**1.** (b) Outline the causes and symptoms of type II diabetes.

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(4)

(Total 6 marks)

**2.** (a) Distinguish between *minerals* and *vitamins* in terms of their chemical nature.

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(2)

(b) Explain the benefits of artificial supplementation of iodine in the diet.

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(3)

(Total 5 marks)

**3.** (a) Define the term *nutrient*.

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(1)

(b) Outline the functions of **two** named vitamins.

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(2)

(c) Explain why the difference between saturated fats and unsaturated fats is important in a healthy diet.

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(3)

(Total 6 marks)

**4.** Osteoporosis is a major health problem for many post-menopausal women. As the ovaries reduce their secretion of estrogen, calcium is gradually lost from bones, weakening them and increasing the chance of fractures. To test whether diet influences the rate of calcium loss, ovaries were removed from groups of female rats and the rats were then either fed a control diet or the same diet with one gram of a supplementary food per day. The rate at which the rats excreted calcium was measured. The ratio of calcium loss between the control rats and the rats that were given a supplementary food was calculated. .

The results are shown in the graph below.



[Source: Muhlbauer and Li, *Nature*, 1999, **401**, pages 343–344]

(a) (i) Identify which supplementary food was **most** effective in reducing calcium loss.

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(1)

(ii) Identify which supplementary food was **least** effective in reducing calcium loss.

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(1)

(b) Among the ten foods shown in the graph, seven are plant products (vegetables) and three are animal products. Discuss whether the plant or the animal products were more effective at reducing calcium loss.

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(3)

(c) Suggest a trial, based on the results shown in the graph, that could be done to try to reduce osteoporosis in humans.

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(3)

(Total 8 marks)