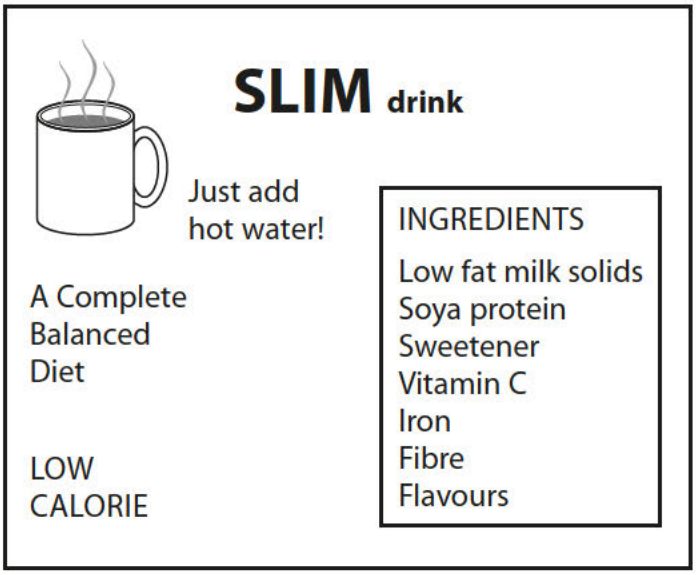
1 The diagram shows the label on a packet of a new kind of food for people who want to lose weight.



The food is a powder which is added to water to make a liquid drink. The label on the packet claims that the food provides a complete balanced diet.

(a) What is meant by the term **balanced diet**?

(2)

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(b) A pregnant woman decides that this food does not provide her with a complete balanced diet.

Use the information on the packet to give two reasons why the pregnant woman may be right.

(2)

1 .....

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2 .....

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(Total for Question = 4 marks)

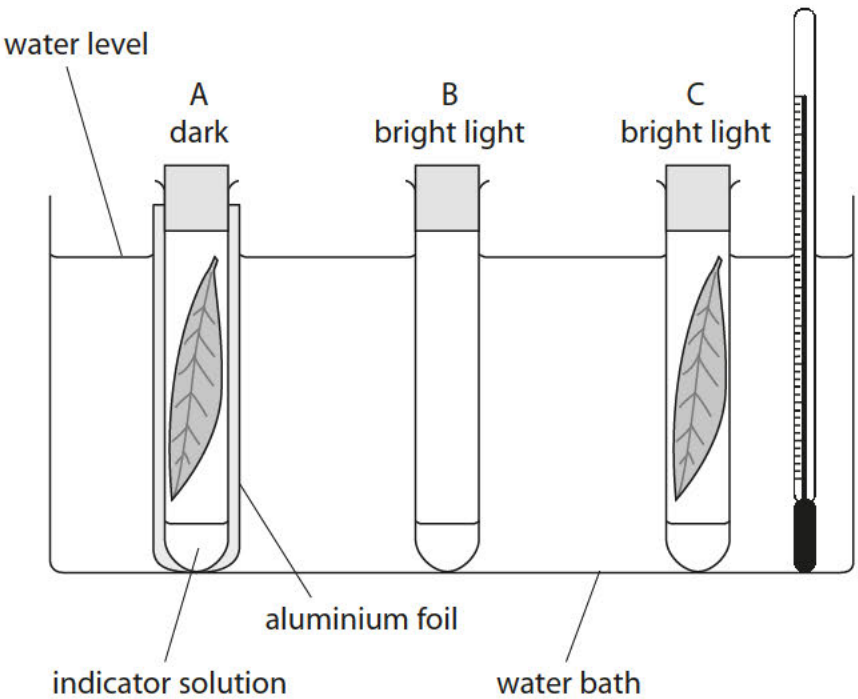
2 Caroline investigated how light affected photosynthesis by looking at changes in carbon dioxide levels.

She placed 2 cm^3 of orange hydrogen carbonate indicator solution into three test tubes.

She put a leaf in two of the test tubes, which were then firmly sealed with a bung. These leaves were similar in size and were taken from the same plant. She wrapped one of the test tubes in foil to prevent light entering.

The third test tube was firmly sealed with a bung but was without a leaf.

She left the three test tubes in the conditions shown in the diagram for two hours. They were then shaken gently and the leaves were removed.



