

Nutrition

2024 examination

Section 1 Questions 1 to 4 (45 marks)

Answer **all** questions in Section 1

Allow approximately 65 minutes

Section 2 Questions 5 to 7 (55 marks)

Answer **all** questions in Section 2

Allow approximately 65 minutes

Approved calculators may be used

Total time: 130 minutes

Total marks: 100

The SACE Board of South Australia acknowledges that this examination was created on Kaurna Land. We acknowledge First Nations Elders, parents, families, and communities as the first educators of their children, and we recognise and value the cultures and strengths that First Nations students bring to the classroom. We respect the unique connection and relationship that First Nations peoples have to Country, and their ever-enduring cultural heritage.

Question 1 (a) to (c)

Space agencies around the world have been studying bone mineral density (BMD) loss in astronauts during long-duration spaceflight.

(a) (i) Identify **two** main micronutrients required to reduce bone mineral density loss.

(1) Micronutrient 1:

(1 mark)

(2) Micronutrient 2:

(1 mark)

(ii) Provide **one** example of a good food source for each of the two micronutrients identified in part (a)(i) for an individual who is lactose intolerant.

(1) Good food source of micronutrient 1:

(1 mark)

(2) Good food source of micronutrient 2:

(1 mark)

(iii) Name **one** group of individuals, other than astronauts and the lactose intolerant community, who may be at risk of bone mineral density loss, **and** explain why.

ABC	B	I	U	x ²	x ₂	1/3	1/4	1/5	1/6	1/7	1/8	1/9	1/10	1/11	1/12	1/13	1/14	1/15	1/16	1/17	1/18	1/19	1/20	1/21	1/22	1/23	1/24	1/25	1/26	1/27	1/28	1/29	1/30	1/31	1/32	1/33	1/34	1/35	1/36	1/37	1/38	1/39	1/40	1/41	1/42	1/43	1/44	1/45	1/46	1/47	1/48	1/49	1/50	1/51	1/52	1/53	1/54	1/55	1/56	1/57	1/58	1/59	1/60	1/61	1/62	1/63	1/64	1/65	1/66	1/67	1/68	1/69	1/70	1/71	1/72	1/73	1/74	1/75	1/76	1/77	1/78	1/79	1/80	1/81	1/82	1/83	1/84	1/85	1/86	1/87	1/88	1/89	1/90	1/91	1/92	1/93	1/94	1/95	1/96	1/97	1/98	1/99	1/100
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(2 marks)

(b) Explain how the consumption of caffeinated products can impact bone mineral density in astronauts.

ABC	B	I	U	x ²	x ₂	1/3	1/4	1/5	1/6	1/7	1/8	1/9	1/10	1/11	1/12	1/13	1/14	1/15	1/16	1/17	1/18	1/19	1/20	1/21	1/22	1/23	1/24	1/25	1/26	1/27	1/28	1/29	1/30	1/31	1/32	1/33	1/34	1/35	1/36	1/37	1/38	1/39	1/40	1/41	1/42	1/43	1/44	1/45	1/46	1/47	1/48	1/49	1/50	1/51	1/52	1/53	1/54	1/55	1/56	1/57	1/58	1/59	1/60	1/61	1/62	1/63	1/64	1/65	1/66	1/67	1/68	1/69	1/70	1/71	1/72	1/73	1/74	1/75	1/76	1/77	1/78	1/79	1/80	1/81	1/82	1/83	1/84	1/85	1/86	1/87	1/88	1/89	1/90	1/91	1/92	1/93	1/94	1/95	1/96	1/97	1/98	1/99	1/100
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(2 marks)

Astronauts on the International Space Station (ISS) exercise for 15 hours a week using three specialised exercise machines that collectively provide them a full-body exercise.

(c) Explain how full-body exercise assists astronauts to maintain bone mineral density.

ABC	B	I	U	x ²	x ₂	1/3	1/4	1/5	1/6	1/7	1/8	1/9	1/10	1/11	1/12	1/13	1/14	1/15	1/16	1/17	1/18	1/19	1/20	1/21	1/22	1/23	1/24	1/25	1/26	1/27	1/28	1/29	1/30	1/31	1/32	1/33	1/34	1/35	1/36	1/37	1/38	1/39	1/40	1/41	1/42	1/43	1/44	1/45	1/46	1/47	1/48	1/49	1/50	1/51	1/52	1/53	1/54	1/55	1/56	1/57	1/58	1/59	1/60	1/61	1/62	1/63	1/64	1/65	1/66	1/67	1/68	1/69	1/70	1/71	1/72	1/73	1/74	1/75	1/76	1/77	1/78	1/79	1/80	1/81	1/82	1/83	1/84	1/85	1/86	1/87	1/88	1/89	1/90	1/91	1/92	1/93	1/94	1/95	1/96	1/97	1/98	1/99	1/100
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(2 marks)

Question 2 (a) to (c)

With changes to working and family life, it is becoming difficult for families to eat meals together.

- (a) Explain why it is important for parents/guardians to have healthy family meals regularly with their adolescent children.

