



South Australian
Certificate of Education

Nutrition 2018

Question booklet 1

- **Part 1: Short-answer and analytical questions**
- **Section A of Part 1** (Questions 1 to 5) 50 marks
- Answer **all** questions in Section A
- Write your answers in this question booklet
- You may write on page 12 if you need more space
- Allow approximately 45 minutes

Examination information

Materials

- Question booklet 1 (Section A of Part 1)
- Question booklet 2 (Section B of Part 1)
- Question booklet 3 (Part 2)
- SACE registration number label

Reading time

- 10 minutes
- You may begin writing during this time
- You may begin using an approved calculator during this time

Writing time

- 2 hours
- Use black or blue pen
- Approved calculators may be used

Total marks 120



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PART 1: SHORT-ANSWER AND ANALYTICAL QUESTIONS (Questions 1 to 10)

(100 marks)

Section A (Questions 1 to 5)

(50 marks)

Answer **all** questions in this section.

1. A study has found that middle-aged women (aged 40–60 years) have a high risk of developing osteoporosis.

- (a) Identify *one* mineral that can reduce the risk of developing osteoporosis.

_____ (1 mark)

- (b) State *two* specific foods, from *two* different food groups, that contain high amounts of the mineral that you identified in part (a).

(i) _____ (1 mark)

(ii) _____ (1 mark)

- (c) Explain *two* lifestyle strategies that could reduce or eliminate the risk of middle-aged women developing osteoporosis.

(i) _____

_____ (2 marks)

(ii) _____

_____ (2 marks)

2. (a) A number of people were diagnosed with a food-borne illness that was caused by eating pre-packaged fresh fruit salad. The fruit salad had been contaminated during harvesting or production with pathogenic bacteria.

(i) State *one* possible source of the bacteria.

_____. (1 mark)

(ii) Identify *one* group of people who would be particularly susceptible to developing a food-borne illness, and outline why they would be susceptible.

_____. (2 marks)

(iii) Bacteria can double in number every 20 minutes when exposed to favourable conditions. State *two* conditions that would increase bacterial growth in pre-packaged fresh fruit salads.

(1) _____
_____. (1 mark)

(2) _____
_____. (1 mark)

(b) With reference to an example, explain how to prepare raw meat in order to make it safe for human consumption.

_____. (2 marks)

3. Juice cafes have grown in popularity in recent years because many consumers today believe that juice is a healthy drink.

Refer to the following table, which shows the nutrition information panel for 250 mL of fresh fruit juice:

	<i>Quantity per serving</i>
Energy	1242.6 kJ
Protein	2.9 g
Total fat – saturated fat	0.9 g 0.2 g
Carbohydrate – sugars	72.5 g 70.4 g
Sodium	19 mg

- (a) (i) Carbohydrates provide 16 kilojoules of energy per gram.

Calculate the proportion (%) of the total energy content of one serving of juice that comes from carbohydrates.

Show your calculations, and round your answer to the nearest whole number.

Proportion = _____ % (3 marks)

- (ii) Calculate the quantity of complex carbohydrate in one serving of juice.

Show your calculations.

Complex carbohydrate = _____ g (1 mark)

- (b) Most school canteens use the Right Bite policy to classify food and drink according to its nutritional value. Many fruit juices are considered red-category drinks.

Right Bite food and drink spectrum

RED	These foods and drinks are banned from sale in SA school canteens and preschools ... They: • lack adequate nutritional value • are high in saturated fat and/or sugar and/or salt • can contribute to excess energy (kilojoules or calories)
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Source: Adapted from DECD 2015, 'Right Bite food and drink spectrum', *Right Bite, easy guide to healthy food and drink supply for South Australian schools and preschools*, Department for Education and Child Development, viewed 23 April 2018, education.sa.gov.au

- (i) (1) Identify *one* diet-related disorder associated with high energy intake for children.

