



FOOD SCIENCE AND TECHNOLOGY

ATAR course examination 2021

Marking key

Marking keys are an explicit statement about what the examining panel expect of candidates when they respond to particular examination items. They help ensure a consistent interpretation of the criteria that guide the awarding of marks.

Section One: Multiple-choice

15% (15 Marks)

Question	Answer
1	a
2	b
3	b
4	d
5	a
6	c
7	c
8	a
9	d
10	c
11	c
12	b
13	d
14	b
15	d

Section Two: Short answer

55% (79 Marks)

Question 16

(9 marks)

Identify **three** minerals. For each, state the impact of the mineral on health and provide an example of a food source containing the mineral.

Description		Marks
For each mineral:		
Identifies the mineral.		1
States the impact of the mineral on health.		1
Provides a food source associated with their selected mineral.		1
Subtotal		3
Total		9
Answers may include, but are not limited to the following:		
Mineral	Impact on health	Food source
Calcium	<ul style="list-style-type: none"> forming the hard structure of bones and teeth assisting muscle contraction functioning of nerves 	<ul style="list-style-type: none"> dairy foods fortified wholegrain breads and cereals seafood
Iron	<ul style="list-style-type: none"> forming red blood cells forming a component of many enzymes Transport oxygen around the body 	<ul style="list-style-type: none"> meat foods wholemeal breads and cereals legumes
Sodium	<ul style="list-style-type: none"> regulating fluid balance transmission of nerve impulses around the body 	<ul style="list-style-type: none"> bread or cheese processed foods snack foods
Potassium	<ul style="list-style-type: none"> regulating fluid balance controlling nerve impulses preventing muscle cramps 	<ul style="list-style-type: none"> fruits or vegetables milk or yoghurt meat or fish
Accept any other answers		

Question 17

(10 marks)

- (a) Explain what is meant by the term 'food product recall' and identify the organisation responsible for coordinating the recall of food in Australia. (4 marks)

Description	Marks
Explains what is meant by the term 'food product recall'.	3
Describes what is meant by the term 'food product recall'.	2
Makes a statement about the term 'food product recall'.	1
Subtotal	3
Identifies the organisation responsible for coordinating the recall of food in Australia.	1
Subtotal	1
Total	4
Answers may include, but are not limited to the following:	
Organisation responsible for food product recalls	
<ul style="list-style-type: none"> • FSANZ or Food Standards Australia New Zealand 	
Explanation of the term food product recall:	
<ul style="list-style-type: none"> • the removal from sale of foods that may pose an unacceptable health risk to consumers. • the removal from distribution of foods that may pose an unacceptable health risk to consumers. • the removal from consumption of foods that may pose an unacceptable health risk to consumers. 	

- (b) Describe **three** reasons why food products may be recalled. (6 marks)

Description	Marks
For each reason:	
Describes the reason why food products may be recalled.	2
Identifies the reason why food products may be recalled.	1
Subtotal	2
Total	6
Answers may include, but are not limited to the following:	
<ul style="list-style-type: none"> • goods that are incorrectly labelled and may pose a risk to health • allergens not being declared on the label 	
<ul style="list-style-type: none"> • pathogens such as listeria or salmonella found in the product • pose a risk to pregnant women or a food poisoning risk 	
<ul style="list-style-type: none"> • toxic chemicals found in the food • pose a serious risk to health 	
<ul style="list-style-type: none"> • foreign bodies found in the food • pose a serious or unknown risk to health 	

Question 18

(10 marks)

- (a) State the purpose of a product proposal. (1 mark)

Description	Marks
States the purpose of a product proposal.	1
Total	1
Answers may include, but are not limited to the following:	
<ul style="list-style-type: none"> clearly identifies all information related to the product explains a technical solution to the problem or product analysis of the pros and cons of the development of a potential product 	

- (b) Identify and describe **three** components of a product proposal. For each component, use the information given in the scenario above to identify **one** feature of the product that would satisfy each component in the product proposal. (9 marks)