ABC	B	<i>I</i>	<u>U</u>	$\times^2$	$\times_2$	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{5}$	$\frac{1}{6}$	$\frac{1}{7}$	$\frac{1}{8}$	$\frac{1}{9}$	$\frac{1}{10}$	$\frac{1}{11}$	$\frac{1}{12}$	$\frac{1}{13}$	$\frac{1}{14}$	$\frac{1}{15}$	$\frac{1}{16}$	$\frac{1}{17}$	$\frac{1}{18}$	$\frac{1}{19}$	$\frac{1}{20}$	$\frac{1}{21}$	$\frac{1}{22}$	$\frac{1}{23}$	$\frac{1}{24}$	$\frac{1}{25}$	$\frac{1}{26}$	$\frac{1}{27}$	$\frac{1}{28}$	$\frac{1}{29}$	$\frac{1}{30}$	$\frac{1}{31}$	$\frac{1}{32}$	$\frac{1}{33}$	$\frac{1}{34}$	$\frac{1}{35}$	$\frac{1}{36}$	$\frac{1}{37}$	$\frac{1}{38}$	$\frac{1}{39}$	$\frac{1}{40}$	$\frac{1}{41}$	$\frac{1}{42}$	$\frac{1}{43}$	$\frac{1}{44}$	$\frac{1}{45}$	$\frac{1}{46}$	$\frac{1}{47}$	$\frac{1}{48}$	$\frac{1}{49}$	$\frac{1}{50}$	$\frac{1}{51}$	$\frac{1}{52}$	$\frac{1}{53}$	$\frac{1}{54}$	$\frac{1}{55}$	$\frac{1}{56}$	$\frac{1}{57}$	$\frac{1}{58}$	$\frac{1}{59}$	$\frac{1}{60}$	$\frac{1}{61}$	$\frac{1}{62}$	$\frac{1}{63}$	$\frac{1}{64}$	$\frac{1}{65}$	$\frac{1}{66}$	$\frac{1}{67}$	$\frac{1}{68}$	$\frac{1}{69}$	$\frac{1}{70}$	$\frac{1}{71}$	$\frac{1}{72}$	$\frac{1}{73}$	$\frac{1}{74}$	$\frac{1}{75}$	$\frac{1}{76}$	$\frac{1}{77}$	$\frac{1}{78}$	$\frac{1}{79}$	$\frac{1}{80}$	$\frac{1}{81}$	$\frac{1}{82}$	$\frac{1}{83}$	$\frac{1}{84}$	$\frac{1}{85}$	$\frac{1}{86}$	$\frac{1}{87}$	$\frac{1}{88}$	$\frac{1}{89}$	$\frac{1}{90}$	$\frac{1}{91}$	$\frac{1}{92}$	$\frac{1}{93}$	$\frac{1}{94}$	$\frac{1}{95}$	$\frac{1}{96}$	$\frac{1}{97}$	$\frac{1}{98}$	$\frac{1}{99}$	$\frac{1}{100}$
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(2 marks)

Research has shown that people over the age of 65 years are more likely to eat meals that are less nutritious.

- (b) Explain **one** probable reason why this population group is more likely to eat less nutritious meals.

ABC	B	<i>I</i>	<u>U</u>	$\times^2$	$\times_2$	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{5}$	$\frac{1}{6}$	$\frac{1}{7}$	$\frac{1}{8}$	$\frac{1}{9}$	$\frac{1}{10}$	$\frac{1}{11}$	$\frac{1}{12}$	$\frac{1}{13}$	$\frac{1}{14}$	$\frac{1}{15}$	$\frac{1}{16}$	$\frac{1}{17}$	$\frac{1}{18}$	$\frac{1}{19}$	$\frac{1}{20}$	$\frac{1}{21}$	$\frac{1}{22}$	$\frac{1}{23}$	$\frac{1}{24}$	$\frac{1}{25}$	$\frac{1}{26}$	$\frac{1}{27}$	$\frac{1}{28}$	$\frac{1}{29}$	$\frac{1}{30}$	$\frac{1}{31}$	$\frac{1}{32}$	$\frac{1}{33}$	$\frac{1}{34}$	$\frac{1}{35}$	$\frac{1}{36}$	$\frac{1}{37}$	$\frac{1}{38}$	$\frac{1}{39}$	$\frac{1}{40}$	$\frac{1}{41}$	$\frac{1}{42}$	$\frac{1}{43}$	$\frac{1}{44}$	$\frac{1}{45}$	$\frac{1}{46}$	$\frac{1}{47}$	$\frac{1}{48}$	$\frac{1}{49}$	$\frac{1}{50}$	$\frac{1}{51}$	$\frac{1}{52}$	$\frac{1}{53}$	$\frac{1}{54}$	$\frac{1}{55}$	$\frac{1}{56}$	$\frac{1}{57}$	$\frac{1}{58}$	$\frac{1}{59}$	$\frac{1}{60}$	$\frac{1}{61}$	$\frac{1}{62}$	$\frac{1}{63}$	$\frac{1}{64}$	$\frac{1}{65}$	$\frac{1}{66}$	$\frac{1}{67}$	$\frac{1}{68}$	$\frac{1}{69}$	$\frac{1}{70}$	$\frac{1}{71}$	$\frac{1}{72}$	$\frac{1}{73}$	$\frac{1}{74}$	$\frac{1}{75}$	$\frac{1}{76}$	$\frac{1}{77}$	$\frac{1}{78}$	$\frac{1}{79}$	$\frac{1}{80}$	$\frac{1}{81}$	$\frac{1}{82}$	$\frac{1}{83}$	$\frac{1}{84}$	$\frac{1}{85}$	$\frac{1}{86}$	$\frac{1}{87}$	$\frac{1}{88}$	$\frac{1}{89}$	$\frac{1}{90}$	$\frac{1}{91}$	$\frac{1}{92}$	$\frac{1}{93}$	$\frac{1}{94}$	$\frac{1}{95}$	$\frac{1}{96}$	$\frac{1}{97}$	$\frac{1}{98}$	$\frac{1}{99}$	$\frac{1}{100}$
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(2 marks)

Research has shown that people over the age of 65 years are also more likely to develop type 2 diabetes.

