Singapore Examinations and Assessment Board

Cambridge Assessment International Education

Singapore–Cambridge General Certificate of Education Ordinary Level (2023)

Nutrition and Food Science (Syllabus 6097)

(First year of examination in 2022)

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AIMS

- Lead a healthier lifestyle proactively through proper diet and nutrition.
- Advocate sustainable food consumption by planning and making appropriate food choices.
- Apply principles of culinary science creatively in food preparation and cooking.

ASESSMENT OBJECTIVES

The examination will assess:

AOA Knowledge with understanding

Candidates should be able to demonstrate knowledge and understanding of facts, concepts, and terminology in relation to:

(i) nutrition and health
(ii) food literacy
(iii) food science.

AOB Handling information and solving problems

Candidates should be able to:

1. locate, select, interpret information
2. analyse information
3. present reasoned explanations
4. solve problems.

AOC Application of skills, knowledge and understanding in a variety of contexts

Candidates should be able to extend the learnt knowledge towards planning a food investigation, preparing, cooking and presenting dishes in a variety of contexts involving the following processes:

- gather information on roles/functions of the ingredients
- gather information on meal planning guidelines for a target group of people
- justify the appropriateness of the selected dishes with reference from the prior research
- present recipes of the final three dishes with justifications
- analyse and use the research findings to plan a food investigation
- observe and record sensory evaluations
- present clear photographic evidence
- observe and measure results accurately
- record results using graphs, tables, charts, sensory analysis, labelled diagrams
- analyse results linked to research findings and food science principles
- demonstrate good organisational and time management skills in planning for investigation and/or task
- apply food preparation techniques and use different cooking methods in preparing dishes/meals for different situations
- demonstrate proficient use of equipment and good management of resources in food preparation
- demonstrate the ability to evaluate the sensory outcome of the dishes.

SCHEME OF ASSESSMENT

All candidates will offer Paper 1 and Paper 2. All questions are compulsory in both papers.
Paper 1 40% (100 marks)
Paper 2 60% (80 marks)

Paper	Assessment Objectives			Total
	AOA	AOB	AOC	
1 (Written Examination)	~25%	~15%	N.A.	40%
2 (Coursework)	~10%	~10%	~40%	60%
Overall	35%	25%	40%	100%

Paper 1 (2 hours) – Written Paper

This will test the candidates' knowledge of theory and practice in response to the assessment objectives. Candidates are to answer all questions.
Section A: 15 marks (multiple choice questions)
Section B: 55 marks (short-answer-type questions and data-response-type questions)
Section C: 30 marks (open-ended questions)
Sub-total: 100 marks

Paper 2 – Coursework

Candidates will be given an assignment at the beginning of the examination year which must be conducted under teacher supervision. It should be completed for assessment by the end of July or early August of the examination year. The assignment requires a problem-solving and investigative approach, with an emphasis on investigation work. A total of **28 hours** of curriculum time must be assigned to discuss, facilitate and carry out the investigation and practical work as required.

Assessment will focus on the research of the task; decision making; development of a plan; recording and interpreting experimental results and a methodical approach in the production and presentation of the final products. The evaluation will require candidates to conduct sensory evaluation of the dishes prepared and the outcomes of the execution process.

Research (R)		(10 marks)
Decision Making (DM)		(8 marks)
Investigation (INV)	– Plan	(6 marks)
	– Conduct	(8 marks)
	– Apply	(8 marks)
Planning (P)		(8 marks)
Execution (Exe)	– Organisation and Management	(6 marks)
	– Manipulation	(10 marks)
	– Product and Presentation	(8 marks)
Evaluation (Eva)		(8 marks)
		(80 marks)

Presentation of Coursework Report

The coursework report must be word processed and submitted electronically. The recommended typeface is Arial, minimum font size 11, or Times New Roman, minimum font size 12. Digital photographic evidence of the Investigation and the final dishes in the Execution criteria must be included in the report. All pages should be clearly numbered. The page requirement of the report is between **20–25 pages.**

