

**F.3 Integrated Science
Final Examination Revision Exercises (2025-2026)**

Name: _____

Class: _____

Class no.: _____

1. For each of the food substance listed in column 1, select from **column 2** one deficiency disease that is caused by a lack of the food substance. Put the appropriate letter in the space provided.(3 marks)

Column 1

- Iodine (a) _____
 Calcium (b) _____
 Vitamin A (c) _____

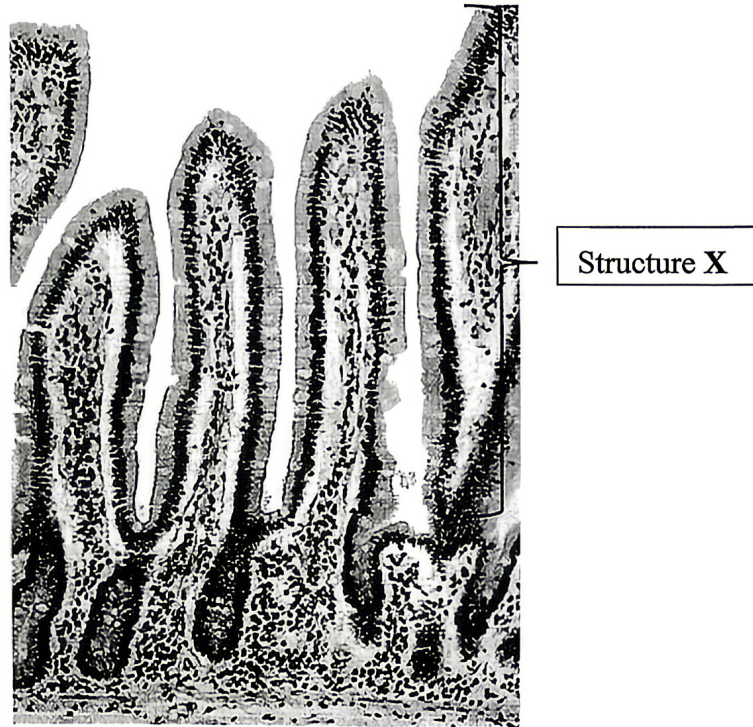
Column 2

- A. Goitre
 B. Constipation
 C. Night blindness
 D. Osteoporosis
 E. Scurvy

2. The table below shows the seven types of food substances needed in a balanced diet and their major functions in the body. Complete the table. (5 marks)

Food substance	Major function
(a)	As a main source of energy
(b)	As an energy reserve and insulation
(c)	For growth and repair, making enzymes and antibodies
Vitamins	Help in chemical reactions and are essential for maintaining good health
(d)	Regulate metabolism and as major components of some types of body structures
(e)	Stimulates peristalsis and prevents constipation
Water	As a solvent, medium for chemical reactions and for transport

3. The following micrograph shows finger-like structure **X** found in the human alimentary canal.



(a) Name the part in which structure X is found in the alimentary canal. (1 mark)

(b) Referring to *TWO* features shown in the micrograph, explain this part of the alimentary canal is adapted for absorption of digested food substances. (4 marks)

4. Individual **W**, a 25-year-old woman, went to see a dietician. She complained about feeling tired easily. The dietician knew that **W** had been a vegetarian and realized that she looked pale. He calculated her average daily intakes of energy and different nutrients, and compared them to the recommended daily intakes. The data is shown in the table below.

