



2011 NUTRITION

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ATTACH SACE REGISTRATION NUMBER LABEL TO THIS BOX

Monday 7 November: 1.30 p.m.

Time: 2 hours

Pages: 21
Questions: 10

Examination material: one 21-page question booklet
 one 8-page script book
 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 booklet or script book or use a calculator during this reading time but you may make notes on the scribbling paper provided.
- This paper is in two parts:
 - Part 1: Short-answer and Analytical Questions** (Questions 1 to 8)
 Answer all questions in the spaces provided in this question booklet.
 Write on page 20 if you need more space to finish your answers.
 - Part 2: Extended-response Questions on Option Topics** (Questions 9 and 10)
 Answer *either* Question 9 *or* Question 10.
 Write your answer in the separate script book.
- 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 box on the front cover of your script book.
- At the end of the examination, place your script book 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.

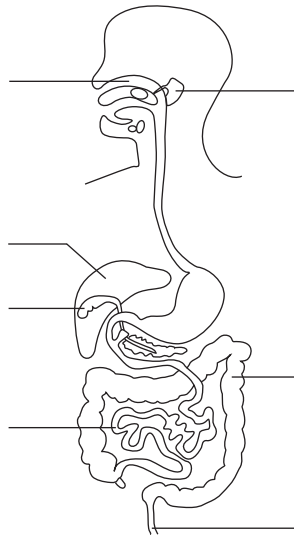
PART 1: SHORT-ANSWER AND ANALYTICAL QUESTIONS (Questions 1 to 8)

(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.

1. Digestion involves breaking food down into smaller units that can be absorbed and used in the body.

(a) Refer to the following diagram, which shows the human digestive system:



On the diagram above, find the following structures and write the corresponding letter (A, B, C) next to the appropriate line:

A. Large intestine

B. Gall bladder

C. Salivary gland.

(3 marks)

- (b) During digestion food is broken down into nutrients.

State *one* by-product (other than a nutrient) of the process of digestion.

_____ (1 mark)

(c) Describe *one* physical role and *one* chemical role of the stomach in the process of digestion.

(i) Physical role: _____

_____ (2 marks)

(ii) Chemical role: _____

_____ (2 marks)

(d) Intolerance to lactose is the inability to digest and absorb lactose. It produces gastrointestinal symptoms when certain foods are consumed.

(i) State *one* food or beverage that would produce gastrointestinal symptoms in a lactose-intolerant person.

_____ (1 mark)

(ii) State the site in the digestive tract that is responsible for the absorption of lactose.

_____ (1 mark)

(iii) Suggest *one* food that lactose-intolerant people could consume to meet their calcium requirement.

_____ (1 mark)

(e) The energy derived from macronutrients is used to fuel the body's basal metabolic processes, digestion, and physical activity.

Describe *one* basal metabolic process.

_____ (2 marks)

2. The Measure Up campaign is 'for all Australians and aims to provide them with the tools and understanding to make healthy lifestyle choices' (www.measureup.gov.au).

(a) Two particular groups are targeted by the campaign: adults 25 to 50 years old who have children, and adults 45 to 60 years old.

Suggest why each of these two groups of people is targeted by the campaign.

(i) Adults 25 to 50 years old with children.

(2 marks)

(ii) Adults 45 to 60 years old.

(2 marks)

(b) The Measure Up campaign uses waist circumference as a diagnostic tool for evaluating health.

Describe another example of a diagnostic tool that is available to help Australians to improve their diet, lifestyle, and health.

(2 marks)

3. Cholesterol is a fatty, wax-like substance produced in the liver. Cholesterol can also be consumed as part of the daily diet.

(a) State *one* function of cholesterol in the human body.