Hydrogen carbonate indicator solution is orange in normal air.

It changes colour to red as the carbon dioxide level decreases.

It changes to yellow as the carbon dioxide level increases.

The colour of the indicator solution in each test tube was recorded.

Her results are shown in the table.

Test tube	Colour of indicator solution at start	Colour of indicator solution at end
A	orange	yellow
B	orange	orange
C	orange	red

(a) Explain the colour change observed in test tube C.

(3)

(b) Explain the purpose of test tube B.

(1)

(c) Caroline set up a fourth test tube that contained a leaf and was exposed to dim light.

After two hours the colour of the indicator solution in this test tube remained orange.

Explain why.

(2)

(d) Caroline carried out another experiment to investigate the effect that light intensity has on the rate of photosynthesis in a water plant.

(i) Suggest how she could change her independent variable.

(1)

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(ii) Suggest how she could measure her dependent variable.

(1)

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(iii) Suggest how she could ensure that her results were reliable.

(2)

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(Total for Question = 10 marks)

3 Read the passage below. Use the information in the passage and your own knowledge to answer the questions that follow.

Diet in children

Doctors have warned that lifestyles of children are putting them at an increased risk of rickets. Rickets is caused by a deficiency of vitamin D. It affects the development of leg bones and was common in Britain many years ago. The disease is making a comeback because poor diet and a change in play habits have led to a vitamin D deficiency.



Children are spending more time indoors using computers compared with previous generations who spent time playing outside with their friends. Children who play outside are exposed to sunlight, which boosts vitamin D levels.

In addition, children are not being given cod liver oil – a rich source of the vitamin – in the same amounts as they were 50 years ago. Many parents used to give their children a spoonful of cod liver oil each day to supplement their diet. Two doctors have suggested that the vitamin should be added to milk and other food products to ensure children are getting the recommended amount. In Birmingham, the health authority has been offering pregnant women supplements of the vitamin to reduce the number of cases of rickets in the city.

Another concern is that families are not eating together, so children often choose their own food and prefer to snack on crisps, chocolate and soft drinks high in sugar. This means that the diet of many children is too high in fat and carbohydrates and contains more calories (energy) than the children need. Children are less active than in previous generations, so they don't use as many calories. This lack of activity may lead to other health problems.

(a) Suggest how spending time outdoors can reduce the chance of getting rickets (lines 7 and 8).

(1)

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(b) Suggest why vitamin D deficiency is more of a problem for children than for adults.

(1)

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(c) Vitamins are an essential part of a balanced diet.

Give **three** other components of a balanced diet.

(3)

1 .....

2 .....

3 .....

(d) Suggest why snacking on crisps, chocolate and soft drinks is an unsuitable diet for children who are not very active (lines 16 and 17).

(2)

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(e) Suggest the health problems that might develop if children have too much fat in their diet (line 18).

(2)

(f) Describe how you would carry out an experiment to find out the energy value of a potato crisp.

(4)

(Total for Question = 13 marks)

4 Multicellular organisms have a transport system for nutrients and waste products. In humans this transport system involves the blood.

(a) The table names some components of blood. Complete the table by giving the function of each component and its cell type.

(4)

Component of blood	Function	Cell type
platelet		cell fragment
phagocyte		white cell
lymphocyte		

(b) Suggest the consequence of having too few platelets in the blood.

(2)

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(c) Vaccination causes the body to produce memory cells.

Describe the advantages to the human body of producing memory cells.

(2)