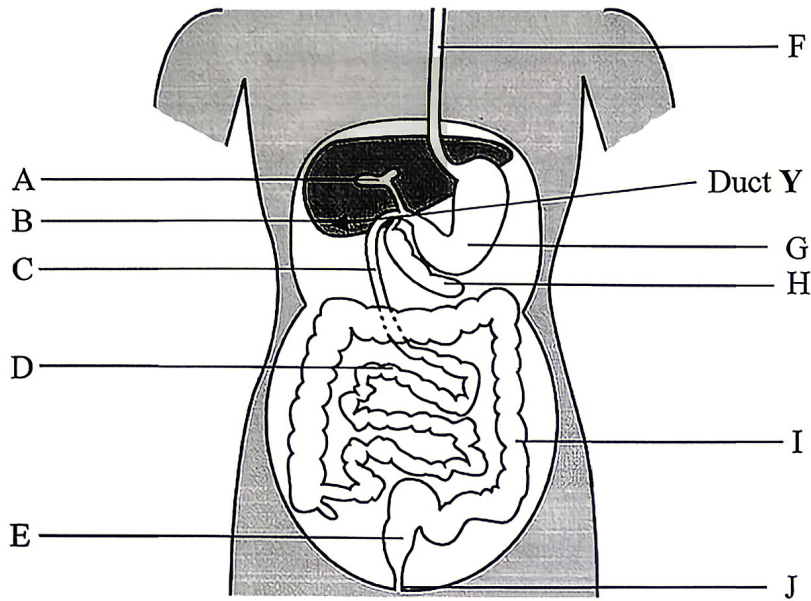
	Individual W	Recommended Daily Intake for Women (18–50 years)
Energy (kJ)	12552	8500
Protein (g)	50	50
Fat (g)	85	65
Sodium (mg)	2200	2000
Vitamin C (mg)	20	40
Iron (mg)	8	18

(a) Suppose you were individual **W**'s dietician. Based on the data shown in the table, make **TWO** recommendations on her diet which could improve **W**'s diet in terms of energy and iron intakes.(4 marks)

(b) Suggest why individual **W** felt tired easily. (3 marks)

(c) Men have a higher daily energy requirement than women. Suggest **TWO** reasons.(2 marks)

5. The diagram below shows the human digestive system with structures labelled as A to J.



(a) Which labelled structures of the digestive system produce digestive juice that is acidic? (1 mark)

(b) In which labelled structure can protease and lipase first be found along the alimentary canal? (2 marks)

(c) Structure A contains a digestive juice. (i) What is the digestive juice in structure A? (1 mark)

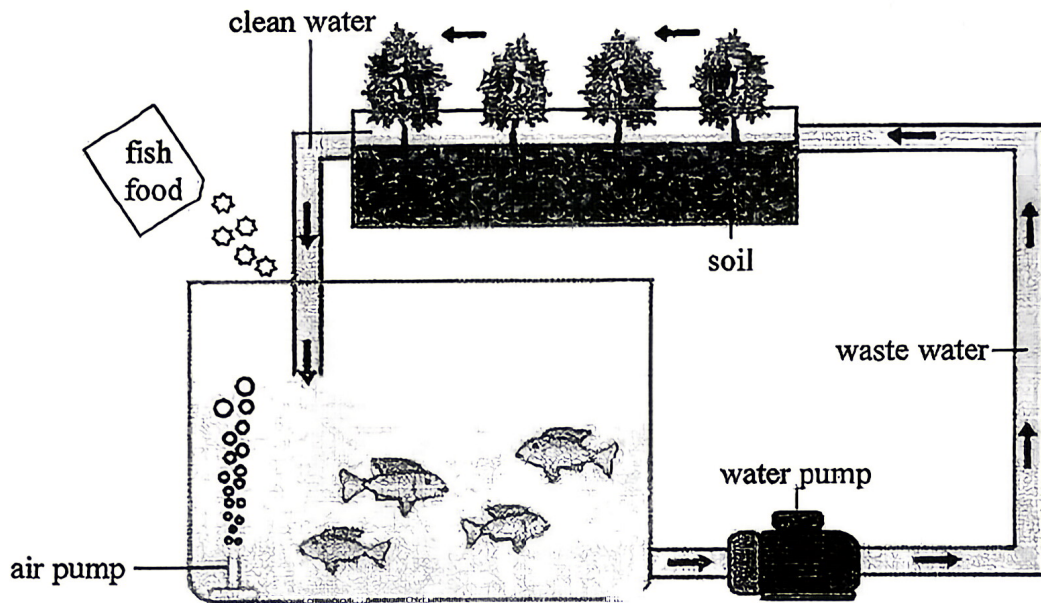
(ii) Explain why this digestive juice is important in digestion. (2 marks)

(d) The function of structure H in some people may become impaired due to the blockage of duct Y.

