



2013 NUTRITION

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ATTACH SACE REGISTRATION NUMBER LABEL TO THIS BOX

QUESTION BOOKLET

1

12 pages, 4 questions

Tuesday 12 November: 9 a.m.

Time: 2 hours

Section A of Part 1: Short-answer and Analytical Questions

Examination material: Question Booklet 1 (12 pages)
 Question Booklet 2 (11 pages)
 Question Booklet 3 (6 pages)
 one SACE registration number label

Approved dictionaries and calculators may be used.

Instructions to Students

- You will have 10 minutes to read the paper. You must not write in your question booklets or use a calculator during this reading time but you may make notes on the scribbling paper provided.
- This paper is in two parts: Section A of Part 1 is in Question Booklet 1; Section B of Part 1 is in Question Booklet 2; and Part 2 is in Question Booklet 3.
 - Part 1: Short-answer and Analytical Questions** (Questions 1 to 8)
 Answer Section A of Part 1 (Questions 1 to 4) in the spaces provided in Question Booklet 1. Answer **all** questions.
 Write on page 12 if you need more space.
 - Answer Section B of Part 1 (Questions 5 to 8) in the spaces provided in Question Booklet 2. Answer **all** questions.
 Write on page 11 if you need more space.
 - Part 2: Extended-response Questions on Option Topics** (Questions 9 and 10)
 Answer **either** Question 9 **or** Question 10.
 Write your answer on the pages provided in Question Booklet 3.
- In Part 1 there is no need to fill all the space provided; clear, well-expressed answers are required. If you delete part or all of an answer, you should clearly indicate your final answer and label it with the appropriate question number.
- The allocation of marks and the suggested allotment of time are as follows:

Part 1	100 marks	90 minutes
Part 2	20 marks	30 minutes
Total	120 marks	120 minutes
- Attach your SACE registration number label to the box at the top of this page. Copy the information from your SACE registration number label into the boxes on the front covers of Question Booklet 2 and Question Booklet 3.
- At the end of the examination, place Question Booklet 2 and Question Booklet 3 inside the back cover of this question booklet.

**STUDENT'S DECLARATION ON THE USE OF
CALCULATORS**

By signing the examination attendance roll I declare that:

- my calculators have been cleared of all memory
- no external storage media are in use on these calculators.

I understand that if I do not comply with the above conditions for the use of calculators I will:

- be in breach of the rules
- have my results for the examination cancelled or amended
- be liable to such further penalty, whether by exclusion from future examinations or otherwise, as the SACE Board of South Australia determines.

The examination questions begin on page 4.

PART 1: SHORT-ANSWER AND ANALYTICAL QUESTIONS (Questions 1 to 8)

(100 marks)

Answer **all** questions in this part in the spaces provided. The allocation of marks is shown in brackets at the end of each part of each question. You should spend about 90 minutes on this part.

Section A: Questions 1 to 4

(50 marks)

1. Vitamin B₁₂ is a micronutrient that is naturally present in some foods, and is added to others. It is also available as a dietary supplement and a prescription medication.

(a) State whether vitamin B₁₂ is water-soluble or fat-soluble.

_____ (1 mark)

(b) State *one* function of vitamin B₁₂ in the human body.

_____ (1 mark)

(c) Name *one* food group that is naturally high in vitamin B₁₂.

_____ (1 mark)

(d) Vitamin B₁₂ deficiency is a relatively common disorder.

(i) Describe the signs and symptoms of vitamin B₁₂ deficiency.

_____ (2 marks)

(ii) Explain why people with coeliac disease are at risk of developing vitamin B₁₂ deficiency.

_____ (2 marks)

- (iii) Name *one other* group of people who are at risk of developing vitamin B₁₂ deficiency, and suggest why they are at risk.

(2 marks)

2. A primary school has introduced a 'brain food' policy. Students are encouraged to snack on nutrient-dense foods, rather than energy-dense foods, throughout the school day.

(a) Explain the difference between nutrient-dense foods and energy-dense foods.

