

GCSE Biology B (Twenty First Century Science)
J257/03 Breadth in Biology (Higher)

Question Set 25

1

The partially permeable membrane of the cell allows the reactants of respiration to enter the cell and the products to leave.

- (a) Complete the table to explain how each of these substances is transported into or out of cells.

Tick (✓) **one** box in each row.

Substance	Diffusion	Osmosis	Active transport
Carbon dioxide out of the cell	✓		
Oxygen into the cell	✓		
Water out of the cell		✓	

[3]

- (b) This image is of a mitochondrion.



- (i) What type of microscope would be used to take this image?

electron microscope

[1]

- (ii) Explain how this type of microscope has increased our understanding of structures such as mitochondria.

[2]

It allows us to see the mitochondria in greater detail. We can see the inner membrane (cristae) of mitochondria and understand that cristae increase the surface area which chemical reaction (respiration) can occur on.

- (iii) Human heart muscle contracts on average 80 times per minute.

Suggest why heart muscle cells contain a large number of mitochondria.

To provide lots of energy / ATP required for the heart muscle contractions

[1]

(c) A human liver has a mass of approximately 1.3 kg.

Hepatocytes are one type of cell found in the liver. They make up approximately 75% of the liver mass.

It is estimated that 18% of each hepatocyte is mitochondria.

Calculate the mass of the liver that is made of hepatocyte mitochondria.

$$\text{Hepatocytes} = 1.3 \times 0.75 = \underline{0.975 \text{ kg}}$$

$$\text{mitochondria} = 0.975 \times 0.18 = 0.1755 \text{ kg}$$

$$\text{Mitochondrial mass of liver} = \dots\dots\dots 0.1755 \text{ kg}$$

[2]

Total Marks for Question Set 25: 9

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