AS Level Biology A

H020/01 Breadth in Biology

Question Set 7

1. The fluid mosaic model describes plasma membranes of all living organisms.

(a) How does the fluid mosaic model describe the structure of plasma membranes?

[2]

(b) Plasma membranes are partially permeable, allowing some molecules to cross the membranewith relative ease.

One molecule that crosses membranes easily is the steroid hormone progesterone which isproduced in the ovaries from cholesterol.

(i) Explain why progesterone can move across membranes.

[2]

(ii) Name one other molecule that can cross plasma membranes.

[1]

(c) **(i)** Potassium ions are unable to move across membranes as they are charged.

State how the structure of the cell surface membrane allows potassium ions to enter orleave a cell.

[1]

(ii) The process of active transport uses ATP to pump potassium ions through the cell surface membrane against the concentration gradient.

ATP is made up of phosphate groups and two other molecules.

Name the **two** other molecules.

1 .....

2 .....

[2]

(d) A group of students investigated the effect of temperature on the membranes of beetrootcells.

A colorimeter was used to measure the concentration of purple betalain pigment that leakedout of the cells when they were exposed to different temperatures.

Table 23 shows a summary of the data collected.

Temperature (°C)	Number of readings	Mean absorbance (arbitrary units)	Standard deviation
0	10	0.04	0.01
10	10	0.04	0.02
20	10	0.04	0.02
30	10	0.06	0.02
40	10	0.09	0.03
50	10	0.21	0.06
60	10	0.44	0.18

Table 23

(i) Using the Student's *t*-test formula below, calculate the value of *t* between the data for **50 °C** and **60 °C**.

$$t = \frac{\left|\overline{x}_A - \overline{x}_B\right|}{\sqrt{\frac{S_A^2}{n_A} + \frac{S_B^2}{n_B}}}$$

where: $\overline{x}$ is the mean
S is the standard deviation
n is the number of readings

Answer =…… **[3]**

(ii) The critical value for *t* at the significance level of 5%, with 18 degrees of freedom, is 2.10.

Use the value of *t* that you calculated in part **(i)** to explain whether the null hypothesis should be accepted or rejected.

[2]

(e) The students plotted the data onto a graph, shown in Fig. 23.

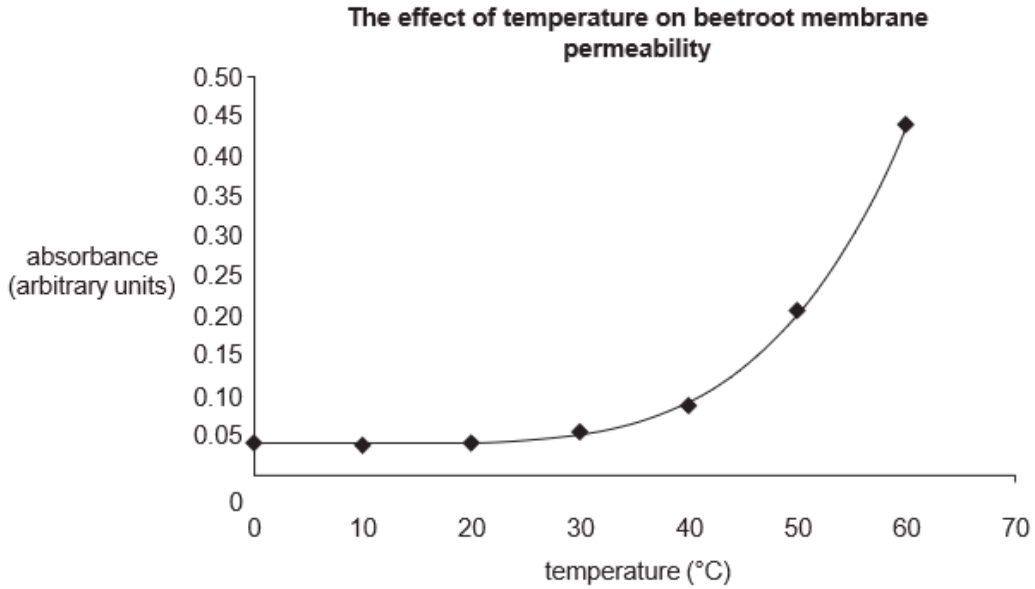

Fig. 23

Describe and explain the pattern of data shown on the graph as temperature increases.

[3]

Total Marks for Question Set 7: 16