_____ (1 mark)

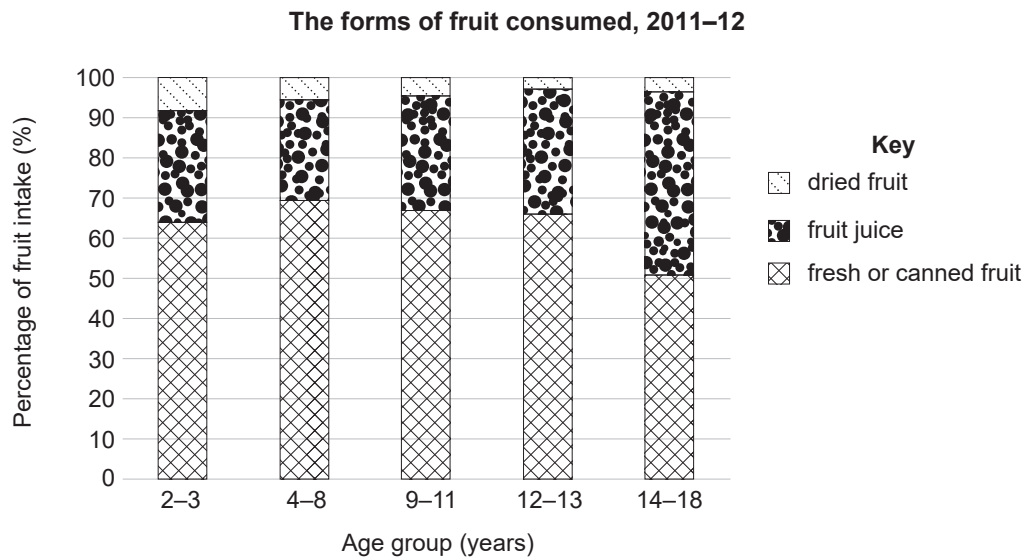
- (2) Explain how overconsumption of fruit juices may increase the risk of this disorder.

_____ (2 marks)

- (ii) Discuss the importance of healthy eating initiatives, like Right Bite, for children aged 5–12 years.

_____ (2 marks)

(c) Refer to the following graph:



Source: Adapted from Australian Bureau of Statistics 2016, 'Australian health survey: consumption of food groups from the Australian dietary guidelines 2011–2012', Commonwealth of Australia, viewed 23 April 2018, abs.gov.au, p 18 (CC BY 4.0)

- (i) State *one* conclusion that can be made about the fresh or canned fruit consumed by Australian children aged 2–18 years.

(1 mark)

- (ii) Health professionals are concerned about the amount of fruit juice consumed by children aged 2–3 years.

- (1) Discuss how fruit juice affects the dental health of children aged 2–3 years.

(2 marks)

- (2) Identify *one* alternative drink to fruit juice for children aged 2–3 years, and outline *one* nutritional benefit of this alternative.

(2 marks)

4. George is a 58-year-old male who was diagnosed with Type 2 diabetes following a test that measured his blood glucose levels after eating a meal. His blood glucose levels were compared with those of Paul — a 58-year-old male who does not have diabetes — as shown in the following graph.



- (a) Using data from the graph, describe the blood glucose levels of the two individuals between 0 and 2 hours after eating a meal.

(2 marks)

- (b) Explain how overconsumption of saturated fats may contribute to an individual developing Type 2 diabetes.

(2 marks)

- (c) Identify and explain *one* symptom that George may be experiencing due to his Type 2 diabetes.

(2 marks)

George consulted a dietitian to learn how best to manage his Type 2 diabetes.

- (d) Refer to the following consultation notes made by the dietitian:

Date: 29/05/2018 **Time:** 1.30 pm
Age: 58 years old
Weight: 115 kg **Height:** 161 cm
Occupation: Cafe owner
Blood glucose level: 16.0 mmol/L (high) 2 hours after eating
Exercise: 1–3 hours of light exercise per week
Smoker status: Non-smoker
Alcohol intake: 3–5 glasses a week
Current diet habits: Regularly consumes pre-packaged and convenience foods, or eats at work. Doesn't like the taste of most vegetables.
Client goals: Lose weight and modify diet and lifestyle habits to manage his Type 2 diabetes.

- (i) Using the formula below, calculate George's body mass index (BMI).
Show your calculations, and state your answer to the nearest whole number.

$$\text{BMI (kg/m}^2\text{)} = \frac{\text{weight (kg)}}{\text{height}^2 \text{ (m}^2\text{)}}$$

BMI = _____ kg/m² (2 marks)

- (ii) Explain *one* diet modification that would help George to manage his Type 2 diabetes.

(2 marks)

- (iii) Identify *two* strategies that George could implement to assist in maintaining lifestyle changes that will help him to manage his Type 2 diabetes.