(i) The faeces produced by such patients usually have a high fat content. Explain why (3 marks)

(ii) In these patients, tissue of structure H may get digested. How would you account for this? (2 marks)

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6. The diagram below shows a mini-ecosystem in which waste water from a fish tank is pumped to the pot with vegetables. This is an eco-friendly way to keep both vegetables and fish together for human consumption.



- (a) Ammonia is the major waste product excreted by fish. Ammonia in waste water from the fish tank can be converted to nitrate.

(i) Name the bacteria involved in the conversion.

(1 mark)

- (ii) Explain why this mini-ecosystem is beneficial to both vegetables and fish (2 marks)

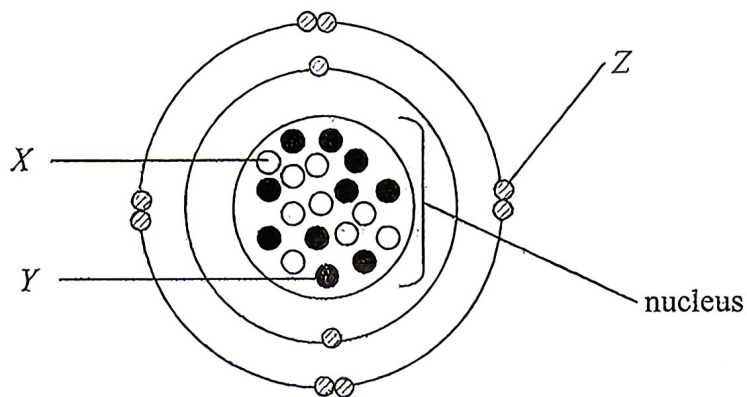
- (b) The air pump performs some important functions in this system. Describe these functions.

(2 marks)

(e) If double the amount of fish food is added accidentally, some fish will die a few days later. Based on your knowledge of the cycling of materials, suggest an explanation for this phenomenon.

(4 marks)

7. The diagram below shows how protons, neutrons and electrons are arranged in an ion of fluorine:



(a) Identify particles *X*, *Y* and *Z*. (3 marks)

X:

Y:

Z:

(b) What is the atomic number of the fluoride ion? (1 mark)

(c) What is the mass number of this fluoride ion? (1 mark)

(d) Write the chemical formula of the fluoride ion. (1 mark)

(e) There are no stable isotopes of fluorine known in nature. What is meant by the term "isotope"?

(2 marks)

(f) Give TWO physical properties of fluorine.

(2 marks)

8. A student performs an experiment to compare the reactivity of calcium and magnesium. He adds calcium and magnesium separately to dilute hydrochloric acid. The table below shows his experimental results.

Metal	Volume of gas collected (cm ³)	Time taken for collecting the gas (s)
calcium	15	4
magnesium	18	6

(a) Suggest TWO controlled variables in this experiment.

(2 marks)

(b) Name the gas that is produced in the reactions. Describe a test for this gas and state the expected observations.

(3 marks)

(c) Assume that the experiments are conducted under controlled conditions. With references to the results from the table, state which metal is more reactive. Show your calculation.

(3 marks)

- (d) Apart from the formation of colourless gas bubbles, state TWO OTHER observations for the reaction between calcium and dilute hydrochloric acid. (2 marks)

9. Consider the following substances obtained from mining:
natural silver, copper pyrite, haematite (iron(III) oxide)

- (a) Describe how copper is extracted from copper pyrite. (1 mark)

- (b) (i) Silver can be obtained by panning natural silver. Is this a chemical or physical change? Explain. (2 marks)