(2 marks)

(b) Suggest why the brain food policy has been introduced at primary school level rather than at high school level.

(2 marks)

(c) The macronutrient content of the lunchbox snacks of two primary school students (Jaime and Li Na) was analysed.

(i) Refer to the following table:

Nutritional Profile of Jaime's Lunchbox Snacks

	<i>Protein (g)</i>	<i>Lipid (g)</i>		<i>Carbohydrate (g)</i>
		<i>Saturated</i>	<i>Total</i>	
<i>Total</i>	12.7	18.0	40.0	89.0

(1) Using the data in the table above, calculate the total energy content of Jaime's lunchbox snacks. Show all calculations and round to the nearest whole number.

Total energy content _____ kJ (4 marks)

- (2) Calculate the proportion of energy (%) provided by lipids in Jaime's lunchbox snacks. Show all calculations.

Proportion of energy _____% (2 marks)

- (ii) Refer to the following table:

**Macronutrient Distribution: Recommended Range (%) and
Macronutrient Distribution (%) in Li Na's Lunchbox Snacks**

	<i>Protein</i>	<i>Lipid</i>		<i>Carbohydrate</i>
		<i>Saturated</i>	<i>Total</i>	
recommended range (%)	15–25	<10	20–30	45–65
Li Na's snacks (%)	30	10	40	30

Compare the percentage distribution of protein, saturated lipid, total lipid, and carbohydrate in Li Na's snacks with the recommended percentages.

Protein: _____

Saturated lipid: _____

Total lipid: _____

Carbohydrate: _____

_____ (4 marks)

- (d) Choose *one* of the following three typical lunchbox snacks of primary school students. Indicate your choice by ticking the appropriate box.

packet of crisps fruit bar soft drink

- (i) Name a suitable nutrient-dense snack that could replace the snack you have chosen.

_____ (1 mark)

- (ii) Explain the nutritional benefit of the replacement snack.

_____ (2 marks)

3. Refer to the following recipe for lasagne served with potato wedges:

Lasagne	
<p>Ingredients</p> <p>2 tablespoons olive oil 300g button mushrooms 350g pork and veal mince 500g Homemade Napoletana Sauce (see below) 4 lasagne sheets 530g Béchamel sauce (see below) 2/3 cup grated pizza cheese</p>	<p>Method</p> <ul style="list-style-type: none"> • Prepare according to recipe instructions. • Bake at 200°C in a greased baking dish 17x28 centimetres and 5 centimetres deep for 45 minutes until golden brown.
Homemade Napoletana Sauce	
<p>Ingredients</p> <p>2 tablespoons olive oil 1 onion 3 cloves of garlic 1.5kg tomatoes 1 tablespoon tomato paste 1 teaspoon sugar 2 bay leaves</p>	<p>Method</p> <ul style="list-style-type: none"> • Prepare according to recipe instructions.
Béchamel Sauce	
<p>Ingredients</p> <p>60g butter 1/3 cup plain flour 4½ cups full-cream milk 75g Parmesan cheese ¼ teaspoon salt pinch of ground nutmeg</p>	<p>Method</p> <ul style="list-style-type: none"> • Prepare according to recipe instructions.
Potato Wedges	
<p>Ingredients</p> <p>2 medium potatoes vegetable oil for deep-frying 2 teaspoons salt 1 teaspoon cracked pepper</p>	<p>Method</p> <ul style="list-style-type: none"> • Peel potatoes and cut into thick wedges. • Deep-fry in hot oil until crisp and golden. • Sprinkle with salt and pepper.

With substitutions to the ingredients and modifications to the method, the recipe for lasagne with potato wedges on page 8 could be made suitable for people with particular dietary requirements.

- (a) (i) There are several substitutions to the ingredients that would make the lasagne recipe more suitable for vegans.

Name and justify *one* appropriate ingredient for substitution.

Ingredient: _____

Justification: _____

_____ (3 marks)

- (ii) Explain how this substitution would also make the recipe more suitable for people with cardiovascular disease (CVD).

