



ATAR course examination, 2024

Question/Answer booklet

FOOD SCIENCE AND TECHNOLOGY

Please place your student identification label in this box

WA student number: In figures

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In words

Time allowed for this paper

Reading time before commencing work: ten minutes

Working time: three hours

Materials required/recommended for this paper

To be provided by the supervisor

This Question/Answer booklet

Multiple-choice answer sheet

Number of additional
answer booklets used
(if applicable):

To be provided by the candidate

Standard items: pens (blue/black preferred), pencils (including coloured), sharpener, correction fluid/tape, eraser, ruler, highlighters

Special items: up to three calculators, which do not have the capacity to create or store programmes or text, are permitted in this ATAR course examination

Important note to candidates

No other items may be taken into the examination room. It is **your** responsibility to ensure that you do not have any unauthorised material. If you have any unauthorised material with you, hand it to the supervisor **before** reading any further.

Structure of this paper

Section	Number of questions available	Number of questions to be answered	Suggested working time (minutes)	Marks available	Percentage of examination
Section One Multiple-choice	15	15	15	15	15
Section Two Short answer	8	8	95	85	55
Section Three Extended answer	3	2	70	40	30
Total					100

Instructions to candidates

1. The rules for the conduct of the Western Australian external examinations are detailed in the *Year 12 Information Handbook 2024: Part II Examinations*. Sitting this examination implies that you agree to abide by these rules.

2. Answer the questions according to the following instructions.

Section One: Answer all questions on the separate Multiple-choice answer sheet provided. For each question, shade the box to indicate your answer. Use only a blue or black pen to shade the boxes. Do not use erasable or gel pens. If you make a mistake, place a cross through that square, then shade your new answer. Do not erase or use correction fluid/tape. Marks will not be deducted for incorrect answers. No marks will be given if more than one answer is completed for any question.

Sections Two and Three: Write your answers in this Question/Answer booklet preferably using a blue/black pen. Do not use erasable or gel pens.

3. You must be careful to confine your answers to the specific questions asked and to follow any instructions that are specific to a particular question.
4. Supplementary pages for planning/continuing your answers to questions are provided at the end of this Question/Answer booklet. If you use these pages to continue an answer, indicate at the original answer where the answer is continued, i.e. give the page number.

Section One: Multiple-choice**15% (15 Marks)**

This section has **15** questions. Answer **all** questions on the separate Multiple-choice answer sheet provided. For each question, shade the box to indicate your answer. Use only a blue or black pen to shade the boxes. Do not use erasable or gel pens. If you make a mistake, place a cross through that square, then shade your new answer. Do not erase or use correction fluid/tape. Marks will not be deducted for incorrect answers. No marks will be given if more than one answer is completed for any question.

Suggested working time: 15 minutes.

1. The **most** effective strategy to minimise oxidation of a freshly cut apple is to
 - (a) refrigerate in small pieces.
 - (b) place in an airtight resealable bag.
 - (c) store with other fruit at room temperature.
 - (d) submerge in water with lemon juice.

2. In order to achieve the desired texture when preparing a fudge mixture, it is important to
 - (a) cool the mixture before stirring, to avoid sugar crystals growing too large.
 - (b) ensure the mixture does not heat above boiling point.
 - (c) consistently stir the mixture to increase the size of sugar crystals.
 - (d) add more water than sugar to avoid supersaturation of the mixture.

3. Low levels of sodium in the blood are more commonly seen in
 - (a) marathon runners.
 - (b) people on a vegan diet.
 - (c) young children.
 - (d) elderly women.

4. Foods that have been modified or fortified to reduce their glycaemic index (GI) may include
 - (a) table salt with added iodine.
 - (b) yoghurt with added probiotics.
 - (c) jam with zero sugar.
 - (d) jelly beans with high glucose.

5. The range of food products available for consumers to choose from has increased as a result of
 - (a) raw food commodities increasing in price.
 - (b) farmers improving the sustainability of their practices.
 - (c) the production of commercially processed foods.
 - (d) natural disasters impacting the types of food sold.