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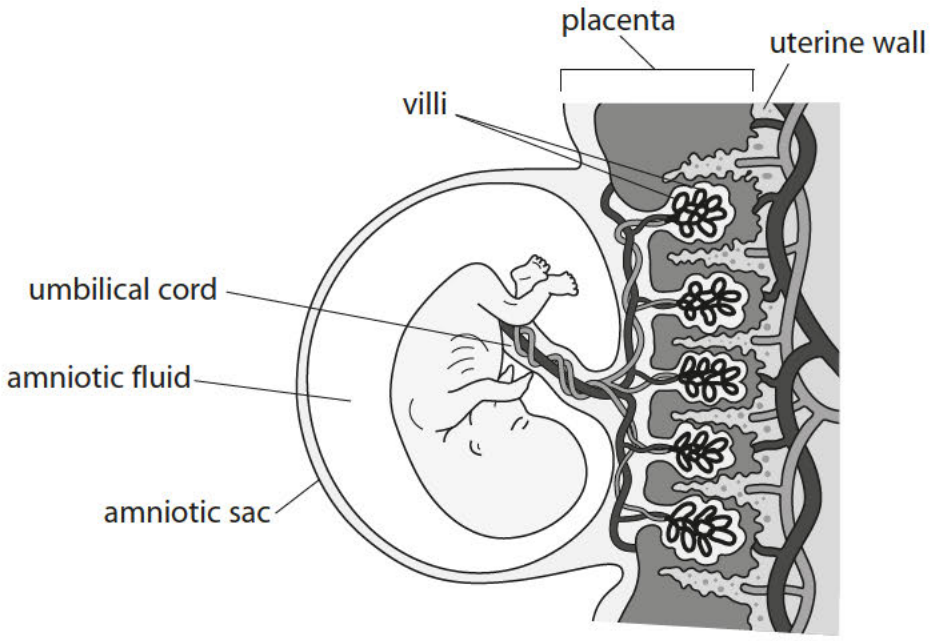
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(Total for Question = 8 marks)

5 The diagram shows a human fetus developing in the uterus.



(a) Describe the function of the amniotic fluid surrounding the fetus.

(2)

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(b) The placenta functions as an organ of exchange.

(i) Name two substances, required by the fetus, that move from the mother's blood into the blood of the fetus.

(2)

1 .....

2 .....

(ii) Name two waste substances that move from the blood of the fetus into the mother's blood.

(2)

1 .....

2 .....

(c) Use information from the diagram to help explain how the placenta is adapted for the efficient exchange of substances.

(3)

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(Total for Question = 9 marks)

6 Read the passage below. Use the information in the passage and your own knowledge to answer the questions that follow.

Japanese knotweed: a space invader

Invasive species are one of the biggest threats to wildlife and plants worldwide. The Department for Environment, Food and Rural Affairs (DEFRA) is introducing new measures that will ban the sale of some of the most dangerous foreign species in the UK.

DEFRA is attempting to prevent a problem before it happens. The majority of invader species are plants. Of the most recent count of 2 721 non-native species, 1 798 were plants. Over £1.5 billion has been spent removing a single plant species, the Japanese knotweed.

Japanese knotweed was first introduced as a garden plant. Japanese knotweed causes problems as it lacks natural predators in the UK and is very difficult to remove completely. Also, the vegetation of the knotweed is so dense, that other plants cannot grow through it. The fast-growing plant can grow up to 4 metres tall and is so strong it can break through paving stones and tarmac.



Japanese knotweed has a large network of underground stems (rhizomes). These rhizomes have to be killed if the plant is to be completely removed. The rhizomes might also be described as 'underground runners'. All above-ground portions of the plant need to be controlled repeatedly for several years in order to weaken and kill the entire patch. Digging up the rhizomes is a common solution where the land is to be developed, as this is quicker than the use of herbicides.

Scientists have looked at the weed's natural predators with the aim of finding one that feeds on Japanese knotweed and little else. After testing the predators on 90 different UK plant species, including plants closely related to Japanese knotweed, they discovered that the insect, *Aphalara itadori,* was the best control agent. It keeps the weed under control in its native Japan by feeding on the sap in the transport tissue in the leaves, which reduces the growth of the plants. The introduction of *Aphalara itadori* would be the first time that biological control has been used in Europe to fight a weed.

(a) Suggest what is meant by the term **invasive species** (line 1).

(2)

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(b) Calculate the percentage of invasive species in the UK that are plants (lines 6 and 7).

Show your working.

(2)

Answer ..... %

(c) Give **one** reason why Japanese knotweed has spread so successfully in the UK.

(1)

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(d) Suggest why the dense growth of the Japanese knotweed reduces the growth of other plants (line 11).

(2)

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(e) The use of *Aphalara itadori* to feed on Japanese knotweed is an example of biological control.

Describe another example of biological control.

(2)

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(f) (i) Name the transport tissue in the leaves that contains sap (line 25).

(1)

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(ii) Suggest why the plant growth is reduced when insects feed on the plant sap (lines 24 and 25).

(2)

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(g) Why is it important that the insect 'feeds on Japanese knotweed and little else' (line 21)?

(1)

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(Total for Question = 13 marks)