- (c) Explain **two** reasons why type 2 diabetes is more common for people in this age group.

ABC	B	<i>I</i>	<u>U</u>	$\times^2$	$\times_2$	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{5}$	$\frac{1}{6}$	$\frac{1}{7}$	$\frac{1}{8}$	$\frac{1}{9}$	$\frac{1}{10}$	$\frac{1}{11}$	$\frac{1}{12}$	$\frac{1}{13}$	$\frac{1}{14}$	$\frac{1}{15}$	$\frac{1}{16}$	$\frac{1}{17}$	$\frac{1}{18}$	$\frac{1}{19}$	$\frac{1}{20}$	$\frac{1}{21}$	$\frac{1}{22}$	$\frac{1}{23}$	$\frac{1}{24}$	$\frac{1}{25}$	$\frac{1}{26}$	$\frac{1}{27}$	$\frac{1}{28}$	$\frac{1}{29}$	$\frac{1}{30}$	$\frac{1}{31}$	$\frac{1}{32}$	$\frac{1}{33}$	$\frac{1}{34}$	$\frac{1}{35}$	$\frac{1}{36}$	$\frac{1}{37}$	$\frac{1}{38}$	$\frac{1}{39}$	$\frac{1}{40}$	$\frac{1}{41}$	$\frac{1}{42}$	$\frac{1}{43}$	$\frac{1}{44}$	$\frac{1}{45}$	$\frac{1}{46}$	$\frac{1}{47}$	$\frac{1}{48}$	$\frac{1}{49}$	$\frac{1}{50}$	$\frac{1}{51}$	$\frac{1}{52}$	$\frac{1}{53}$	$\frac{1}{54}$	$\frac{1}{55}$	$\frac{1}{56}$	$\frac{1}{57}$	$\frac{1}{58}$	$\frac{1}{59}$	$\frac{1}{60}$	$\frac{1}{61}$	$\frac{1}{62}$	$\frac{1}{63}$	$\frac{1}{64}$	$\frac{1}{65}$	$\frac{1}{66}$	$\frac{1}{67}$	$\frac{1}{68}$	$\frac{1}{69}$	$\frac{1}{70}$	$\frac{1}{71}$	$\frac{1}{72}$	$\frac{1}{73}$	$\frac{1}{74}$	$\frac{1}{75}$	$\frac{1}{76}$	$\frac{1}{77}$	$\frac{1}{78}$	$\frac{1}{79}$	$\frac{1}{80}$	$\frac{1}{81}$	$\frac{1}{82}$	$\frac{1}{83}$	$\frac{1}{84}$	$\frac{1}{85}$	$\frac{1}{86}$	$\frac{1}{87}$	$\frac{1}{88}$	$\frac{1}{89}$	$\frac{1}{90}$	$\frac{1}{91}$	$\frac{1}{92}$	$\frac{1}{93}$	$\frac{1}{94}$	$\frac{1}{95}$	$\frac{1}{96}$	$\frac{1}{97}$	$\frac{1}{98}$	$\frac{1}{99}$	$\frac{1}{100}$
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(4 marks)

Source 1

Information for Question 3

Hybrid 'beef rice'

Scientists have inserted muscle and fat stem cells from cows into rice grains to create a 'lab-grown meat'. The cells taken from living cows are cultured and allowed to grow inside the rice in the same way that they grow inside a living animal's body. This results in a pink hybrid 'beef rice'. When cooked, it has a firm and brittle texture and tastes slightly nutty with a savoury flavour characteristic of meat.

The scientists have predicted that:

- growing hybrid 'beef rice' using a cell culture would take 9–11 days (compared with growing rice (95–250 days) or beef (1–3 years))
- the hybrid 'beef rice' would cost about 15% of the price of beef per kilogram
- the production process for hybrid 'beef rice' would release less carbon dioxide (CO₂) than the production process for beef, as shown below.

	<i>Hybrid 'beef rice'</i>	<i>Beef</i>
Mass of CO ₂ (kg) released to produce 100 g of protein	6.27	49.89

Source: adapted from Sample, I 2024, 'Lab grown beef rice could offer more sustainable protein source say creators', *The Guardian*, viewed 28 June 2024, theguardian.com

Source 2

Information for parts (a), (b), and (c)

Comparison of standard white rice and hybrid 'beef rice' nutrition information (per 100 g)

	<i>Hybrid 'beef rice'</i>	<i>Standard white rice</i>
Carbohydrate (g)	48.35	48.19
Protein (g)	3.89	3.58
Fat, total (g)	0.15	0.14
Fat, saturated (g)	0.00	0.00

Source: adapted from S Park et al. 2024, *Rice grains integrated with animal cells: A shortcut to a sustainable food system*, *Matter*, 7(3), viewed 28 June 2024, CC BY 4.0, p 1292–1313

Source 3

Information for part (c)

Nutrition information panel for roasted mealworms

Nutrition information		
Servings per package: 1.00		
Serving size: 1.00 g		
	Average quantity per serving	Average quantity per 100 g
Energy	3.0 kJ	314.0 kJ
Protein	0.3 g	33.1 g
Fat, total – saturated	0.2 g 0.0 g	18.1 g 0.0 g
Carbohydrate – sugars	0.1 g 0.0 g	4.6 g 0.0 g
Sodium	0.0 mg	0.0 mg

Source: roasted mealworms plain, viewed 28 June 2024, <https://ediblebugshop.com.au/products/roasted-mealworms-plain>

Read Source 1 before answering Question 3.