See next page

6. Bottling or canning fruits when they are in abundance and in season is a cost-effective preservation method involving heating cans or bottles to kill harmful bacteria and prevent spoilage. The effect of heating fruit can affect chemical properties by
- (a) reducing water-soluble, and retaining fat-soluble vitamins.
 - (b) retaining water-soluble, and reducing fat-soluble vitamins.
 - (c) reducing both water-soluble and fat-soluble vitamins.
 - (d) retaining both water-soluble and fat-soluble vitamins.
7. Creating new food products that have enhanced taste, texture and consistency, and food packaging that uses antimicrobial compounds to extend shelf life, are examples of
- (a) nanotechnology.
 - (b) microencapsulation.
 - (c) high-pressure processing.
 - (d) modified atmosphere packaging.
8. During the process of digestion, the pancreas is responsible for
- (a) producing bile, a chemical that helps turn fat into energy for use by the body.
 - (b) producing enzymes that break down protein, carbohydrates and fats.
 - (c) holding the food and mixing it with acid and enzymes to break it down.
 - (d) breaking down food, absorbing its nutrients and solidifying waste.
9. Introducing new products to the market by adapting the quantity in which a commodity is sold to consumers will allow for
- (a) the use of packaging technologies that increase shelf life.
 - (b) products with increased health benefits and sensory appeal.
 - (c) a wider variety of products and reduced profit margins.
 - (d) higher profit margins and an increased consumer base.
10. The purpose of a consumer profile in a product proposal for a new food product is to
- (a) determine new product specifications.
 - (b) evaluate the acceptability of the new product.
 - (c) understand the target market characteristics.
 - (d) respond to the purpose statement.
11. A research method used to collect quantitative demographic data is
- (a) sensory testing.
 - (b) a survey.
 - (c) observation.
 - (d) taste testing.

12. Factors that influence the development of new food products include
- (a) population growth and health.
 - (b) fair trade and location.
 - (c) infrastructure and population growth.
 - (d) fair trade and health.
13. A key factor in improving the living standards of subsistence farmers who depend on the land for their food and livelihood is
- (a) land ownership.
 - (b) wealthy tenant farmers.
 - (c) state control of land.
 - (d) security of tenure.
14. Over-nutrition is a consequence of
- (a) accelerated growth rates.
 - (b) low socioeconomic status.
 - (c) an imbalance in nutritional intake.
 - (d) inadequate kilojoule intake.
15. Farming practices in Australia affect
- (a) weather change.
 - (b) sustainable food production.
 - (c) government trade policies.
 - (d) labour market practices.

End of Section One

See next page

Section Two: Short answer**55% (85 Marks)**

This section has **eight** questions. Answer **all** questions. Write your answers in the spaces provided.

Supplementary pages for planning/continuing your answers to questions are provided at the end of this Question/Answer booklet. If you use these pages to continue an answer, indicate at the original answer where the answer is continued, i.e. give the page number.

Suggested working time: 95 minutes.

Question 16**(13 marks)**

- (a) Explain how consumers are informed of the presence of allergens in food products. (3 marks)

Aisha has been diagnosed with a severe food allergy to eggs.

- (b) (i) Define the term 'food allergy'. (2 marks)

- (ii) Describe **two** potential consequences for Aisha if she consumes any foods containing eggs. (4 marks)

One: _____

Two: _____

See next page

Read the following recipe.

Chocolate Cake

Ingredients	Method
1 ½ cups hot water 250g butter 200g dark chocolate ¼ cup cocoa powder 2 cups caster sugar 2 eggs, lightly beaten 2 teaspoons vanilla essence 1 ½ cups self-raising flour	1. Preheat the oven to 150 °C. 2. In a saucepan over low heat, combine butter, cocoa, chocolate, sugar, vanilla and hot water. Stir until butter and chocolate have melted. 3. Set aside to cool. Grease and line a 30 cm cake tin. 4. When the chocolate mixture has cooled, add the eggs. Mix well, then fold in the flour. 5. Pour into cake tin, and bake for 75 minutes.