(1)

(1 mark)

(2)

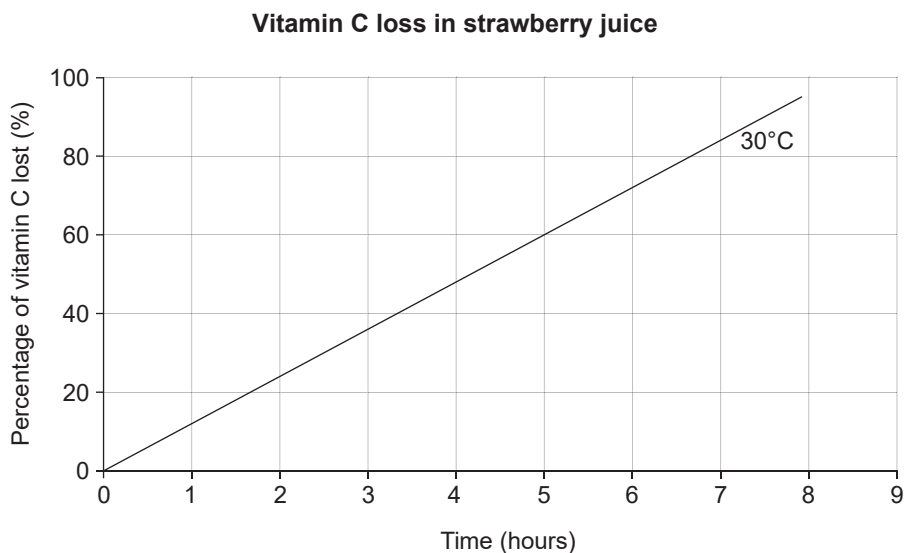
(1 mark)

5. Fresh fruit juice should be stored at 4°C and consumed within 3 days.

Students conducted an experiment to investigate the effect of poor storage on the vitamin C content of strawberry juice.

The strawberry juice was heated to 30°C and the amount of vitamin C was measured every hour for 8 hours.

Refer to the following graph, which shows the percentage of vitamin C lost over time:



- (a) (i) Mark the graph with an **X** to indicate the percentage of vitamin C lost after 5 hours.

(1 mark)

- (ii) From the graph, identify the time taken to lose 40% of vitamin C.

(1 mark)

- (b) State *one* conclusion that could be drawn from the graph.

_____ (2 marks)

- (c) (i) Identify *one* variable that must remain constant during the experiment.

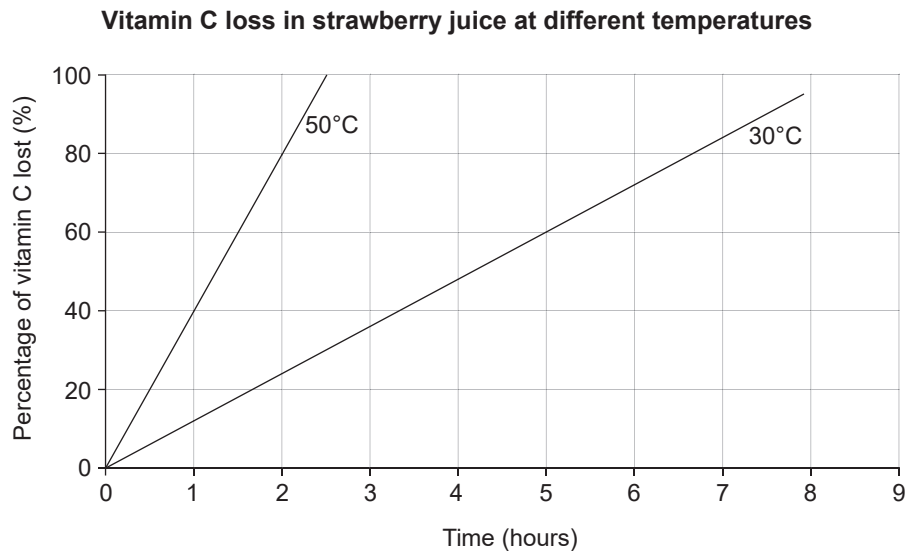
_____ (1 mark)

- (ii) Explain why this variable must remain constant during the experiment.

_____ (2 marks)

- (d) This experiment was repeated, but the juice was heated to 50°C instead of 30°C.

Refer to the following graph, which shows the results from both experiments:



Using data from the graph, compare the percentage of vitamin C lost after 2 hours of heating at 30°C and at 50°C, and explain this result.

_____ (3 marks)

[illegible]



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Question booklet 2

- **Part 1: Short-answer and analytical questions**
- **Section B of Part 1** (Questions 6 to 10) 50 marks
- Answer **all** questions in Section B
- Write your answers in this question booklet
- You may write on page 11 if you need more space
- Allow approximately 45 minutes

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PART 1: SHORT-ANSWER AND ANALYTICAL QUESTIONS

Section B (Questions 6 to 10)

(50 marks)

Answer **all** questions in this section.

6. An individual went to the supermarket and bought a pre-packaged, frozen meal of chicken satay with rice.

(a) Identify *one* labelling requirement that the manufacturer of this frozen meal must fulfil.

(1 mark)

(b) The frozen meal of chicken satay with rice was packaged in plastic.

