Practice Question Set For A-Level
Subject : Biology
Paper-1 Topic: 2 Cells

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Name of the Student:_____
Max. Marks : 25 Marks **Time : 25 Minutes**

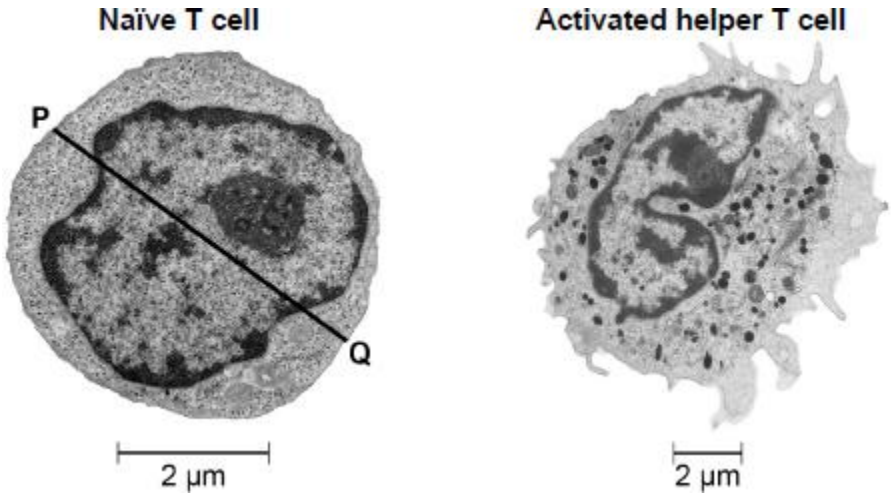
Q1.

Scientists investigated the activation of T lymphocytes.

The scientists studied two types of cell:

- naïve T cells, which are T cells that have not yet been in contact with a foreign antigen
- activated helper T cells, which are T cells that have been activated by a foreign antigen.

The figure below shows electron microscope images of the two types of cell.



The activated helper T cell has a volume of 463 µm^3

(a) Calculate the volume of the naïve T cell shown in the figure.
Then calculate how many times larger the activated helper T cell volume is compared with the naïve T cell volume.
Assume the cell is spherical.
Use line **PQ** to measure the diameter of the naïve T cell.

Volume of a sphere = $\frac{4}{3}\pi r^3$ where π is 3.14

Show your working.

Volume of naïve T cell _____ µm^3

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Number of times larger the activated helper T cell volume is compared with the naïve T cell volume _____

(3)

(b) State **one** feature that shows the images in the figure in part (a) were taken with an electron microscope and **not** an optical microscope.

Explain your answer.

_____

_____

_____

_____

_____

_____

(2)

(c) State **one** role of a helper T cell.

_____

_____

_____

(1)

(d) The rate of translation is increased in T cells activated by antigens.

Describe the role of tRNA in translation.

_____

_____

_____

_____

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_____

(2)

(Total 8 marks)

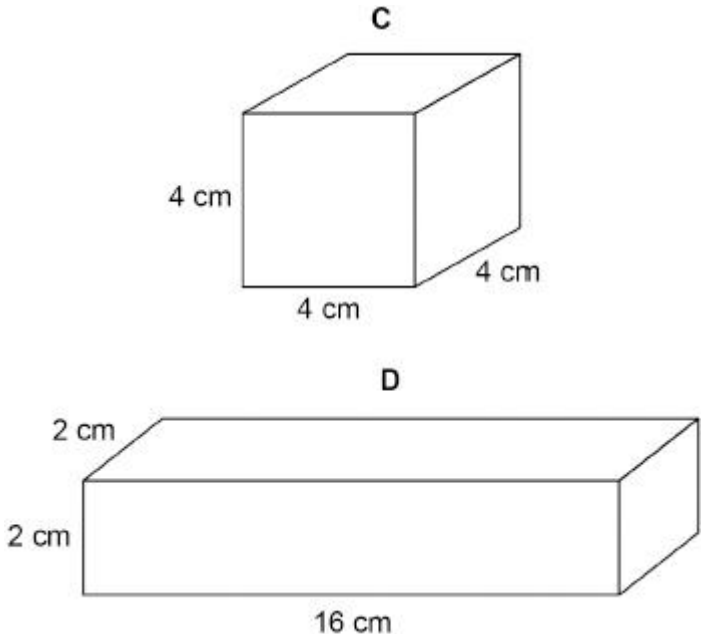
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Q2.

A student investigated the effect of changing surface area on the rate of diffusion of a solution into the centre of agar blocks.

She used agar coloured by an indicator. The indicator is pink at pH > 8 and colourless at pH 8 and pH < 8

She cut blocks in different shapes as shown in the figure below.



(a) Complete **Table 1** to show the surface area and the surface area to volume ratio for the two shapes.

Table 1

Shape	Surface area / cm^2	Volume / cm^3	Surface area to volume ratio
C	_____	64	_____ : 1
D	_____	64	_____ : 1

(2)

(b) The student put the blocks into an acidic solution.

The acidic solution caused the blocks to gradually turn from pink to colourless.

She recorded the time taken for the blocks to turn completely colourless.
She repeated this three times.

Table 2 shows the student's results.

Table 2

Shape	Time for block to turn colourless / s				Mean time for block to turn colourless / s
	Block 1	Block 2	Block 3	Block 4	
C	3490	1200	3540	3530	_____

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D	1680	1500	1590	1610	1595

After collecting the data, the student noticed that shape **C**, block 2 was damaged.

Calculate the mean for shape **C**.

(1)

(c) Suggest what the student should have done when she saw that shape **C**, block 2 was damaged.

_____

_____

_____

(1)

(d) State **three** variables the student controlled in order to obtain valid results.

1 _____

2 _____

3 _____

(2)

(e) Describe how gas exchange occurs in single-celled organisms **and** explain why this method cannot be used by large, multicellular organisms.

_____

_____

_____

_____

_____

_____

_____

_____

_____

(3)

(Total 9 marks)

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