_____ (1 mark)

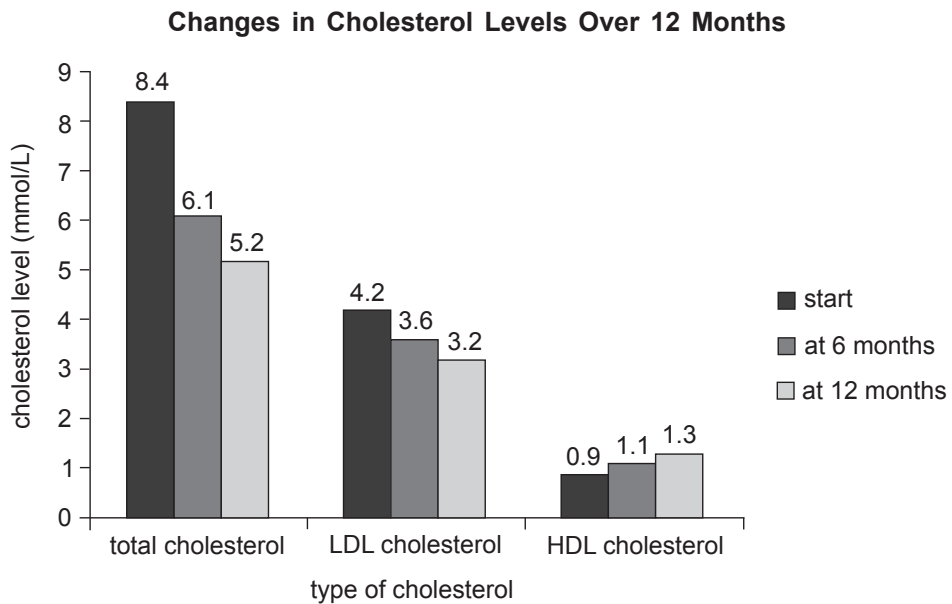
(b) Explain the link between high blood cholesterol and atherosclerosis.

_____ (2 marks)

(c) Outline the function of high-density lipoprotein (HDL) cholesterol in the human body.

_____ (2 marks)

(d) A person's cholesterol levels were monitored for 12 months, as shown in the graph below:



(i) With reference to the graph above, describe the trend in:

(1) low-density lipoprotein (LDL) cholesterol.

_____ (2 marks)

(2) HDL cholesterol.

(2 marks)

(ii) State *two* dietary strategies that may have been used to lower the person's total cholesterol level.

(1) _____ (1 mark)

(2) _____ (1 mark)

(iii) Describe *one* lifestyle strategy that could lower the person's total cholesterol level to less than 5.2 millimoles per litre.

(2 marks)

(iv) Refer to the following table, which shows reference ranges for total cholesterol, LDL cholesterol, and HDL cholesterol levels:

<i>Total Cholesterol Level Reference Range (mmol/L)</i>		<i>LDL Cholesterol Level Reference Range (mmol/L)</i>		<i>HDL Cholesterol Level Reference Range (mmol/L)</i>	
Low	< 5.2	Low	< 3.3	Low	< 1.3
Medium	5.2 – 6.2	Medium	3.4 – 4.1	Medium	1.3 – 1.5
High	> 6.2	High	> 4.1	High	> 1.5

Source: Adapted from www.mayoclinic.com/health/cholesterol-levels/CL00001

Compare the LDL cholesterol level at 6 months, as shown in the graph on the page opposite, with the reference ranges shown in the table above.

(2 marks)

4. The Go for 2&5[®] campaign is a nutritional educational aid that encourages people to eat two servings of fruit and five servings of vegetables every day (www.gofor2and5.com.au).

(a) You have been asked to conduct an investigation to assess the impact of the Go for 2&5[®] campaign in helping people to improve their diet, lifestyle, and health.

Write a suitable question for the investigation.

(2 marks)

(b) Outline *three* procedural steps that could be undertaken to explore your question for the investigation.

(i) _____ (1 mark)

(ii) _____ (1 mark)

(iii) _____ (1 mark)

(c) State *two* factors that need to be held constant to ensure the reliability of the data collected during the investigation.