(i) Explain *one* advantage for the consumer of using plastic as a packaging material.

(2 marks)

(ii) Explain *one* environmental disadvantage of using plastic as a packaging material.

(2 marks)

7. (a) Refer to the following table, which shows the Australian recommended dietary intake (RDI) of protein for adolescents aged 14–18 years:

Gender	RDI of protein
Boys	65g/day
Girls	45g/day

Source: Based on data provided by the National Health and Medical Research Council (CC BY 3.0)

Provide *one* reason why the RDI of protein is different for boys and girls.

(1 mark)

- (b) Provide *two* food sources that are considered high in protein, *one* of which is suitable for a vegan.

(i) _____ (1 mark)

(ii) _____ (1 mark)

Question 7 continues on page 4.

(c) (i) Describe the chemical process related to the digestion of protein.

(3 marks)

(ii) Complete the following table to explain how macronutrients are metabolised.

<i>Macronutrient</i>	<i>Simplest substance</i>	<i>Function</i>
Carbohydrate		Produces ATP energy
Lipid	Fatty acids and glycerol	
Protein		

(4 marks)

(iii) Explain how excess carbohydrates are stored in the human body.

(2 marks)

(d) Refer to the following nutrition information panel for a protein shake called 'Protein to Build':

	Quantity per 60g serving	Quantity per 100g
Energy	915 kJ	1525 kJ
Protein (total)	26.6 g	44.3 g
Fat (total) – saturated	2.4 g 1.6 g	4.0 g 2.7 g
Carbohydrate (total) – sugars	23.4 g 13.6 g	39.0 g 22.7 g
Sodium	91 mg	152 mg
<i>Ingredients:</i> whey protein concentrate (40%), emulsifier (sunflower oil, lecithin), skim milk powder, whey protein isolate, emulsifier (soy lecithin), cocoa powder, full-cream milk powder, vegetable gum, food acid, sweetener (sucralose)		

(i) Identify *one* additive that is used in Protein to Build, and explain its function.

(2 marks)

(ii) Protein provides 17 kilojoules of energy per gram.

From the nutrition information panel, calculate the amount of energy provided by protein in one serving of Protein to Build.

Show your calculations, and round your answer to the nearest whole number.

Energy provided by protein = _____ kJ (2 marks)

8. (a) Refer to the following table, which compares the nutritional information for two different muesli bars:

	Quantity per serving (30g)	
	Apricot and yoghurt muesli bar	Strawberry and yoghurt muesli bar
Energy	463 kJ	451 kJ
Protein	2.2 g	2.1 g
Fat – total – saturated	3.5 g 1.3 g	3.3 g 1.4 g
Carbohydrates – total – sugars	18.5 g 3.6 g	18.3 g 7.1 g
Fibre	3.5 g	1.2 g
Sodium	6 mg	6 mg

Using the nutritional information provided, explain *two* reasons why the apricot and yoghurt muesli bar is a healthier option than the strawberry and yoghurt muesli bar.

- (i) _____

 _____ (2 marks)

- (ii) _____

 _____ (2 marks)

- (b) Explain how frequently selecting processed foods like muesli bars can contribute to poor health.

 _____ (2 marks)

- (c) The Health Star Rating is a front-of-pack labelling system that rates the overall nutritional profile of packaged food, and assigns it a rating from $\frac{1}{2}$ star to 5 stars.

The more stars, the healthier the food.



Source: Health Star Rating system,
© Commonwealth of Australia

- (i) Explain *one* advantage for the manufacturer of having a Health Star Rating on a product.

(2 marks)

- (ii) The Health Star Rating system is an Australian Government initiative. Prior to its implementation, it was estimated that the promotion, education, and maintenance of the initiative would cost over \$2 million a year.

State *one* benefit to society that would outweigh the estimated costs. Justify your answer.

(3 marks)

9. Grass-fed beef has increased in popularity in recent years, and many consumers believe it to be more nutritious than grain-fed beef because it has a higher omega-3 fatty acid content.

- (a) Omega-3 fatty acids are a type of polyunsaturated fat.

Name *one* feature of the chemical structure of polyunsaturated fat that is different from that of saturated fat.

(1 mark)

- (b) State *two* functions of omega-3 fatty acids in the human body.