[illegible]

(b) Using the data from Source 2,

[illegible]

(ii) determine the percentage of protein by mass in hybrid 'beef rice'.

ABC ✓ B I U x² x₂ ☰ ▼ ☷ ▼ ☳ ▹ ☵ ☶ ☷ ☸ ↶ ↷

Refer to Sources 2 and 3, when answering part (c).

There has been a growing interest in the development of novel proteins as a food source.

[illegible]

Use your understanding of science as a human endeavour, when answering part (d).

ABC B I U x² xₓ ☰ ☷ ☶ ☵ ☱ ☲ ☳ ☴ ↩ ↪

(4 marks)

Source 1

Information for parts (a) and (b)

Ingredients list for cream cheese spread

Cheese (Minimum 40%) (Milk, Cream (From Milk), Milk Solids, Salt, Vegetable Gums (410, 412, 415), Starter Culture, Enzymes), Water, Butter or Cream (From Milk) or Milk Fat, Milk Solids, Mineral Salts (339, 341), Salt, Sugar, Food Acid (270), Flavour (Contains Milk), Preservative (200, 234), Colour (160a), Spice.

Source 2

Information for parts (c) and (d)

Nisin additive

Nisin (234) is a widely used food preservative in food products such as beer, sausages, and processed cheese. Nisin belongs to a class of antibiotics called lantibiotics that are used to kill pathogenic bacteria.

A research group applied six nisin-like lantibiotics to cultures of specific human microbiome and pathogenic bacteria in a laboratory. It was observed that all six lantibiotics affected the growth of the human microbiome and pathogenic bacteria cultures tested. In some cases, the human microbiome bacteria were more sensitive to the lantibiotics than pathogenic bacteria. The researchers concluded that nisin as a food additive may be harmful to the human gut microbiome.

Source: adapted from JZ Zhang et al. 2024, 'Activity of gut-derived Nisin-like lantibiotics against human gut pathogens and commensals', ACS Chem Biol, viewed 28 June 2024, CC BY 4.0, pubs.acs.org

Question 4 (a) to (e)

Refer to Source 1, when answering parts (a) and (b).

- (a) Using your nutritional knowledge, explain **one** benefit to the manufacturer for including the food acid (270) additive in the cream cheese spread.

[illegible]

(3 marks)

- (b) (i) Suggest **one** suitable substitution to the ingredients of the cream cheese spread in Source 1 that would make it more suitable for an individual with hypertension.

ABC

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(1 mark)

- (ii) Justify the substitution recommended in part (b)(i).

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(3 marks)

Refer to Source 2, when answering parts (c) and (d).

- (c) Identify **and** explain **one** limitation of the conclusion made by the research group.

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(2 marks)

- (d) Discuss **one** probable unexpected health consequence of using lantibiotics as a food preservative.

[illegible]

(2 marks)

- (e) Select **one** of the food items listed below **and** explain how the consumption of this food could help reverse the potential harmful effects of preservatives, such as nisin, on the human gut microbiome.

Food item:

Explanation

ABC	✓	B	I	U	x ²	x ₂	≡	≡	≡	≡	≡	≡	≡	≡	↶	↷

(3 marks)

Source 1

Information for part (d)

SA Health Awareness Poster

ARE YOU DRINKING ENOUGH WATER?



VERY DEHYDRATED
Drink a large bottle of water straight away

DEHYDRATED
Drink 2 to 3 glasses of water now

SOMEWHAT DEHYDRATED
Drink a large glass of water now

HYDRATED
You are drinking enough water – keep drinking water at the same rate

Source: adapted from poster 'Are you drinking enough water?' 2021, viewed 28 June 2024, www.sahealth.sa.gov.au

Source 2

Information for part (f)

Microplastic and nanoplastic particles in bottled water

Bottled water is known to contain microplastic and nanoplastic particles. Nanoplastics are smaller than microplastics and have been hard for scientists to detect and identify. Scientists have now developed an imaging technique to determine the number of plastic particles in popular brands of bottled water.

The new technique revealed that some bottles contained 100 times more plastic particles than previous estimates and 90% of the particles were nanoplastics. The most common particle detected had leached from the plastic filter used to purify the bottled water, and the second most abundant particle detected had leached from plastic bottles.

Source: adapted from Koumoundouros, T 2024, 'Bottled water is packed full of up to 100x more microplastic than expected', *ScienceAlert*, viewed 29 June 2024, www.sciencealert.com

Question 5 (a) to (j)

Humans can only survive for a few days without consuming water.

(a) State **two** ways water is lost from the human body.