Description	Marks	
For each product proposal component:		
Identifies and describes the component of the product proposal.	2	
Identifies the component of the product proposal.	1	
Subtotal	6	
For each product proposal component:		
Provides a feature	1	
Subtotal	3	
Total	9	
Answers may include, but are not limited to the following:		
Component	Description	Feature of the product
Consumer profile	<ul style="list-style-type: none"> identifies the target market gathers information about the needs of the consumer or budget of targeted consumers or health needs or lifestyle choices 	<ul style="list-style-type: none"> international tourists likes native Australian ingredients or flavours
Product purpose	<ul style="list-style-type: none"> current market trends e.g. ethically raised products identifies trends that are current which informs the development process 	<ul style="list-style-type: none"> capture international tourist dollars (souvenirs) reflect ingredients or flavours of native Australian ingredients
Product specifications	<ul style="list-style-type: none"> creates a description of the product or ingredients or materials required to make a product ensures all departments involved in the creation of the new product are in agreement establishes the budget required for production 	<ul style="list-style-type: none"> gourmet biscuit reflect authentic Australian ingredients or flavours suitable to package or transport without damage reflect the Australian theme

Question 19

(9 marks)

Explain **one** way in which **each** of the following factors influences the production of the loaf of bread:

- ingredients
- processing techniques
- environment.

Description		Marks
For each factor:		
Explains one way in which the factor influences the production of the loaf of bread.		3
Describes one way in which the factor influences the production of the loaf of bread.		2
Makes a statement about the factor that influences the production of the loaf of bread.		1
Total		9
Answers may include, but are not limited to the following:		
Ingredients	<ul style="list-style-type: none"> • use of bread flour • contains more gluten • gluten is responsible for the structure of bread or for trapping air or carbon dioxide in the mixture 	
	<ul style="list-style-type: none"> • sugar is required to activate the yeast • sugar and oxygen combine to produce carbon dioxide • carbon dioxide acts as a leavening agent in the bread 	
	<ul style="list-style-type: none"> • use of dried yeast • is more concentrated than compressed yeast • so less is needed 	
Processing techniques	<ul style="list-style-type: none"> • sifting flour and salt • removes lumps • traps air in the flour 	
	<ul style="list-style-type: none"> • kneading the dough • develops the gluten • gluten is necessary to hold the risen shape of the loaf 	
	<ul style="list-style-type: none"> • proving the dough • allows time for carbon dioxide to be produced • this provides the light texture 	
	<ul style="list-style-type: none"> • covering dough with plastic wrap to prove • prevents the dough from drying out • allows for maximum expansion of the dough 	
Environment	<ul style="list-style-type: none"> • use of warm water to mix the yeast and sugar • yeast needs warmth to begin the fermentation process • fermentation produces the carbon dioxide necessary for leavening 	
	<ul style="list-style-type: none"> • baking in a hot oven • stops the activation of yeast • sets the shape of the loaf 	
	<ul style="list-style-type: none"> • proving in a warm place • yeast needs warmth to begin the fermentation process • fermentation produces the carbon dioxide necessary for leavening 	

Question 20

(12 marks)

Identify the **four** components of the marketing mix and describe how **each** is used to market a new food product.

Description		Marks
For each component of the marketing mix:		
Identifies a component of the marketing mix.		1
Subtotal		4
For each strategy:		
Describes how the strategy is used to market a new food product.		2
States how the strategy is used to market a new food product.		1
Subtotal		8
Total		12
Answers may include, but are not limited to the following:		
Strategy	Description	
Product	<ul style="list-style-type: none"> consider the weight or shape or size of the container, such as bulk or individual options to ensure product differentiation or that the product is different to others on the market 	
	<ul style="list-style-type: none"> include branding or product imaging appropriate to market to increase appeal to the target market 	
	<ul style="list-style-type: none"> develop a product that meets a need; health or cost or convenience or sensory properties to increase appeal to target market 	
Place	<ul style="list-style-type: none"> make available in appropriate venues to increase consumer access to the product 	
	<ul style="list-style-type: none"> consider proximity to the competition display prominently for maximum consumer impact 	
	<ul style="list-style-type: none"> product availability matches demand improves customer service and satisfaction 	
	<ul style="list-style-type: none"> online or delivery options makes product more accessible and convenient 	
Price	<ul style="list-style-type: none"> conduct market research determine price consumers are prepared to pay 	
	<ul style="list-style-type: none"> establish a price that will compete in the marketplace to be comparable with competitors and aware of prices being charged 	
	<ul style="list-style-type: none"> consider a range of prices and sizes extend the market range and potential profits 	
Promotion	<ul style="list-style-type: none"> capture the attention of target market raises interest in the product or informs the consumer of the features of the product 	
	<ul style="list-style-type: none"> hold the attention of the consumer for as long as the promotional message is conveyed conveys the appeal of the product 	
	<ul style="list-style-type: none"> arouse the consumers desire to purchase the product or persuades the customer promote in a way that changes desire or want into the act of purchasing 	
	<ul style="list-style-type: none"> loyalty cards or trial free samples or recipe ideas bundling products to make a meal 	