(i) _____

(1 mark)

(ii) _____

(1 mark)

- (c) Refer to the following table, which shows the omega-3 fatty acids and omega-6 fatty acids content of grass-fed and grain-fed beef:

Feeding system	Omega-3 fatty acids	Omega-6 fatty acids
	(mg/100 g lean meat)	
Grass-fed beef	155	334
Grain-fed beef	97	354

Source: Data from Ponnampalam, EN, Mann, NJ & Sinclair, AJ 2006, 'Effect of feeding systems on omega-3 fatty acids ...', *Asia Pacific Journal of Clinical Nutrition*, vol. 15 (1), p 25, table 3

- (i) The recommended daily intake (RDI) of omega-3 fatty acids for a 15-year-old male is 610 mg.

Calculate the percentage of the RDI of omega-3 fatty acids that a 15-year-old male would consume if he ate 100 g of grass-fed beef.

Show your calculations, and round your answer to the nearest whole number.

Omega-3 fatty acids = _____ % RDI (2 marks)

- (ii) Name *one* other animal food source that could provide high levels of omega-3 fatty acids.

(1 mark)

- (d) Most members of society consume much more than their RDI of omega-6 fatty acids.

Name *one* dietary source of omega-6 fatty acids other than meat.

_____ (1 mark)

- (e) Many members of society do not eat meat.

- (i) Explain *one* physiological factor that prevents some individuals from eating meat.

_____ (2 marks)

- (ii) Explain *one* psychological reason why some individuals do not eat meat.

_____ (2 marks)

Question 10 is on page 10.

10. The recommended daily intake (RDI) of vegetables and legumes/beans for 2–3-year-old children is 2.5 serves per day.

(a) Data from the Australian Health Survey in 2011–12 show that less than 1% of children aged 2–3 years are consuming the RDI of vegetables and legumes/beans (ABS 2016).

(i) Identify *one* media campaign and explain how it helps families ensure that children consume their RDI of vegetables and legumes/beans.

(2 marks)

(ii) Explain how social interaction can influence the nutritional health and wellbeing of children aged 2–3 years. Provide an example to support your answer.

(2 marks)

(b) The second guideline from the *Australian dietary guidelines* recommends that Australians consume 'a wide variety of nutritious foods from [the] five food groups every day'.

(i) Explain the importance of this dietary guideline.

(2 marks)

(ii) State *one* other guideline from the *Australian dietary guidelines*.

(1 mark)

[illegible]



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Question booklet 3

- **Part 2: Extended-response questions on option topics** (Questions 11 and 12) 20 marks
- Answer **one** question from Part 2
- Write your answer in this question booklet
- Allow approximately 30 minutes

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PART 2: EXTENDED-RESPONSE QUESTIONS ON OPTION TOPICS

(Questions 11 and 12)

(20 marks)

Answer **either** Question 11 **or** Question 12.

Write your answer on pages 3 to 6, clearly labelling it with the number of the question you choose.

You should spend about 30 minutes on this part, 5 to 10 minutes planning and 20 to 25 minutes writing. Credit will be given for clear, well-expressed answers that are well organised and relevant to the question.

Option topic 1: Global nutrition and ecological sustainability

11. Bananas are one of Australia's most popular supermarket products, with over 5 million sold daily. In Australia, farmers grow bananas on plantations using monoculture agriculture. Nearly 40% of the bananas grown are discarded because they do not meet the cosmetic criteria of Australian supermarkets.

Discuss:

- *two* environmental issues associated with Australian production of bananas using monoculture agriculture
- *one* food production alternative to monoculture agriculture that would ensure a sustainable supply of bananas in Australia
- *two* processing initiatives that could reduce wastage of fruit such as bananas produced in Australia
- *two* government or non-government current food-security initiatives that reduce food wastage by retailers and/or consumers.

Option topic 2: Global hunger

12. Water scarcity is defined as 'insufficient supply of clean water to meet the water needs of a community'. According to the United Nations Sustainable Development Goals, water scarcity is largely due 'to bad economics or poor infrastructure ...'

Discuss:

- *two* ways in which a drought contributes to food shortages and famine
- *one* education initiative and how it can empower individuals to promote a safe and adequate water supply within their local community
- *two* water-borne diseases and how they affect individuals and the community
- the role of *one* food-provision program, and explain *one* limitation of a community relying on this.

Question no.

[illegible]

[illegible]

[illegible]

[illegible]

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ACKNOWLEDGMENT

Question 8(c): Department of Health, 'How to use Health Star Ratings', *Health Star Rating System*, © Commonwealth of Australia, viewed 23 April 2018, www.healthstarrating.gov.au

Question 9(c), table: Ponnampalam, EN, Mann, NJ & Sinclair, AJ 2006, 'Effect of feeding systems on omega-3 fatty acids, conjugated linoleic acid and trans fatty acids in Australian beef cuts: potential impact on human health', *Asia pacific journal of clinical nutrition*, vol. 15, no. 1, p 25, table 3

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