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(1 mark)

(b) Explain **one** function of water in the human body.

ABC

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(2 marks)

Although nutritional advice is to ‘drink eight glasses of water a day’, individual needs are different based on body size, body composition, daily activities, and climatic conditions.

(c) Explain **one** reason why drinking eight glasses of water a day may not be necessary.

ABC

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$\times_2$

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$\vdots$

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$\approx$

$\equiv$

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$\equiv$

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(2 marks)

Refer to Source 1, when answering part (d).

An inadequate consumption of water can lead to dehydration.

(d) Explain **one** limitation of the health awareness poster (Source 1) where some individuals identify themselves as '*very dehydrated*' based on the information it provides.

ABC

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$\equiv$

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(2 marks)

Infants younger than 6 months should not drink plain water, as this can affect blood mineral concentrations, which can be fatal.

- (e) (i) State **one** appropriate source of water for an infant younger than 6 months.

ABC	✓	B	I	U	x ²	x ₂	≡	≡	≡	≡	≡	≡	≡	≡	↶	↷

(1 mark)

- (ii) Explain why plain water given to infants older than 6 months should be boiled first.

ABC	✓	B	I	U	x ²	x ₂	≡	≡	≡	≡	≡	≡	≡	≡	↶	↷

(2 marks)

Refer to Source 2 and use your understanding of the interaction between science and society, when answering part (f).

- (f) Discuss how bottled water manufacturers could apply the newly discovered information about plastic particles in bottled water.

ABC	✓	B	I	U	x ²	x ₂	≡	≡	≡	≡	≡	≡	≡	≡	↶	↷

(2 marks)

Global human consumption of bottled water results in 25 million tonnes of plastic waste each year.

- (g) Explain how the incorrect disposal of the water bottles by humans could negatively impact other mammals.

ABC	✓	B	I	U	x ²	x ₂	≡	≡	≡	≡	≡	≡	≡	≡	↶	↷

(2 marks)

(h) State **one** strategy consumers can implement to reduce their consumption of plastic particles when consuming water.

(1 mark)

(i) (i) Explain how consumer safety issues, such as the consumption of plastic particles, are regulated.

(2 marks)

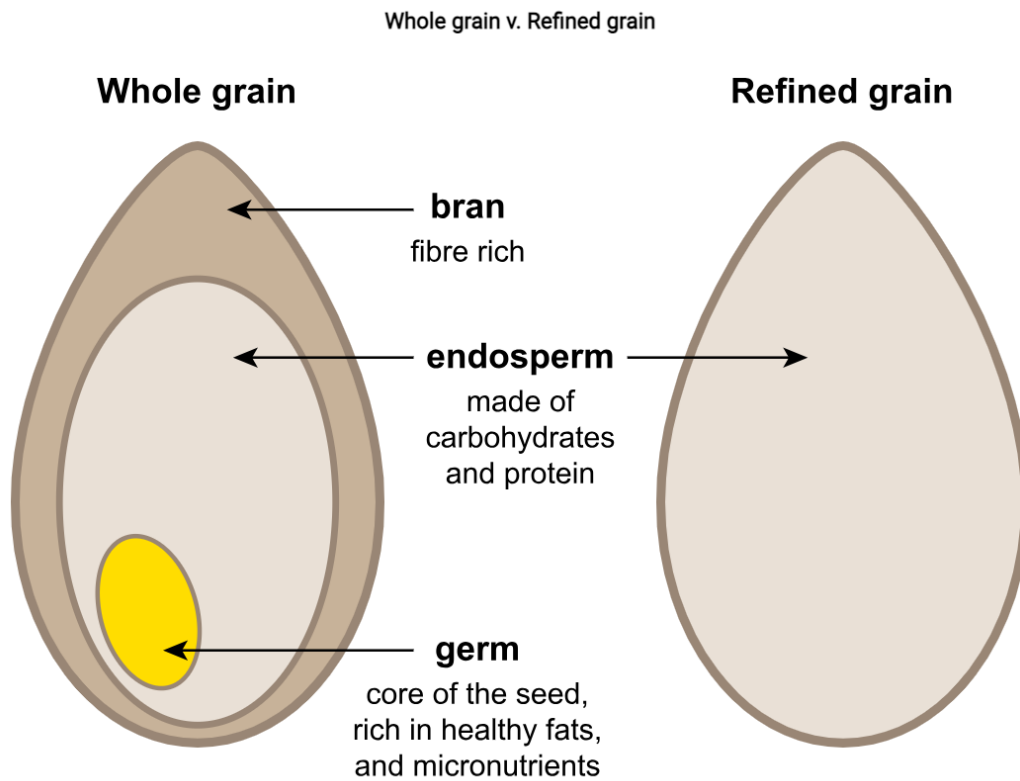
(4 marks)

(j) Explain why an individual who has had their gall bladder removed is less likely to be able to digest and absorb fats as efficiently.