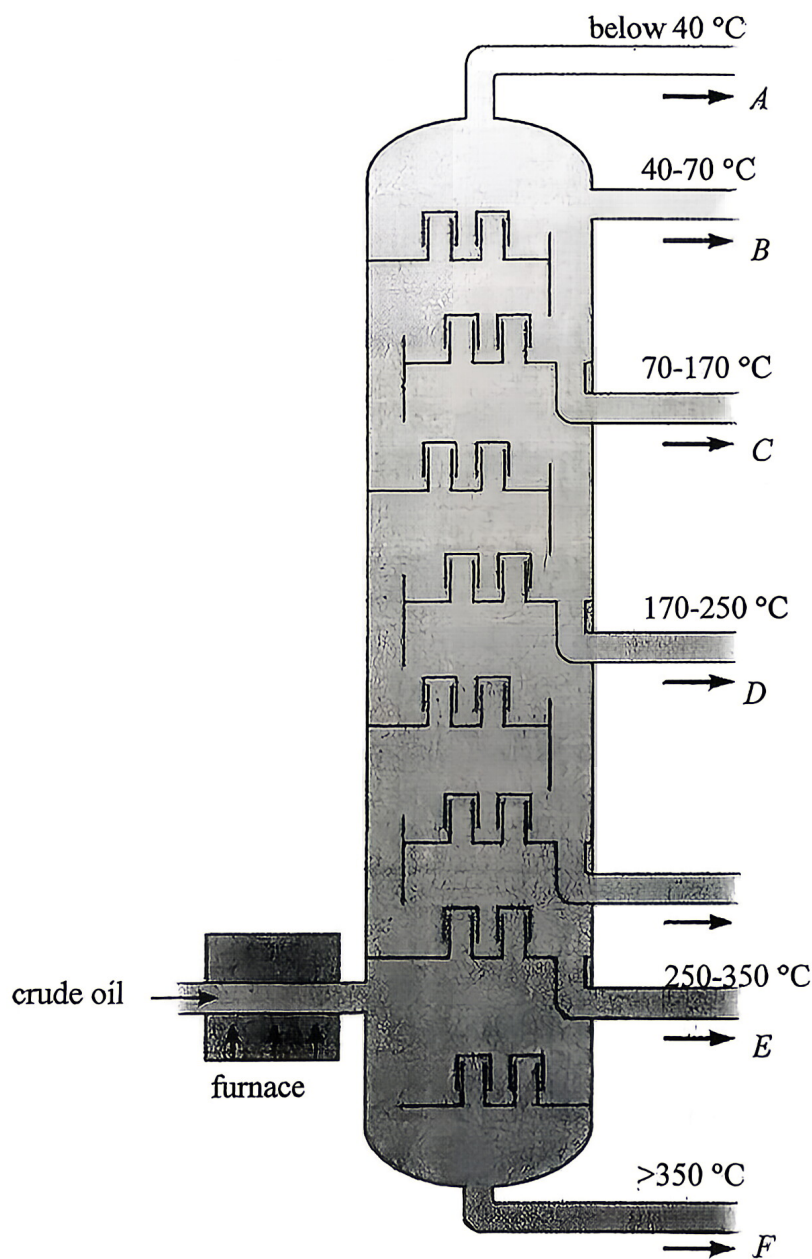
- (ii) State TWO uses for silver. (2 marks)

- (c) (i) To extract iron from haematite, haematite is heated with charcoal in a blast furnace. Write the word equation for this chemical reaction. (2 mark)

- (ii) Carbon dioxide is also produced in the extraction of iron from haematite. Suggest a chemical test for carbon dioxide and state the expected observations. (2 marks)

- (d) Gold, silver, mercury, lead, tin and copper are called “metals of antiquity”. Explain why these metals, but not other metals such as lithium and aluminium, were used in ancient times. (2 marks)

10. Daqing Oil Field (大庆油田) of the Heilongjiang province is the largest oil field in our Country. The oil field produces up to 50 million tons of crude oil annually and is one of the top ten most productive oil fields in the world. Refinery plants are installed at the oil field for the fractional distillation of crude oil. A typical refinery plant is illustrated below:



- (a) Give the NAME of the fraction (NOT letter!) that is a gas in room temperature. (1 mark)

- (b) Give the names of the fractions B, C, D and E. (4 marks)

B:

D:

C:

E:

(c) Compare the fractions of different boiling point ranges. How does each of the following properties of a fraction change when the boiling point increases? (3 marks)

(i) Volatility

(ii) Flammability

(iii) Colour

(d) Although fraction *F* is more difficult to burn than fraction *E*, people use fraction *F* as fuel for power stations instead of fraction *E*. Why?

(2 marks)