Q1.

(a) Molasses is a solution obtained from sugar beet plants. The sugars present in molasses are sucrose, glucose and fructose.

Give the number of different types of monosaccharides present in molasses.

_____

(1)

(b) A student used the biochemical test for reducing sugars on a clear sample of molasses.

Describe the biochemical test for a reducing sugar.

Explain the result expected from the test on the sample of molasses.

Description of biochemical test _____

_____

_____

_____

Explanation of expected result _____

_____

_____

_____

(3)

(c) 'Free sugar' is the sugar in food and drinks released when food is crushed or when sugar is added to food at home or by manufacturers.

Scientists recommend that no more than 5% of the energy consumed per day should come from 'free sugar'.
The mean daily energy requirement for a 10-year-old child is 8100 kJ

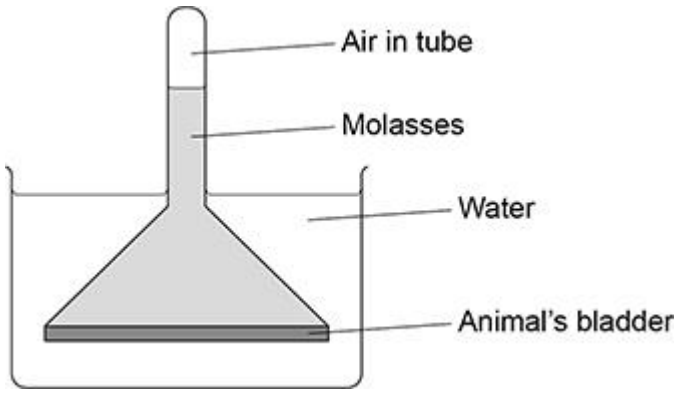
The 'free sugar' in one tablespoon of molasses contains 250 kJ of energy.

Calculate the number of tablespoons of molasses required for a 10-year-old child to reach the recommendation for energy consumed in 'free sugar' per day.

Number of tablespoons _____ per day

(1)

(d) A scientist used the apparatus in below figure to investigate osmosis.



Use your understanding of osmosis to explain why the air pressure in the tube increased.

(3)

(e) The scientist repeated the investigation, but made **one** change to the molasses. The scientist did **not** change the volume of molasses at the start of the investigation.

The scientist observed that the air pressure inside the tube increased by 160 kPa compared with 800 kPa in the first investigation.

Suggest the change the scientist made to the molasses to cause this smaller increase in air pressure.

Use the air pressure figures in a calculation to support your answer.

Suggested change _____

_____

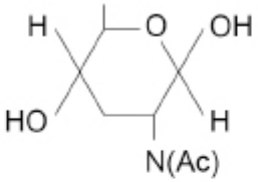
(2)

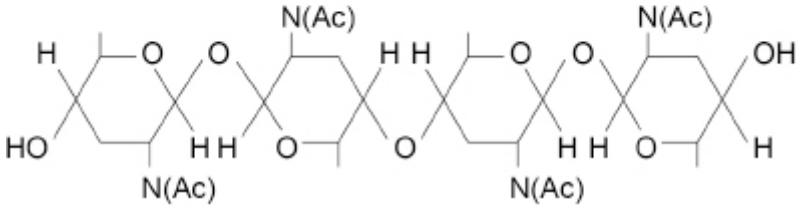
(Total 10 marks)

Q2.

(a) Chitin is a polysaccharide. The chitin monomer is a β-glucose molecule with one OH group replaced by an $NHCOCH_3$ group. $NHCOCH_3$ can be represented by N(Ac).

The figure below shows the monomer that forms chitin and the chitin polymer.





Chitin has a similar structure to cellulose.

Use the figure above to describe **three** ways the structure of chitin is similar to the structure of cellulose.

1 _____

_____

_____

2 _____

_____

_____

3 _____

_____

_____

(3)

(b) Chitin keeps the tracheae open in the tracheal system of gas exchange in an insect. Gas exchange does **not** occur in the tracheae.

Explain the importance of **one** adaptation of the gas exchange surface in the tracheal system of an insect.

(2)

(c) Lignin is a polymer found in the walls of xylem vessels in plants. Lignin keeps the xylem vessel open as a continuous tube.

Explain the importance of the xylem being kept open as a continuous tube.

(3)

(Total 8 marks)

Q3.

(a) What term is used to describe the different structures of α-glucose and β-glucose?

_____

(1)

(b) A student investigated the difference in the reducing sugar content of two fruit juices. He performed a biochemical test on each fruit juice using Benedict's solution. He then used a colorimeter with each test result.

Describe how the results from the colorimeter can identify the fruit juice containing the higher sugar content.

_____

_____

_____

_____

(1)

(c) The student controlled variables in the test using Benedict's solution.

Give **two** variables the student controlled.

1 _____

2 _____

(2)

(d) Apples consist of flesh tissue which surrounds core tissue where the seeds are located.

A student has an apple with a mass of 180 g
The ratio of flesh tissue to core tissue in this apple is 5:1
8% of the whole apple is sugar.

Calculate the mass of sugar in the flesh tissue.

Show your working.

Answer _____ g

(2)

(e) Iodine solution stains fresh apple tissue black. When iodine solution is added to apples stored for a week, the stain is less black.

The water potential of apple juice decreases when apples are stored.

Suggest why the water potential of apple juice decreases when apples are stored.

_____

_____

_____

_____

_____

_____

(2)

(Total 8 marks)

Q4.

(a) Describe the transport of carbohydrate in plants.

(5)

(b) Compare and contrast the structure of starch and the structure of cellulose.

(6)

(c) Describe the complete digestion of starch by a mammal.

(4)

(Total 15 marks)