1 Well, what do you know?

Read the following passage

The poet who wrote 'Sugar and spice and all things nice, that's what little girls are made of' was lying. Any biologist can tell you that little girls, and their brothers, are made of protein, carbohydrates, lipids, nucleic acids, some inorganic ions and a lot of water.

Now Walter de la Mare was telling the truth when he wrote: 'It's a very odd thing, as odd as can be, that whatever Miss T eats turns into Miss T'. Whatever the associated delights of food may be, we eat for two reasons: to get energy and to acquire the raw materials for growth and metabolism.

Any organic material is food for something; it's all a matter of taste. Dung beetles find nourishment in what sheep leave behind, and sheep can gain from grass all the materials for making meat and wool. The macromolecules that make up our own cells are all derived from the macromolecules we consume. Whether we are omnivores or herbivores, the carbohydrates, proteins, lipids (fats and oils) and nucleic acids that we digest and absorb become the components of human cells.

Cells are mostly water, but if all the water is driven off by heating we are left with the organic content of the cells and some inorganic ions. The organic compounds are mostly polymers, particularly protein and, if we are talking of plant cells, cellulose.

The cytoplasm contains thousands of different soluble proteins known as enzymes, which play an important role in all metabolic processes. Proteins also have an important structural function because they form part of all cell membranes. The other major components of cell membranes are lipids. These are a heterogeneous group of substances, but one thing they all have in common is that they are insoluble in water. A cell surface membrane is more than just a bag holding everything in; it also exerts control over what enters and leaves the cell.

A cell wall is completely different from a cell surface membrane. A plant cell synthesises the cell wall on the outer surface of the cell surface membrane by linking together molecules of glucose to make cellulose. This polysaccharide is never found in animal cells, although glucose is.

Glucose is a carbohydrate and is the most commonly occurring monosaccharide. For almost all cells it is the starting-point in respiration. Remember that food not only provides the materials to make cells, it also provides the energy to make cells work. Energy is released when glucose is broken down chemically inside cells in the process called respiration.

Cells are involved in all kinds of work. Watch a time-lapse film of animal cells and you can see how much they move. Under the microscope you can watch chloroplasts streaming around the cells of Canadian pond weed. Movement is only one of the energy-requiring activities of cells; making bigger molecules from smaller ones is another and so is the control of some substances entering or leaving through the cell surface membrane.

Respiration is one of the characteristics of living organisms. Plants are living organisms, so plants carry out respiration. But plants get their energy from sunlight, so why do they respire? For one thing, only the green parts of a plant photosynthesise, and all cells, green or not, require energy. Even the green cells respire, and this takes place all the time, not only at night. Photosynthesis in the chloroplasts makes glucose, and this travels to other parts of the cell, where it is broken down to release energy for jobs such as building up proteins or cellulose, controlling entry of molecules through the cell surface membrane and cell division.

1 Well, what do you know?

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Your task...

Reading to get information is one of the essential skills for effective learning. The following questions and exercises are designed to help you analyse and understand what you have just read.

1 Find and underline in pencil all the words which you are unable to define.

Learning biology is like learning a new language; there are so many new words. Understanding what some of the prefixes mean will help you to learn some of the new words. 'Pre-' means before, so a *pre*fix is the beginning part of a word. 'Poly-' means many, while 'mono-' means one. 'Hetero-' means different and 'macro-' means large.

2 Here are definitions of some of the technical words in the passage. See if you can match the definitions to the appropriate words in the text. Use the context and the information above to help you.

(a) Composed of different types .....

(b) Compounds which do not contain carbon, or if they do, they do not also contain hydrogen .....

(c) Molecules consisting of large numbers of atoms .....

(d) All the chemical reactions which occur in cells .....

(e) A sweet-tasting molecule consisting of a single unit .....

(f) A kind of acid abundant in the nuclei of cells; includes DNA and RNA .....

(g) Compounds which contain carbon and usually hydrogen .....

(h) Molecules consisting of chains of repeating units .....

(i) A chain of sweet-tasting molecules .....

(j) The chemical breakdown of organic molecules with the release of energy; occurs inside cells .....

Metabolism includes two types of processes: reactions which result in larger molecules being broken down into smaller ones and those which result in smaller molecules being built up into larger ones. The breakdown of large molecules into smaller ones is called catabolism (from a Greek word meaning to throw down). The building up of small molecules into larger ones is called anabolism (which means to throw up!). You may have heard of anabolic steroids. These are hormones that stimulate the building up of muscle protein.

3 In the text, two paragraphs refer to catabolism, two refer to anabolism and one paragraph refers to both. Find these paragraphs. Underline references to catabolism in red and references to anabolism in blue.

4 Give the names of two catabolic processes and one anabolic process.

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1 Well, what do you know?

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5 Do enzymes play a part in both anabolism and catabolism? Which line tells you the answer?

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6 What is cellulose used for in cells?

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7 What is cellulose made from?

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8 Which of the following words describe cellulose? Underline your answers.

carbohydrate macromolecule polymer polysaccharide protein

9 Dietary fibre is mainly cellulose. Suggest an explanation of how 'dung beetles find nourishment in what sheep leave behind' (lines 7–8).

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10 The passage refers to cell membranes and cell surface membranes. Suggest a distinction between these two terms.

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11 Which substances are found in:

(a) Plant cell walls? .....

(b) Cell membranes? .....