(4 marks)

Source 1

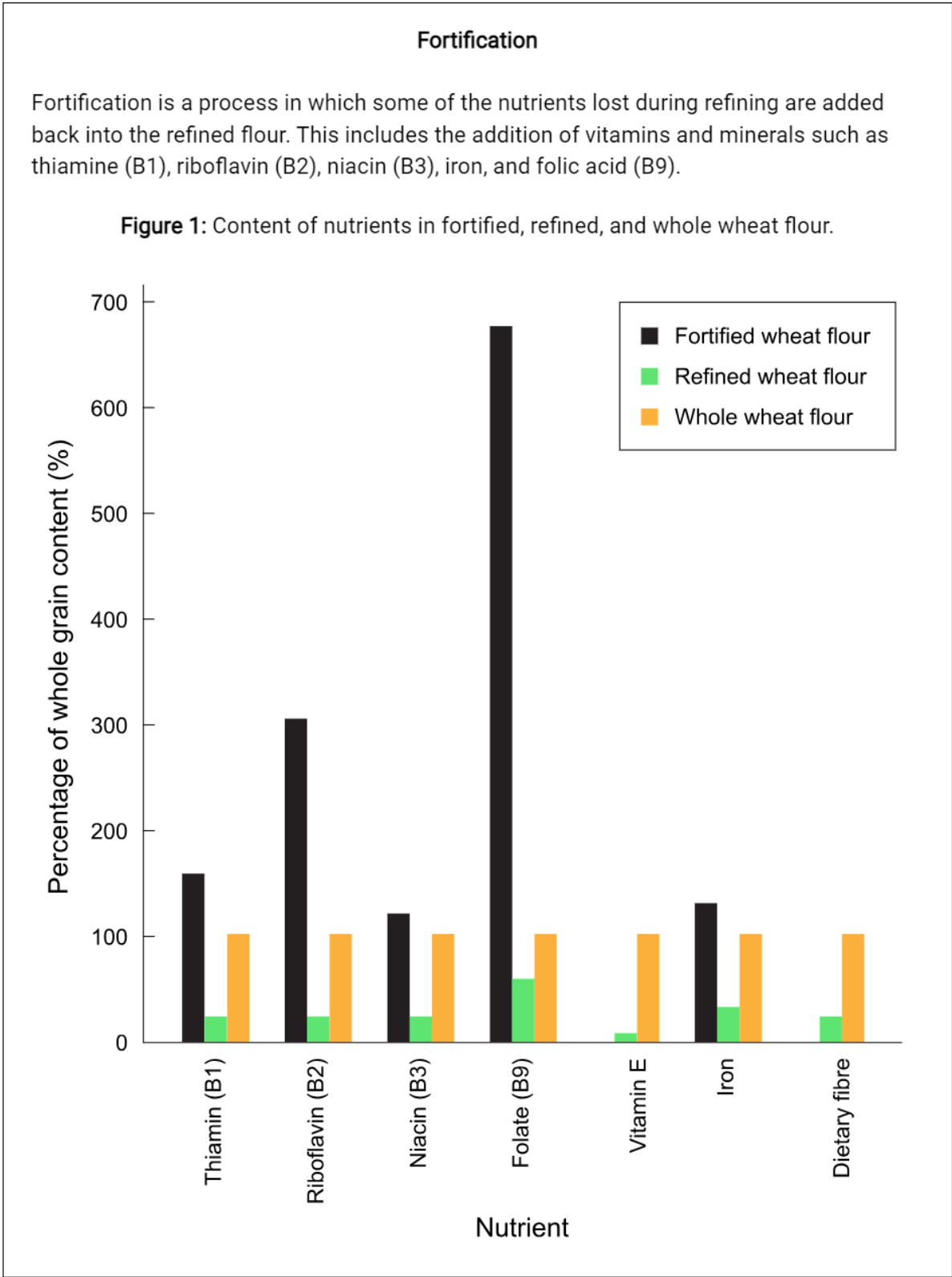
Information for parts (a) and (b)



Source: adapted from 'Understanding whole grains', viewed 28 June 2024, <https://www.roastytasty.com>

