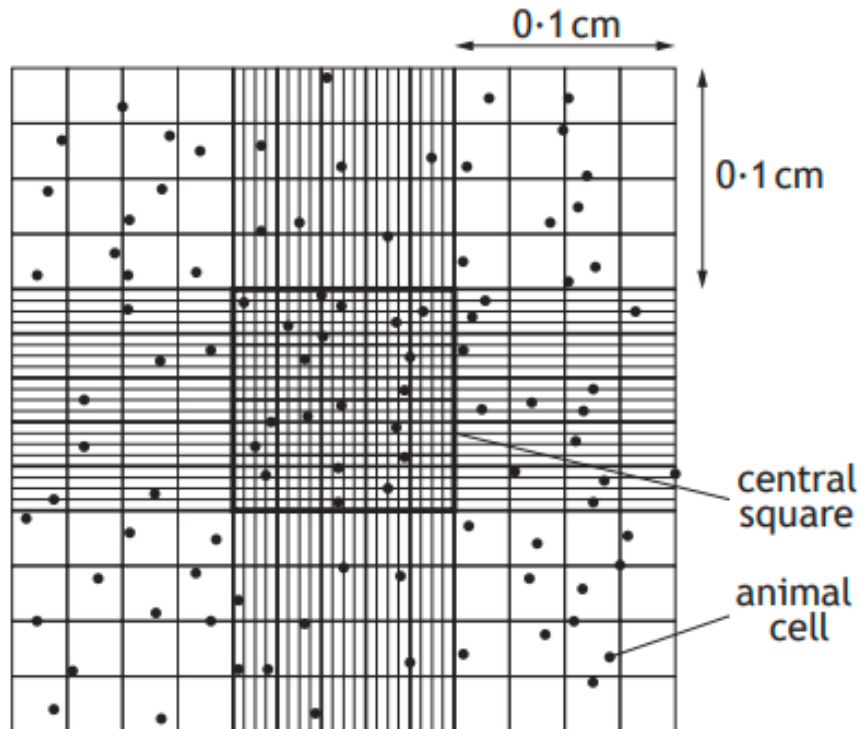
10 RBC's are on the inside of the haemocytometer grid.

3. Proportion	0.0001cm^3	→	10 RBC
	1cm^3	→	<u>100,000 RBC</u>

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Specimen 2 (no longer available on SQA website) - easier as no mm to cm conversion

The diagram below shows a haemocytometer counting chamber containing animal cells. The depth of the chamber is 0.01 cm.



The concentration of animal cells, based on the cell count from the central square, is

1. Work out volume

$$L \times b \times h = 0.1 \times 0.1 \times 0.01 = \underline{0.0001\text{cm}^3}$$

2.Count Cells

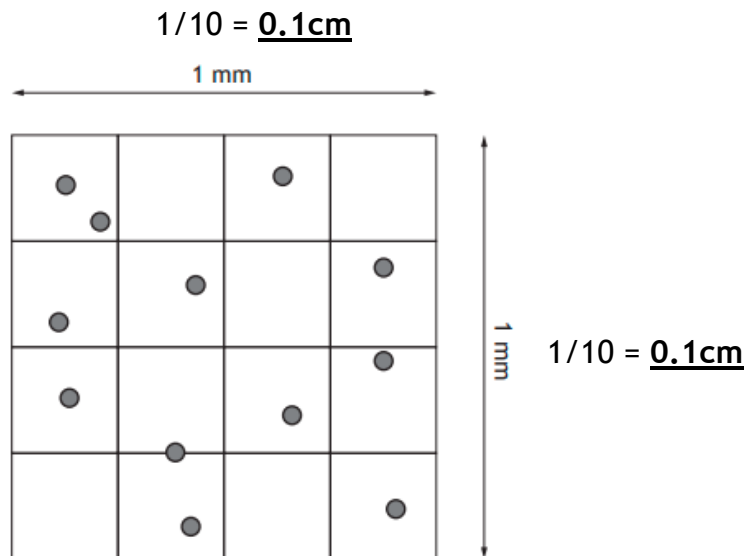
20 animal cells on the inside of the haemocytometer grid.

	0.0001cm^3	→	20 animal cells
3.Proportion	<u>1cm^3</u>	→	<u>200, 000 animal cells</u> = <u>2.0×10^5 animal cells</u>

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2022 Q2b

A haemocytometer can be used to estimate the number of bacterial cells in a liquid culture. The figure represents bacterial cells from a culture, placed in a haemocytometer that has a depth of 0.1 mm ← $0.1/10 = \underline{0.01\text{cm}}$



Calculate the number of cells per cm^3 of the liquid culture.

1. Work out volume

$$L \times b \times h = 0.1 \times 0.1 \times 0.01 = \underline{0.0001\text{cm}^3}$$

2.Count Cells

12 bacterial cells are on the inside of the haemocytometer grid.