_____ (2 marks)

- (iii) Recommend *two other* substitutions to the ingredients that would improve the lasagne recipe for a person with CVD.

(1) _____

_____ (1 mark)

(2) _____

_____ (1 mark)

- (b) Describe *one* modification to the method that would make the recipe for potato wedges more suitable for a person with CVD.

_____ (2 marks)

(c) Leftover lasagne in the uncovered baking dish has been left on the kitchen benchtop for 4 hours.

(i) Explain why the lasagne would not be recommended as safe to eat.

(2 marks)

(ii) Describe a suitable way of storing leftover lasagne.

(2 marks)

(iii) (1) Suggest an appropriate method for reheating the lasagne.

(1 mark)

(2) Explain why this is an appropriate method.

(2 marks)

4. Omega-3 and omega-6 are polyunsaturated essential fatty acids.

(a) Fatty acids can be classified as saturated or unsaturated.

Describe *one* structural difference **or** *one* physical difference between these two types of fatty acids.

(2 marks)

(b) Explain the term 'essential fatty acids'.

(2 marks)

(c) Refer to the following list of six food items:

- almonds
- salmon
- cheese
- natural yoghurt
- sunflower oil
- bacon

Choose *one* of the foods listed above that is high in:

(i) omega-3 fatty acids. _____ (1 mark)

(ii) omega-6 fatty acids. _____ (1 mark)

(d) The fatty acids omega-3 and omega-6 have important functions in the human body.

(i) State *one* function of omega-3 fatty acids in the human body.

(1 mark)

(ii) State a different function of omega-6 fatty acids in the human body.

(1 mark)



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NUTRITION							

QUESTION BOOKLET

2

11 pages, 4 questions

Tuesday 12 November: 9 a.m.

Section B of Part 1: Short-answer and Analytical Questions

Write your answers to Section B of Part 1 in this question booklet.

PART 1: SHORT-ANSWER AND ANALYTICAL QUESTIONS

Section B (Questions 5 to 8)

(50 marks)

Answer *all* questions in the spaces provided.

5. Samuel, a 40-year-old man with a sedentary lifestyle, weighs 125 kilograms and has a body mass index (BMI) of 40.

(a) (i) Using the following information, calculate Samuel's total daily energy expenditure.

- daily energy intake — 15 870 kJ
- basal metabolic rate (BMR) — 12 600 kJ
- energy expenditure from daily activity — 580 kJ
- thermic effect of food — 10% of daily energy intake.

Total daily energy expenditure: _____ kJ (3 marks)

(ii) Calculate the difference between Samuel's daily energy intake and his total daily energy expenditure.

Difference: _____ kJ (1 mark)

(iii) State the impact on Samuel's weight if this difference between intake and expenditure continues.

_____ (1 mark)

(b) The non-surgical management of obesity includes dietary, lifestyle, and psychological approaches.

(i) A dietitian advises Samuel to follow a diet based on the Australian Guide to Healthy Eating (AGHE). Samuel ignores this advice and, in an attempt to lose weight quickly, starts a fad diet that is high in protein and fat and low in carbohydrate.

Explain why the approach of the AGHE to weight loss is better than that of the fad diet.

(3 marks)

(ii) One lifestyle change that could help Samuel to lose weight would be to increase his physical activity.

Explain how exercise could help Samuel to achieve a healthy BMI.

(2 marks)

(iii) State *two other* lifestyle changes that would help Samuel to lose weight.