(i) _____ (1 mark)

(ii) _____ (1 mark)

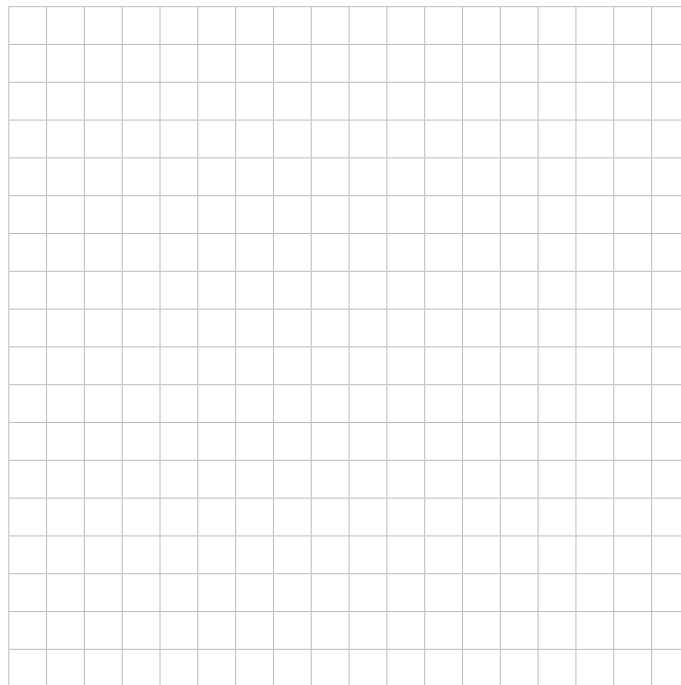
(d) State *one* possible error (either random or systematic) that could occur during the investigation.

(1 mark)

- (e) People from three different age groups were interviewed in a survey to determine their level of understanding about the Go for 2&5® campaign. The results of this survey are shown in the following table:

<i>Age Group (years)</i>	<i>Level of Understanding</i>	
	<i>Poor</i>	<i>Good</i>
11–20	2	15
21–30	6	7
31–40	5	2

- (i) On the grid below, construct a graph to represent the data in the table above.



(5 marks)

- (ii) With reference to your graph, write a conclusion about the level of understanding of the age groups surveyed.

(2 marks)

- (iii) Suggest *one* improvement (other than increasing the number of people surveyed) that would increase the reliability of the data from this survey, if it were to be repeated.

(1 mark)

5. An 83-year-old man is 1.75 metres tall and weighs 56 kilograms. His body mass index (BMI) is 18, which is considered underweight.

(a) Describe *two* physiological factors that could be contributing to the elderly man's low body weight.

(i) _____

_____ (2 marks)

(ii) _____

_____ (2 marks)

(b) The elderly man has been diagnosed with iron deficiency anaemia.
State *two* factors (psychological and/or social) that could contribute to this disorder.

(i) _____ (1 mark)

(ii) _____ (1 mark)

(c) The Australian Dietary Guidelines recommend that people 'Eat plenty of vegetables, legumes and fruits' (www.nhmrc.gov.au).

Suggest *two* nutritional reasons why this recommendation is important for the elderly man.

(i) _____

_____ (2 marks)

(ii) _____

_____ (2 marks)

(d) Economic factors may affect people's food choices.

State *two* strategies that the elderly man could use to make nutritional choices that would reduce the amount of money he spends on food.

(i) _____ (1 mark)

(ii) _____ (1 mark)

(e) Good nutrition can be maintained by the appropriate selection and preparation of food.
Describe *one* food selection method and *one* food preparation method that the elderly man could use to ensure that his food is of a high nutritional standard.

(i) Food selection method: _____

_____ (2 marks)

(ii) Food preparation method: _____

_____ (2 marks)

6. Refer to the following recipe for a savoury pancake that serves two people:

Ingredients

1 cup white self-raising flour	2 middle bacon rashers, cut into thin strips
2 eggs	1 tablespoon whole-egg mayonnaise
$\frac{2}{3}$ cup water	pinch of salt
$\frac{1}{2}$ small cabbage, finely shredded	
2 spring onions, sliced	

Method

- Whisk the flour, eggs, and water together in a mixing bowl.
- Stir the cabbage and spring onions into the mixture.
- Heat a non-stick frypan.
- Pour the mixture into the frypan and use a spatula to form a pancake 1.5 centimetres thick.
- Sprinkle the strips of bacon over the pancake.
- Cook for 3 minutes, then turn the pancake and cook for 4 minutes on the other side.
- Turn the pancake again and cook for 3 minutes, or until set.