ASSESSMENT CRITERIA FOR PAPER 2: GCE O-LEVEL COURSEWORK

Criteria		Indicators The candidate:			
		NO MARKS	**LOW**	**MEDIUM**	**HIGH**
RESEARCH		No evidence 0 mark	• Presents limited research that is linked to the task • Presents poorly organised research gathered from a narrow range of sources 1–3 marks	• Presents adequate research that is linked to the task • Presents well organised research gathered from some sources 4–7 marks	• Presents detailed and relevant research that is linked to the task • Presents very well organised research gathered from a wide range of sources 8–10 marks
DECISION MAKING		No evidence 0 mark	• Selects final dishes that are not so appropriate • Provides limited justification based on limited range of factors presented in the previous research 1–2 marks	• Selects final dishes that are mostly appropriate • Provides adequate justification based on some range of factors presented in the previous research 3–5 marks	• Selects final dishes that are all appropriate • Provides detailed justification based on a wide range of factors presented in the previous research 6–8 marks
INVESTIGATION	**PLAN**	No evidence 0 mark	• Presents an investigation plan which includes: – an investigation aim with few details – few details of investigation process and data collection methods 1–2 marks	• Presents an investigation plan which includes: – an investigation aim with some details – some details of investigation process and data collection methods 3–4 marks	• Presents an investigation plan which includes: – an investigation aim that is clear and comprehensive – detailed and logical investigation process and data collection methods 5–6 marks
	CONDUCT	No evidence 0 mark	• Carries out investigation with some assistance 1–2 marks	• Carries out investigation quite proficiently and methodically 3–5 marks	• Carries out investigation proficiently and methodically 6–8 marks
	APPLY	No evidence 0 mark	• Records few observations that are irrelevant and/or inaccurate • Shows limited interpretation of results with poor application of food science content 1–2 marks	• Records some observations that are relevant and accurate • Shows some interpretation of results with some application of relevant food science content 3–5 marks	• Records a range of observations that are relevant and accurate • Shows thorough interpretation of results with good application of relevant food science content 6–8 marks

Criteria		Indicators The candidate:			
		NO MARKS	**LOW**	**MEDIUM**	**HIGH**
PLANNING		No evidence 0 mark	• Includes few recipes with incomplete/missing list of ingredients, materials, equipment and methods • Develops a time plan that is poorly sequenced and shows inefficient use of time and resources 1–2 marks	• Includes some recipes, list in some detail of the ingredients, materials, equipment and methods • Develops a time plan that has some sequencing and shows some efficient use of time and resources 3–5 marks	• Includes all recipes with a thorough list of ingredients, materials, equipment and methods • Develops a time plan that is well-sequenced and shows efficient use of time and resources 6–8 marks
EXECUTION	**ORGANISATION AND MANAGEMENT**	No evidence 0 mark	• Works in an organised manner when provided with assistance • Shows poor use of time and resources 1–2 marks	• Works in an organised manner with some initiative • Shows fairly effective and economical use of time and resources 3–4 marks	• Works independently with a high level of organisation and initiative • Shows effective and economical use of time and resources 5–6 marks
	MANIPULATION	No evidence 0 mark	• Carries out the execution processes appropriately when provided with assistance • Demonstrates a low level of proficiency in a range of food preparation, cooking skills and the use of equipment • Demonstrates a limited range of food preparation skills 1–3 marks	• Carries out the execution processes independently without any assistance • Demonstrates moderate level of proficiency in a range of food preparation, cooking skills and the use of equipment • Demonstrates some food preparation skills 4–7 marks	• Carries out the execution processes independently without any assistance • Demonstrates a high level of proficiency in a range of food preparation, cooking skills and the use of equipment • Demonstrates a wide range of food preparation skills 8–10 marks
	PRODUCT AND PRESENTATION	No evidence 0 mark	• Presents food products that are unattractive, uncooked and not well-prepared for the target group • Presents unclear photographic evidence of final dishes 1–2 marks	• Presents food products that are quite attractive, well-cooked and well-prepared for the target group • Presents clear photographic evidence (including cross section, if necessary) of final dishes 3–5 marks	• Presents food products that are very attractive, well-cooked and well-prepared for the target group • Presents clear photographic evidence (including cross section, if necessary) of final dishes 6–8 marks