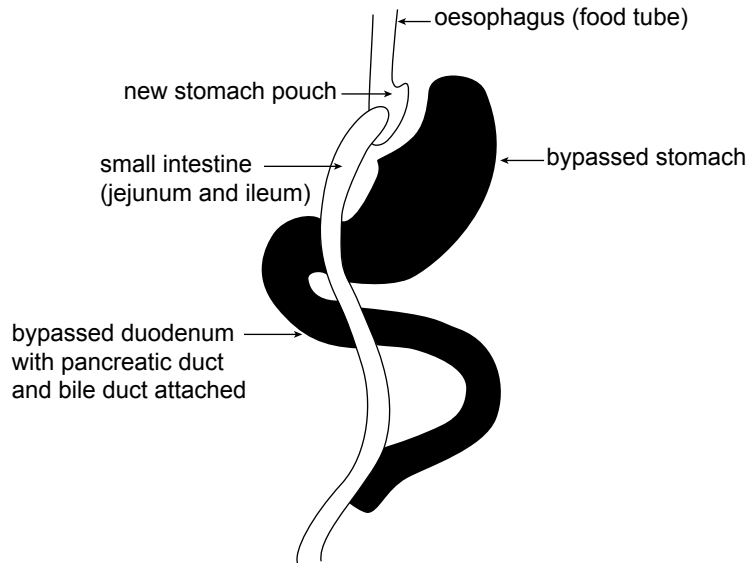
(1) _____
_____ (1 mark)

(2) _____
_____ (1 mark)

- (c) Samuel is considering gastric bypass surgery as a weight loss option. This would involve taking a thumb-sized section of his stomach and attaching it to the second part of his small intestine (the jejunum). His new stomach pouch would hold about 25 millilitres of food, whereas his stomach pouch now holds about 400 millilitres. The rest of his stomach and the first part of his small intestine (the duodenum) would no longer be functional after this surgery, resulting in changes to his digestion of food. The procedure is considered to be permanent.

Refer to the following diagram:

Rearrangement of Digestive Tract after Gastric Bypass Surgery



- (i) (1) Explain why Samuel is likely to develop micronutrient deficiencies if he has gastric bypass surgery.

(2 marks)

- (2) State the micronutrient deficiency disorder that results from a lack of:

vitamin A. _____

vitamin B₃. _____

vitamin C. _____ (3 marks)

6. Before Fran's Fine Fish Cafe can open for business, the owner is required to establish a Hazard Analysis Critical Control Points (HACCP) plan.

(a) Outline *one* reason for establishing a HACCP plan.

(1 mark)

(b) Refer to the following table:

The Seven Key HACCP Steps

<i>Step</i>	<i>Description</i>
1	Analyse the hazards and assess risks
2	Identify the critical control points
3	Set the critical limits for each critical control point
4	Monitor the critical control points
5	Establish corrective actions
6	Set up records
7	Verify that the HACCP system is working correctly

Choose *one* of the HACCP steps from the table above and describe the purpose of this step in ensuring consumer safety.

Step: _____

Purpose: _____

(2 marks)

- (c) Fran's Fine Fish Cafe makes fish cakes to be used in fish burgers. The main ingredients in the fish cakes are fish, eggs, capers, breadcrumbs, potatoes, onions, parsley, and wheat flour.

Refer to the following table:

Key Stages in the Production of Fish Cakes

<i>Stage</i>	<i>Description</i>
A	Delivering the raw ingredients
B	Storing the raw ingredients
C	Cooking the fish cakes
D	Packaging and storing the fish cakes

With reference to the table above, choose *two* of the key stages (A, B, C, D) in the production of fish cakes.

For each stage, outline *one* hazard that could lead to food spoilage or food poisoning and describe *one* food safety practice that could be used to overcome the hazard you have outlined.

(i) (1) Stage: _____

Hazard: _____
_____ (1 mark)

(2) Food safety practice: _____

_____ (2 marks)

(ii) (1) Stage: _____

Hazard: _____
_____ (1 mark)

(2) Food safety practice: _____

_____ (2 marks)

7. In a recent survey, four consumers were asked to evaluate the physical and sensory characteristics of a ham and pineapple pizza from a local pizza store and those of a similar reheated frozen pizza from a supermarket.

(a) Describe how *one* physical characteristic could differ between fresh pizza and reheated frozen pizza.

(2 marks)

(b) Identify *two* factors that should be held constant when this physical characteristic of the fresh pizza and the reheated frozen pizza is evaluated.