- (c) State **one** modification that could be made to the chocolate cake recipe to enable Aisha to safely consume the cake. Explain why this modification would be suitable. (4 marks)

Modification: _____

Explanation: _____

Question 17

(9 marks)

Describe **one** effect of the consumption of functional foods for each of the following and state **one** example of a functional food that assists in achieving or maintaining optimal health.

Neural development: _____

Example: _____

Skeletal structure: _____

Example: _____

Cardiovascular system: _____

Example: _____

Question 18

(11 marks)

- (a) Explain how economic factors can influence food consumption patterns in Australia.

(3 marks)

In order to reduce the quantity of plastic waste from food packaging entering landfill, many consumers are choosing food products that feature reusable, recyclable or biodegradable packaging.

- (b) Discuss **two** ways, other than an increased preference for sustainably packaged foods, in which environmental factors can influence food consumption patterns in Australia.

(8 marks)

One: _____

Two: _____

Question 19

(13 marks)

- (a) Define the term 'innovation' and describe its purpose in relation to food product development.

(4 marks)

Value-adding is the process of changing or transforming a food product from its original state to a more valuable state.

- (b) Identify **three** innovative developments, other than value-adding, that increase the availability of food.

(3 marks)

One: _____

Two: _____

Three: _____

- (c) Explain **two** ways in which value could be added to an existing food product to enhance its appeal to busy families who are health conscious. (6 marks)

One: _____

Two: _____

Question 20

(9 marks)

In September 2018, a nationwide food recall was announced after numerous punnets of strawberries, grown in Queensland and Western Australia, were found to be contaminated with sewing needles.

- (a) Explain the *Australia New Zealand Food Standards Code* requirements for recalling the contaminated strawberries. (3 marks)

- (b) Describe **three** reasons, other than contamination with foreign matter, why food may be recalled in Australia. (6 marks)

One: _____

Two: _____

Three: _____

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See next page

Question 21

(13 marks)

- (a) Identify the food additive responsible for each of the following. (3 marks)

Preventing ingredients from becoming lumpy: _____

Preventing rancidity: _____

Stopping fats from clotting together: _____

Read the following recipe, to answer part (b) on page 15.

Mini Pavlova

Ingredients	Method
1 large, fresh egg white ½ cup caster sugar ½ teaspoon vanilla ½ teaspoon cornflour ½ teaspoon white vinegar 2 tablespoons boiling water cream selection of fruit	Keep egg at room temperature overnight. 1. Preheat oven to 160 °C. 2. Separate egg, place white in a large bowl. 3. Add all other ingredients except fruit and cream. 4. Use an electric beater, beat until mixture is firm and peaks form. 5. Spread into a round shape on a tray lined with baking paper. 6. Place in oven for ten minutes. Reduce oven heat to 140 °C for 30 minutes. 7. Cool in oven. 8. When cold, serve topped with whipped cream and fruit.

- (b) In the table below, describe how each factor impacts the production of the mini pavlova.
(10 marks)

Factor	Description
Equipment	<hr/> <hr/> <hr/> <hr/>
Ingredients	<hr/> <hr/> <hr/> <hr/>
Storage	<hr/> <hr/> <hr/> <hr/>
Processing techniques	<hr/> <hr/> <hr/> <hr/>
Environment	<hr/> <hr/> <hr/> <hr/>

Question 22

(8 marks)

- (a) (i) Define the term 'phytochemicals'. (2 marks)

- (ii) Identify **two** phytochemicals. (2 marks)

One: _____

Two: _____

- (b) Describe the role of the **two** phytochemicals identified in part (a)(ii) in promoting health. (4 marks)

One: _____

Two: _____

Question 23**(9 marks)**

Explain **one** example of how each of the following processing techniques is used to control the performance of food.