Criteria	Indicators The candidate:			
	NO MARKS	**LOW**	**MEDIUM**	**HIGH**
EVALUATION	No evidence 0 marks	• Provides weak sensory evaluation of all dishes, using limited or inappropriate sensory terms • Provides limited review (strengths, weaknesses and suggestions for improvement) of the execution process 1–2 marks	• Provides adequate sensory evaluation of all dishes, using some appropriate sensory terms • Provides some review (strengths, weaknesses and suggestions for improvement) of the execution process 3–5 marks	• Provides detailed sensory evaluation of all dishes, using appropriate sensory terms • Provides detailed review (strengths, weaknesses and suggestions for improvement) of the execution process 6–8 marks

SUBJECT CONTENT

TOPIC	LEARNING OUTCOMES Candidates will be able to:
NUTRITION AND HEALTH	
A. Nutrients, Water and Dietary Fibre	**1. Proteins** (a) State the chemical elements which make up a protein molecule (b) State the digestion products of proteins (i.e. amino acids) (c) List the food sources of proteins (d) Explain the functions of proteins in the body (e) Define: (i) essential amino acids and give examples (ii) non-essential amino acids and give examples (iii) high biological value proteins and give food examples (iv) low biological value proteins and give food examples (v) complementary proteins and give food examples **2. Carbohydrates** (a) State the chemical elements which make up a carbohydrate molecule (b) State the digestion products of carbohydrates (i.e. glucose, fructose and galactose) (c) List the food sources of carbohydrates (d) Explain the functions of carbohydrates in the body (e) Define: (i) simple carbohydrates as monosaccharides and disaccharides and give food examples (ii) complex carbohydrates as polysaccharides (i.e. starch, cellulose and pectin) and give food examples **3. Fats** (a) State the chemical elements which make up a fat molecule (b) State the digestion products of fats (i.e. fatty acids and glycerol) (c) List the food sources of fats (d) Explain the functions of fats in the body (e) Define: (i) saturated fats and give food examples (ii) monounsaturated fats and give food examples (iii) polyunsaturated fats and give food examples (iv) trans fats and give food examples **4. Vitamins** (a) Classify vitamins into fat-soluble vitamins (A, D, E and K) and water-soluble vitamins (B_1, B_2, B_3, B_{12} and C) (b) List the food sources of the following vitamins: A, B_1, B_2, B_3, B_{12}, C, D, E and K (c) Explain the functions of vitamins A, B_1, B_2, B_3, B_{12}, C, D, E and K in the body **5. Minerals** (a) List the food sources of the following minerals: calcium, phosphorus, iron, sodium chloride and potassium (b) Explain the functions of calcium, phosphorus, iron, sodium chloride and potassium in the body