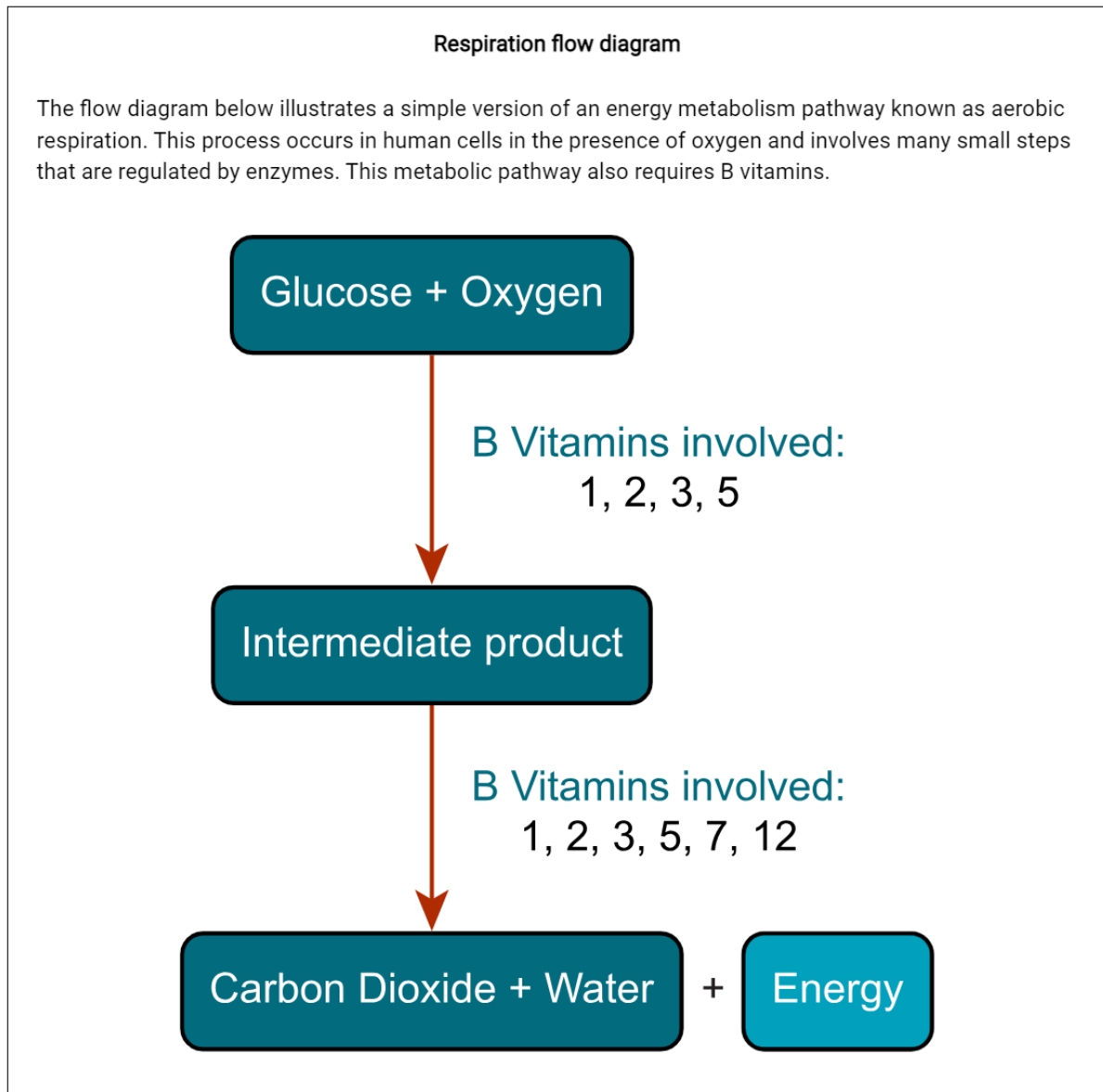
Source 2

Information for part (b)



Source: adapted from WholeGrain n.d., 'Why is better to choose whole grains over refined or enriched grains?' WholeGrain, viewed 28 June 2024, www.gzs.si/wholegrain/vsebinske/Facts/Differences-between-whole-refined-and-enriched-grains

Source 3

Information for part (c)

Question 6 (a) to (c)

Refer to Source 1, when answering part (a).

- (a) Using evidence from Source 1, discuss **two** potential health risks associated with a diet primarily consisting of products made from refined wheat flour compared to whole wheat flour.

ABC	B	<i>I</i>	<u>U</u>	x ²	x ₂										

(4 marks)

Refer to Sources 1 and 2, when answering part (b).

- (b) (i) Explain the difference in vitamin E storage within the whole wheat and refined wheat flour.

ABC	B	<i>I</i>	<u>U</u>	x ²	x ₂										

(4 marks)

- (ii) Using data from Source 2, compare the folate content of the three types of wheat flour.

ABC	B	<i>I</i>	<u>U</u>	x ²	x ₂										

(2 marks)

Folate fortification is important in the prevention of neural tube defects.

- (iii) Explain **one** other advantage of the folate fortification of wheat flour to adolescent females.

ABC	B	<i>I</i>	<u>U</u>	x ²	x ₂										

(3 marks)

Refer to Source 3, when answering part (c).

- (c) Explain how a deficiency in a B vitamin shown in Source 3 could affect the energy metabolism pathway, **and** how this would impact an individual.

ABC	B	<i>I</i>	<u>U</u>	x ²	x ₂										

(3 marks)

Source 1

Extract of dietician's case notes

Patient, male, 65 years, presented to the clinic for a 12-month review after having a large section of his jejunum and ileum, parts of the small intestine (see Source 2), surgically removed due to cancer. His cancer is in remission; however, he is experiencing moderate symptoms of abdominal pain, diarrhoea, weight loss, and ongoing fatigue. He has also recently started experiencing hair loss and increased incidence of respiratory viral infections, which are taking longer for his body to overcome.

