Oxford Cambridge and RSA

AS Level Biology A

H020/02 Depth in biology

Question Set 6

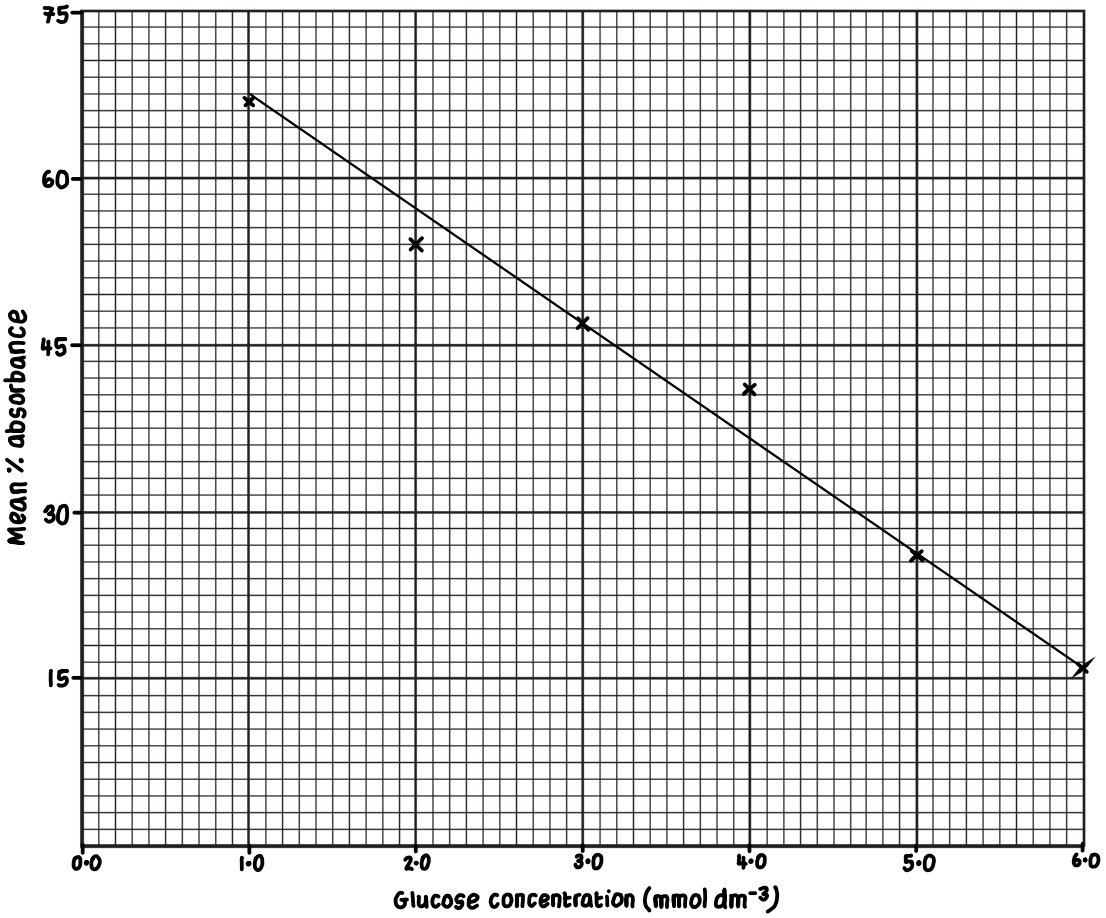
1. A group of students decided to investigate the glucose content of three types of fruit juice. They carried out the Benedict's test on known concentrations of glucose solutions and used these to calibrate a colorimeter.

The results of their calibration are shown in Table 1.

glucose concentration (mmol dm^{-3})	% absorbance			
	Trial 1	Trial 2	Trial 3	Mean
1.0	67	68	65	67
2.0	54	52	55	54
3.0	47	46	48	47
4.0	41	41	40	41
5.0	27	25	25	26
6.0	16	16	17	16

Table 1

(a) **(i)** Plot a graph of the mean % absorbance at each glucose concentration.



[3]

(ii) The students were provided with three different fruit juices labelled A, B and C. The Benedict's test was carried out on each fruit juice and samples were prepared for the colorimeter.

Explain how the students would use the calibration curve to estimate the glucose concentration of the fruit juices.

[2]

Use the colorimeter to determine the absorbance of each fruit juice. Using the calibration curve, draw a line from the absorbance value on the y-axis to the line of best fit and then down to the the concentration on the x-axis.

(b) The students wrote the following hypothesis:

'The higher the concentration of glucose in the fruit juice, the sweeter it will be.'

(i) Describe how you would carry out a controlled experiment to test this hypothesis **without** using a colorimeter.

[4]

Taste the fruit juices to qualitatively determine their sweetnesses and rank them from most (1) to least (3) sweet. The taste test should be blind to avoid bias, and the same volume of fruit juice ingested. Use a biosensor to determine the amount of glucose present in each juice. Place a small volume of each juice into the biosensor and rank each of the resultant readings displayed from highest (1) to lowest (3) glucose concentration. Use a Spearmann's rank correlation coefficient test to identify and determine the strength of any association between the two variables.

(ii) Suggest one reason why the results for this experiment might **not** support the students' hypothesis. **[1]**

Determining the sweetness of the juice by taste is subjective so opinions may vary between individuals.

(c) Glucose and cholesterol are both molecules transported in the bloodstream that may needmonitoring in people with different medical conditions.

Fig. 1 represents the structure of a cholesterol molecule.

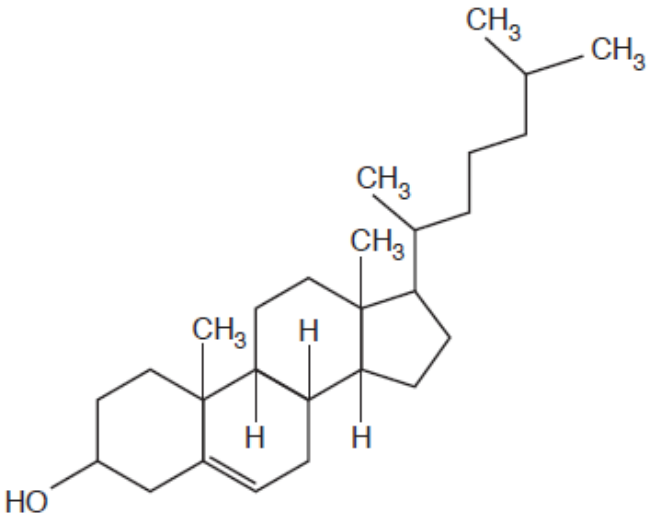


Fig. 1

(i) State **two** ways in which the molecular structure of cholesterol is similar to the molecular structure of glucose. **[2]**

Both contain C, H and O atoms. Both contain hydroxyl groups.

(ii) Glucose is an important biological molecule required by cells for cellular respiration.

State the physical property of glucose that allows it to be easily transported in the bloodstream. **[1]**

Glucose is soluble in water.

Total Marks for Question Set 6: 13