TOPIC	LEARNING OUTCOMES Candidates will be able to:
A Nutrients, Water and Dietary Fibre continued	**6. Water** (a) Explain the factors that affect water intake: state of health, diet, level of activity and environment (b) List the food sources of water in the diet (c) Explain the functions of water in the body **7. Dietary Fibre** (a) List the food sources of dietary fibre (b) Explain the functions of dietary fibre in the body
B. Diet and Health Problems	**8. Diet and Health Problems** (a) Define the term malnutrition (shortage / excess intake of particular nutrients) (b) Explain the common health problems associated with an excessive or insufficient intake of nutrients, water and dietary fibre in Singapore: (i) obesity (ii) hypertension (iii) type 2 diabetes (iv) coronary heart disease (v) dehydration (vi) heat stroke (vii) constipation (viii) osteoporosis (ix) anaemia
FOOD LITERACY	
A. Food Management	**9. Diet & Meal Planning** (a) Explain the term balanced diet (b) Explain the concept of energy balance (c) Explain the factors to consider when planning meals: (i) nutritional needs: school children, teenagers, adults and elderly (ii) physiological: age, gender, metabolic rate, level of physical activity, health status (iii) psychological: individual preferences (including vegetarians: lacto vegetarian, ovo vegetarian, lacto-ovo vegetarian and vegan) (iv) social: occasions, ethnic customs and traditions, religions, parental / peer / media influence, vegetarianism (v) economic: value for money, demand and supply (in relation to cost, quality, quantity and nutritional value) **10. Meal Analysis** (a) Evaluate and modify recipes / meals using the food guide recommended by HPB and Recommended Dietary Allowances to meet different dietary / nutritional needs

TOPIC	LEARNING OUTCOMES Candidates will be able to:
B. Smart Consumer	**11. Sustainable Food Consumption** (a) Define the term sustainable food consumption (b) Identify current food consumption practices and their impact on the environment (c) State sustainable food consumption guidelines: (i) selecting food from sustainable sources (ii) aiming to be waste-free (d) Apply sustainable food consumption guidelines in the preparation and cooking of food **12 Convenience Food** (a) List the different types of convenience food (ready-to-cook and ready-to-eat: bottled / canned food, dried food, frozen / chilled food) (b) Explain the advantages and disadvantages of convenience food (c) Explain the functions of the following additives: (i) salt (ii) sugar and sweeteners (aspartame, saccharin, stevia) (iii) sodium nitrite (iv) monosodium glutamate (d) State the health concerns of excessive consumption of these additives: (i) salt (ii) sugar and sweeteners (aspartame, saccharin, stevia) (iii) sodium nitrite (iv) monosodium glutamate (e) Interpret and apply information found on food and nutrition labels (f) Evaluate the benefits of food and nutrition labels to the consumer
FOOD SCIENCE	
A. The Science of Food Preparation and Cooking	**13. Food Safety** (a) State causes of food spoilage: microbial, chemical and physical spoilage (b) Explain how to avoid and reduce the risk of food spoilage and food contamination when preparing, cooking and storing food (including hygienic practices) **14. Preparation and Cooking of Food** (a) Explain the reasons for cooking food (b) Explain the choice (in terms of nutrients, uses and effects of preparation and cooking) of: (i) meat (ii) poultry (iii) seafood (iv) eggs (v) dairy products (vi) cereals (vii) fruit (viii) vegetables (ix) pulses and legumes

TOPIC	LEARNING OUTCOMES Candidates will be able to:
B. Reactions in Food during Preparation and Cooking	**15. Methods of Cooking** (a) Explain how heat is transferred (conduction, convection and radiation) in the different methods of cooking (grilling, baking, dry-frying, stir-frying / sautéing, shallow-frying, deep-frying, boiling, simmering, steaming, microwave cooking) (b) State the advantages and disadvantages of each method of cooking (c) Use a variety of cooking methods in the preparation of meals **16. Reactions in Food during Preparation and Cooking** (a) Explain the following terms that occur in the preparation and cooking of food: (i) carbohydrates: gelatinisation, caramelisation, dextrinisation (ii) fats: shortening, emulsion, melting point, smoke point (iii) proteins: denaturation, foaming, coagulation, gluten development, Maillard browning (iv) fruit / vegetables: enzymatic browning (b) Explain the functions of the key ingredients (flour, sugar, raising agent, fat, egg, liquid) and justify the procedures in the preparation and cooking of the following products: cakes, biscuits, pastries, batters, sauces (including local dishes)
C. Evaluation of Food	**17. Sensory Evaluation** (a) State the reasons for conducting sensory evaluation of food products from recipes and food investigations (b) Evaluate the sensory properties (texture, flavour, appearance, aroma) of food products