Serving

Slide the pancake onto a serving plate. Drizzle with the mayonnaise, and sprinkle with a pinch of salt. Cut into wedges and serve with optional accompaniments (soy sauce, seaweed flakes, shrimp flakes, and fried shallot flakes).

(a) Refer to the following table, which shows the macronutrient distribution (%) for each serving of the pancake and the recommended macronutrient range (%) for each macronutrient:

Macronutrient Distribution and Range (%)					
	<i>Carbohydrate</i>		<i>Lipids</i>		<i>Protein</i>
	<i>Total</i>	<i>Sugar</i>	<i>Total</i>	<i>Saturated</i>	
Per serving	39	4	42	29	19
Recommended range	45–65	10–15	20–30	<10	15–25

Choose *one* of the macronutrients listed in the table above and compare its value with the recommended range.

Macronutrient: _____

Comparison: _____

_____ (2 marks)

(b) Explain *one* way in which the savoury pancake recipe maximises the nutritional value of the meal.

(2 marks)

(c) The total sodium content of the pancake (without optional accompaniments) is high. Suggest and justify *one* modification to the ingredients that would make the pancake more suitable for a person with hypertension.

Modification: _____

Justification: _____

(2 marks)

(d) The pancake has a low fibre content. Suggest and justify *one* modification to the ingredients that would increase the fibre content.

Modification: _____

Justification: _____

(2 marks)

- (e) Refer to the following label, which shows nutrition information for the fried shallot flakes that were suggested as an accompaniment to the savoury pancake:

Global Brand Fried Shallot Flakes

No artificial flavour Net weight 100g
 No preservatives

Ingredients
 100% shallots and vegetable oil

Imported by
 La Brothers Pty Ltd, 10 Ben Ave.,
 Sunshine, Vic. 3020
 Telephone (03) 1003 5673
 Fax (03) 1003 5679

Packed by
 Shine Success Company
 6123 Batu, Malaysia

Use by 13 05 2009

Nutrition Information		
Serving size 5g (1 teaspoon)		
	<i>Per serving</i>	<i>Per 100g</i>
Energy	106kJ	2110kJ
Protein	0.3g	5.4g
Carbohydrates	3.1g	62.8g
Sugar	1.1g	22.3g
Fat	1.3g	26.1g
Saturated	0.6g	11.8g
Sodium	3mg	80mg

- (i) Identify *one* piece of information on the label that does not conform to Australian law, and explain why this information is required.

Information: _____

Explanation: _____

 _____ (2 marks)

- (ii) State *one* nutritional claim that the company makes about this product.

_____ (1 mark)

7. Refer to the following table, which shows the nutritional profile of foods that a bushwalker plans to consume during a 6-hour walk:

<i>Food</i>	<i>Protein (g)</i>	<i>Carbohydrate (g)</i>	<i>Fat (g)</i>
pita bread	5	33	1
cheese	5	1	9
tomato	1	5	0
Total	11	39	10

- (a) Calculate the total energy content of the foods listed in the table above. Show all calculations and round up to the nearest whole number.

Total energy content: _____ kJ (4 marks)

- (b) The bushwalker will need 2121 kilojoules of energy to complete the 6-hour walk.
Calculate the difference between the bushwalker's expected energy intake and energy expenditure. Show all calculations and round up to the nearest whole number.

Difference: _____ kJ (2 marks)

- (c) Refer to the following table, which shows the energy content (kJ) of foods that could improve the bushwalker's energy intake:

Food	Energy Content (kJ)
1 muesli bar	577
1 piece of chocolate cake	1420
1 blueberry muffin	641
1 banana	449
1 orange	257
1 small pack of almonds	914

- (i) Name *one* food listed in the table above that the bushwalker could consume (as well as the pita bread, cheese, and tomato) to provide an improved energy intake of 400 to 1000 kilojoules. Justify your choice on the basis of the food's nutritional benefit.

Food: _____

Justification: _____

_____ (3 marks)

- (ii) Name *two* processes that could cause a person to lose body fluid during a 6-hour walk.

(1) _____ (1 mark)

(2) _____ (1 mark)

- (iii) Identify *one* food listed in the table above that would best replace some of the fluid lost by the bushwalker, and justify its nutritional suitability.