3.Proportion

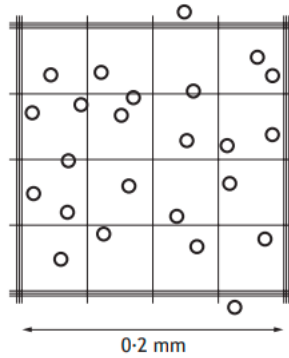
0.0001cm^3	→	12 RBC
1cm^3	→	<u>120,000 bacterial cells</u>

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Specimen Paper

The diagram shows a haemocytometer grid that was used to estimate the number of cells in a **10 cm³** microbial culture. The depth of the counting chamber is **0.2 mm**.

$$0.2 / 10 = \underline{\underline{0.02 \text{ cm}}}$$



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Calculate the number of cells per cm³ of the liquid culture.

1. Work out volume

$$L \times b \times h = 0.02 \times 0.02 \times 0.02 = \underline{\underline{0.000008 \text{ cm}^3}}$$

2. Count Cells

22 bacterial cells are on the inside of the haemocytometer grid.

3. Proportion

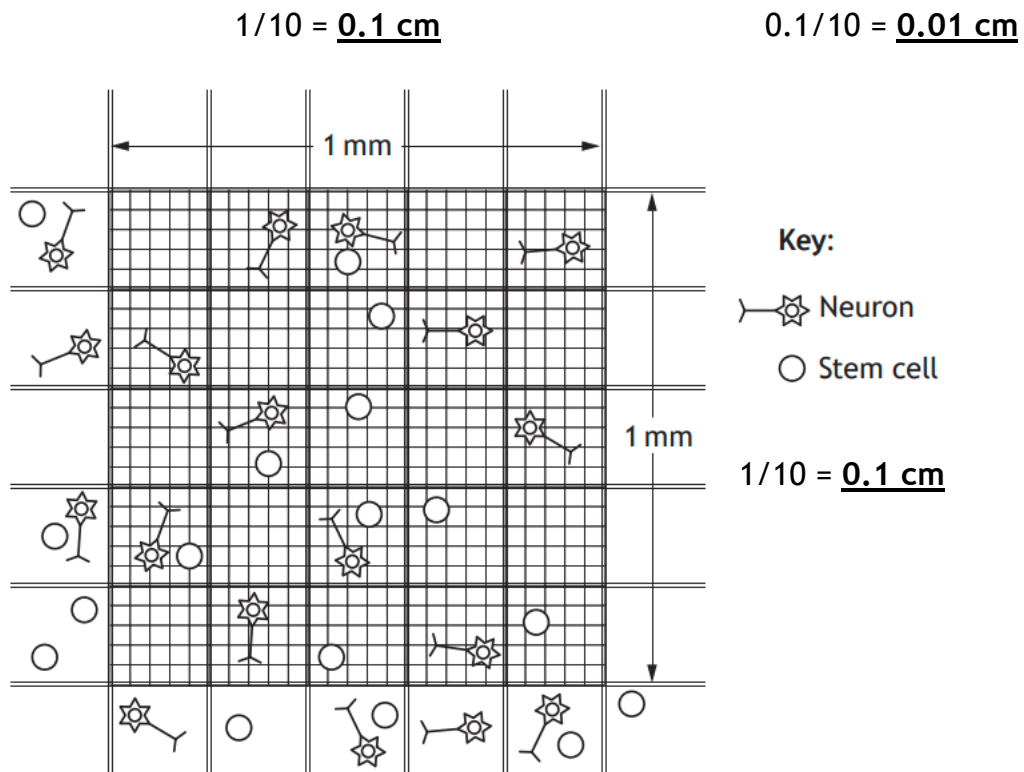
$$\begin{array}{lcl} 0.000008 \text{ cm}^3 & \longrightarrow & 22 \text{ bacterial cells} \\ \underline{10 \text{ cm}^3} & \longrightarrow & \underline{\underline{27,500\,000 \text{ bacterial cells}}} \\ & & = \underline{\underline{2.75 \times 10^7 \text{ bacterial cells}}} \end{array}$$

**** Be careful this question asked for **10 cm³** NOT the usual **1 cm³**.

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2016 Paper

Scientists used a haemocytometer to perform a cell count to calculate the number of stem cells that developed into neurons. The diagram below represents a sample from a culture placed in a haemocytometer and viewed under a microscope. The grid is 0.1 mm in depth.



Calculate the number of neurons in 1 cm^3 of the culture.

1. Work out volume

$$L \times b \times h = 0.1 \times 0.1 \times 0.01 = \underline{0.0001 \text{ cm}^3}$$

2.Count Cells

11 neurons on the inside of the haemocytometer grid.

3.Proportion

$$\begin{array}{lcl} 0.0001 \text{ cm}^3 & \longrightarrow & 11 \text{ bacterial cells} \\ \underline{1 \text{ cm}^3} & \longrightarrow & \underline{110,000 \text{ neurons}} \end{array}$$