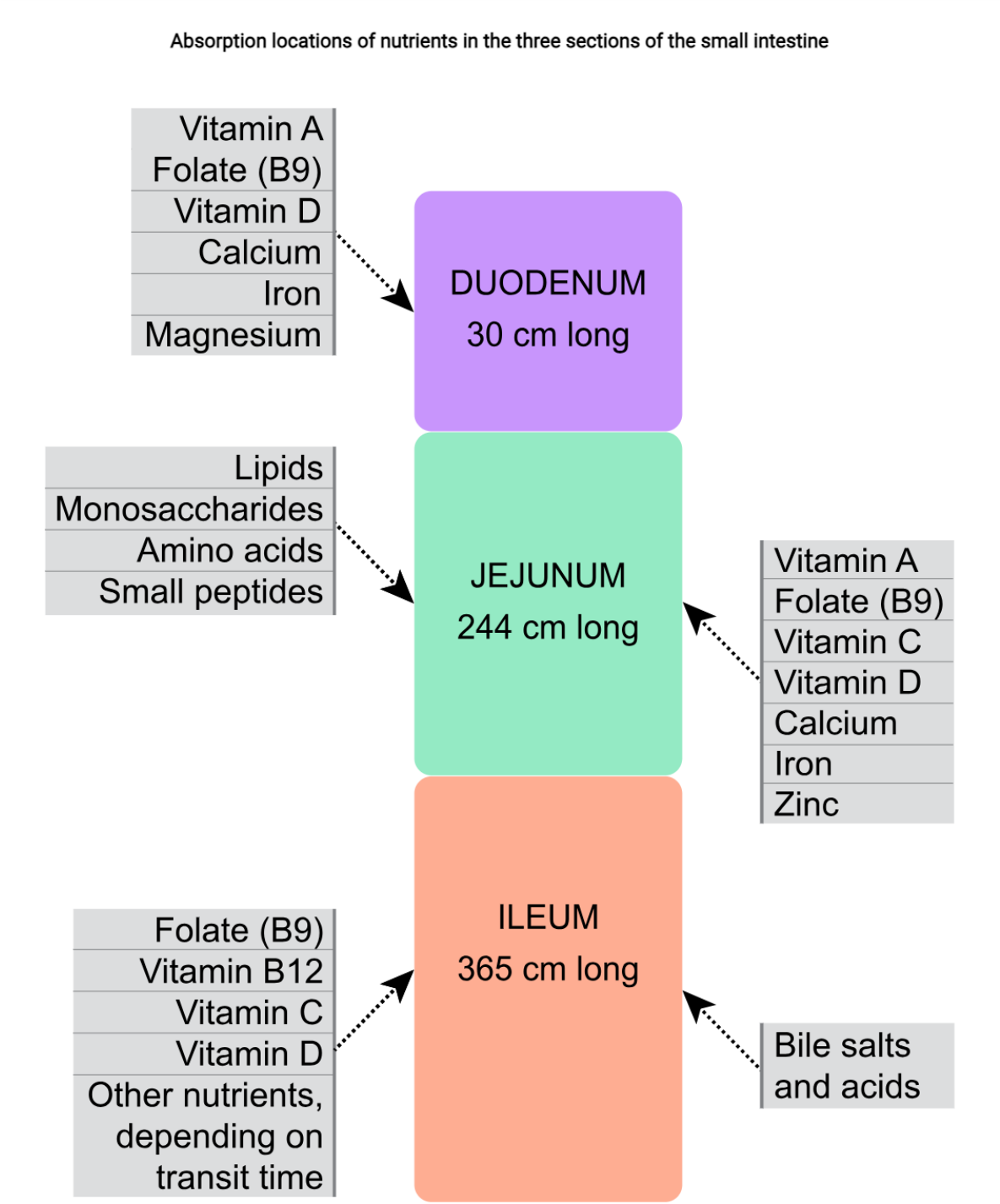
The patient does not go outside much, and his exercise level is minimal, as he is feeling tired and experiencing some nerve pain. He participates in a weekly 45-minute gentle exercise class at the local pool. Although he sleeps for 10 hours each night, he wakes up every 3–4 hours feeling very groggy and struggles to get out of bed.

Since having surgery, many of the foods he used to eat now makes him feel nauseous. As a result, he avoids red meat, fatty foods, and fruits, reducing the variety of foods in his diet.

He lives on his own and sees his son once every 2–3 weeks for dinner.

Patient's 24-hour diet recall has been recorded (Source 3) and he was sent for blood analysis testing (Source 4).

Source 2



Source: adapted from 'Evaluation of the outcome of a proposed more physiological bypass surgery technique in morbid obesity: Long term 3 years follows up' 2022, *Annals of Medicine and Surgery*, vol 84, December, 104952, viewed 28 June 2024, sciencedirect.com

Source 3

Patient's 24-hour diet recall

Breakfast (10 am)	Black coffee with 2 teaspoons of sugar and a slice of toast with butter and vegemite
Lunch (1 pm)	A curried egg and lettuce sandwich using white bread
Snacks (3 pm)	Crackers with cheese
Dinner (6 pm)	Store-bought chicken kiev with powdered instant mashed potato and boiled peas
Daily water intake	1 litre

Source 4

Extract of patient's blood analysis result

Test	Result	Reference range
Iron – Serum iron (level in blood) – Ferritin (stored iron)	15.0 µmol/L 10.0 µg/L	(10.0–30.0) µmol/L (30.0–200.0) µg/L
Calcium	2.30 mmol/L	(2.10–2.60) mmol/L
Vitamin B12	135.0 pmol/L	>180.0 pmol/L
Serum Folate (B9)	16.0 nmol/L	>10.0 nmol/L

Question 7

Read Sources 1 to 4 before answering Question 7.

Use evidence from the sources and your own nutritional knowledge to:

- explain why the patient's current vitamin B12 level is low
- explain **two** likely effects of a deficiency of vitamin B12 on the body
- identify **two** micronutrients of concern for this patient, other than vitamin B12, **and** justify your answers using evidence from the sources
- suggest **two** different modifications to the patient's 24-hour diet recall that could help address the identified micronutrient concerns, **and** explain why.

ABC ✓	B	I	U	x ²	x ₂											0 Words

(14 marks)

Final checklist

- ☐ I have reviewed my work
- ☐ I understand that by selecting 'Next' I cannot return to the examination

Next