Food: _____

Justification: _____

_____ (2 marks)

- (d) Choose *one* of the following three foods that are also available for the bushwalker. Indicate your choice by ticking the appropriate box and then answer parts (i) to (iii).

Salami slices Smoked chicken slices Individual servings of long-life milk

- (i) Identify the preservation method used for this food.

_____ (1 mark)

- (ii) Describe how this preservation method reduces the risk of food poisoning.

_____ (2 marks)

- (iii) (1) Suggest suitable packaging that would prevent the food from being damaged or contaminated on a 6-hour walk.

_____ (1 mark)

- (2) Explain why this packaging is suitable for carrying food on a 6-hour walk.

_____ (2 marks)

8. In a recent study, researchers evaluated the impact of contemporary packaging on the level of vitamin C in green peppers (capsicums).

Green peppers were harvested on Day 0. After preparation and packaging on Day 10, all the green peppers were stored at 4°C. Vitamin C levels (expressed as a percentage) were measured three times: at the time of harvesting (Day 0), after preparation and packaging (Day 10), and at the end of the study (Day 20). The results are shown in the table below:

Green Peppers: Preparation Method, Packaging Material, and Vitamin C Level (%)

Preparation Method				
	Sample A: Whole (unprocessed)	Sample B: Sliced	Sample C: Sliced	Sample D: Sliced
Packaging Material				
	stored in unsealed bag	pillow-packed: sealed in a polyethylene bag, 3mm thickness of gas mixture (5% oxygen/ 5% carbon dioxide/ 90% nitrogen)	squeeze-packed: in a polyethylene package with excess air removed	vacuum-packed: in a polyethylene package with <i>total</i> air removed
Vitamin C Level (%)				
	Day 0	Day 10	Day 20	Day 0
	100	100	100	100
	85	83	82	84
	83	67	71	73

Source: Adapted from A. Hussein *et al.*, 'Effects of Processing and Packaging on Vitamin C and β -carotene Content of Ready-to-Use (RTU) Vegetables', in *Food Research International*, 33, 2000, pp. 131–6

- (a) State *one* function of vitamin C in the human body.

_____ (1 mark)

- (b) With reference to the table above, state *one* trend relating to vitamin C levels that is evident in all samples between the time of harvesting (Day 0) and after preparation and packaging (Day 10).

 _____ (1 mark)

- (c) At the end of the study (Day 20) the percentage loss of vitamin C content is higher in all sliced green peppers than in whole (unprocessed) green peppers.

Using the data in the table on the page opposite, identify the sample of green peppers that has the highest percentage loss of vitamin C. Tick the appropriate box to indicate your answer.

Sample A Sample B Sample C Sample D

Suggest why the sample you have identified has the highest percentage loss of vitamin C.

(2 marks)

PART 2: EXTENDED-RESPONSE QUESTIONS ON OPTION TOPICS

(Questions 9 and 10)

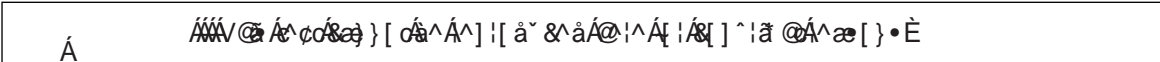
(20 marks)

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

Write your answer in the separate script book, 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. 

(from an article by Rosanne Barrett, *Australian*, 18 March 2011)

Discuss:

- how increasing land-use pressures, such as larger major towns and cities, could impact on future food supply
- one government strategy that could be implemented to ensure a more secure supply of fruits and vegetables in Australia
- how increases in world population affect Australian food security
- how the import and export of food affect the environment.

Option Topic 2: Global Hunger

10. 'The United Nations has predicted the global population would reach seven billion this year and climb to nine billion by 2050 ... To feed all those mouths, "we will need to produce as much food in the next 40 years as we have in the last 8000", Jason Clay of the World Wildlife Fund said.' (*Advertiser*, Adelaide, 22 February 2011)

Discuss:

- how the provision of a secure water supply can lead to increased food production
- the importance of education in promoting increased food production for growing populations
- the role of a stable government in the production of food to ensure a secure food supply
- the nutritional consequences of insufficient food for the growing population.

NUTRITION 2011
ACKNOWLEDGMENT

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