(i) _____
_____ (1 mark)

(ii) _____
_____ (1 mark)

(c) Refer to the following table:

Survey Results of Sensory (Flavour) Evaluation of Frozen Pizza*

<i>Flavour Characteristic</i>	<i>Taster 1</i>	<i>Taster 2</i>	<i>Taster 3</i>	<i>Taster 4</i>	<i>Average</i>
ham	5	4	4	3	4.0
pineapple	4	3	4	5	4.0
salt	5	5	5	5	5.0
tomato sauce	1	1	1	1	1.0
cheese	1	2	2	1	1.5

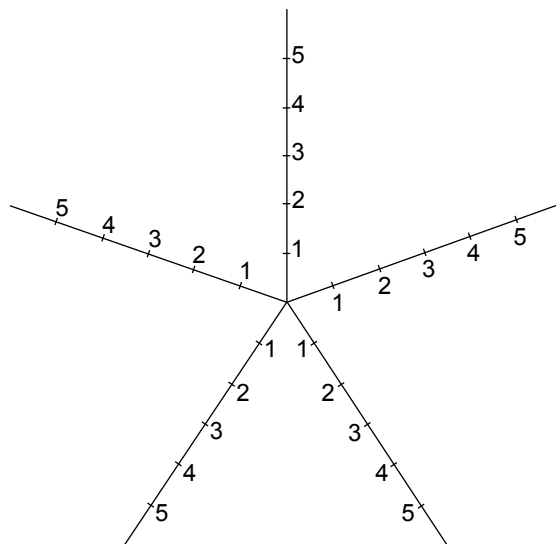
*1 is the lowest score, 5 is the highest score

(i) Explain how the pizza could be modified to improve its nutritional suitability for a person with high blood pressure.

(2 marks)

- (ii) Graph the data under the 'Average' heading from the table on page 8 onto the axes of the star profile below, and add a suitable title.

Title: _____



(4 marks)

8. A recent survey found that 75% of adults had used vitamin and mineral supplements in the previous 3 months.

(a) Suggest why most dietitians state that the best way to obtain the essential vitamins and minerals is to consume a variety of foods from each of the food groups in the Australian Guide to Healthy Eating (AGHE) rather than to take supplements.

(2 marks)

(b) Identify *two* micronutrients available in supplement form that may be of particular benefit to elderly people, and explain why.

(i) _____

(2 marks)

(ii) _____

(2 marks)



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QUESTION BOOKLET

3

6 pages, 2 questions

Tuesday 12 November: 9 a.m.

Part 2: Extended-response Questions on Option Topics

Write your answer to Part 2 in this question booklet.

PART 2: EXTENDED-RESPONSE QUESTIONS ON OPTION TOPICS

(Questions 9 and 10)

(20 marks)

Answer **either** Question 9 **or** Question 10.

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

9. Extreme weather events around the world can have devastating effects on food supplies. Food producers, processors, and manufacturers need to find sustainable ways to provide food supplies to compensate for loss after extreme weather events.

Discuss:

- the impact of severe weather events on the ecological sustainability of food production, using an example from agricultural, animal, or fishing industries
- how the use of genetically modified organisms (GMOs) could help food producers to secure a sustainable food supply for communities
- *two* strategies that food processors could use to ensure food is sustainably packaged
- *two* strategies that governments could implement to help food processors or manufacturers to overcome the effects of extreme weather events and so contribute to a sustainable and secure food supply.

Option Topic 2: Global Hunger

10. It is estimated that up to half of all food produced globally is wasted and therefore not available for consumption. Such wastage impacts on food security, without which countries and their populations are susceptible to food shortages and malnutrition.

Discuss:

- food wastage in the food supply chain that contributes to food shortages
- *one* macronutrient deficiency disorder that people affected by food shortages could develop, and how this might impact on the community
- how economic status could limit the access of individuals and/or communities to an adequate food supply
- *two* long-term strategies that government organisations or non-government organisations (NGOs) could implement to reduce the incidence of food shortages.