Application of heat: _____

Addition of salt: _____

Manipulation: _____

End of Section Two

See next page

Section Three: Extended answer**30% (40 Marks)**

This section contains **three** questions. Answer **two** questions only. Write your answers in the spaces provided following Question 26.

Supplementary pages for planning/continuing your answers to questions are provided at the end of this Question/Answer booklet. If you use these pages to continue an answer, indicate at the original answer where the answer is continued, i.e. give the page number.

Suggested working time: 70 minutes.

Question 24**(20 marks)**

Marcelo is a 22-year-old university student who follows a vegan diet. He has been informed by his doctor that a poorly-planned vegan diet may lead to the development of anaemia due to a low iron or Vitamin B12 intake. Protein intake may also be low on a vegan diet.

- (a) Identify **two** *Australian Dietary Guidelines* that could assist in preventing the development of anaemia. For each guideline, describe how it could assist Marcelo in achieving a sufficient iron intake. (6 marks)
- (b) Outline **three** differences between fat-soluble and water-soluble vitamins. Explain how this information could help Marcelo manage his Vitamin B12 levels. (6 marks)
- (c) Explain **two** differences between complete and incomplete proteins. Describe how this information could assist Marcelo in consuming adequate protein in his diet. (8 marks)

Question 25**(20 marks)**

Biotechnology involves using living microorganisms to produce improved food products. It is an emerging technology in food production, manufacturing and packaging.

- (a) Define the process of genetic modification and discuss how the process is achieved in food production. (6 marks)
- (b) Describe **three** potential risks to human health resulting from the consumption of genetically modified food. (6 marks)
- (c) Identify **two** examples of biotechnology (other than genetic modification) and explain how each is used in food systems. (8 marks)

Question 26**(20 marks)**

Packaging has many functions in food manufacturing. Packaging technologies can be used to develop new and improve existing food products.



Image 1: Oxygen absorber in food packaging

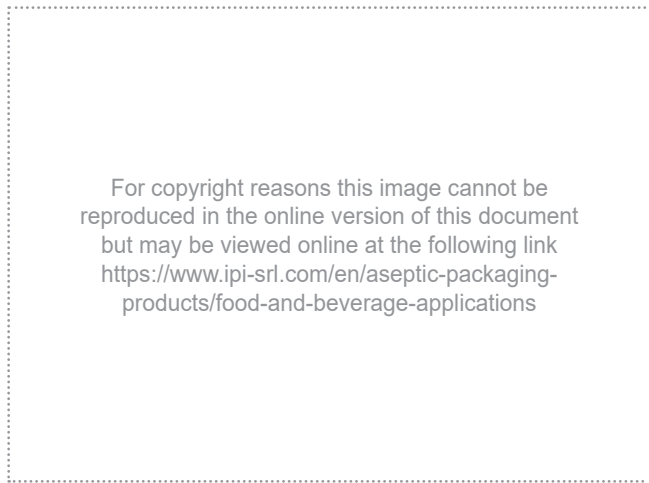


Image 2: Long-life beverage packaging

- (a) Explain the use of **one** packaging technology used in each of the images above. (6 marks)
- (b) Define 'modified atmosphere packaging' (MAP) and explain **one** benefit of its use in food packaging. (5 marks)
- (c) Describe **three** different types of MAPs used in the food industry and identify **one** food example for each. (9 marks)

End of questions

ACKNOWLEDGEMENTS

Question 26

Image 1: BakingWarehouse. (n.d.). *Oxygen Absorber for Food Storage* [Photograph]. Retrieved April, 2024, from https://bakingwarehouse.com/cdn/shop/products/3640-5_2048x.jpg?v=1618979767

Image 2: IPI. (n.d.). *Applications: Non-carbonated Liquid Foods* [Photograph]. Retrieved April, 2024, from <https://www.ipi-srl.com/en/aseptic-packaging-products/food-and-beverage-applications>

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