Question 21

(9 marks)

Identify **three** digestive conditions that cause the body to be unable to process nutrients.
For **each** condition, identify the health consequence and outline the cause.

Description		Marks
For each of three digestive conditions:		
Identifies a digestive condition that cause the body to be unable to process nutrients.		1
Subtotal		3
For each inability:		
Identifies a health consequence caused.		1
Subtotal		3
For each health condition:		
Provides an outline of the cause.		1
Subtotal		3
Total		9
Answers may include, but are not limited to the following:		
Health consequence	Digestive condition	Cause of the condition
Inability to digest nutrients	Lactose intolerance	<ul style="list-style-type: none"> the body requires the enzyme lactase to digest lactose; without sufficient lactase the body does not break down all of the lactose
		<ul style="list-style-type: none"> natural bacteria ferment the lactose and produce acids and gas which causes abdominal pain or bloating or diarrhoea
Inability to absorb nutrients	Coeliac disease	<ul style="list-style-type: none"> an autoimmune disease in which the immune system reacts abnormally to gluten
		<ul style="list-style-type: none"> causes inflammation of the villi which reduces the surface area of the bowel for nutrient absorption and can lead to various gastrointestinal or malabsorption symptoms
Inability to metabolise nutrients	Diabetes	<ul style="list-style-type: none"> caused by the inability of the pancreas or body to produce sufficient insulin to metabolise glucose
		<ul style="list-style-type: none"> glucose cannot enter the cells without insulin and remains in the bloodstream causing elevated blood sugar levels

Question 22

(11 marks)

- (a) Identify **two** methods of preservation that Ben could use to effectively preserve his tomatoes. State **one** way in which each of the sensory, physical and chemical properties is affected by each method of preservation. (8 marks)

Description		Marks
For each preservation method:		
Identifies a preservation method Ben could use to effectively preserve his tomatoes.		1
Subtotal		2
States one way in which the preservation effects the sensory properties.		1
Subtotal		2
States one way in which the preservation effects the physical properties.		1
Subtotal		2
States one way in which the preservation effects the chemical properties.		1
Subtotal		2
Total		8
Answers may include, but are not limited to the following:		
Preservation methods	Properties	How properties are affected
Dehydration	Sensory	• flavour or aroma or colour are intensified
	Physical	• becomes drier or smaller
	Chemical	• water soluble vitamins will be removed
Addition of salt or vinegar or sugar	Sensory	• food becomes more salty or vinegary or sweeter or tender or sugar has a dehydrating effect
	Physical	• loss of shape or viscosity
	Chemical	• salt or sugar content is increased: if heat is applied, vitamins may be lost
Canning/Bottling	Sensory	• becomes more tender or absorbs the flavour of the solution in which it is placed
	Physical	• some loss of colour or shape or structure
	Chemical	• heat destroys enzymes or vitamins or nutrients are added through the solution in which it is placed

Question 22 (continued)

- (b) Explain **one** way in which frozen produce may lose sensory **or** physical quality if the storage environment is not maintained. (3 marks)

Description	Marks
Explains one way in which frozen produce may lose sensory or physical qualities if the storage environment is not maintained.	3
Describes one way in which frozen produce may lose sensory or physical qualities if the storage environment is not maintained.	2
Makes a statement about one way in which frozen produce may lose sensory or physical qualities if the storage environment is not maintained.	1
Total	3
Answers may include, but are not limited to the following:	
<ul style="list-style-type: none"> • frozen goods must be maintained at -18°C • ice crystals may enlarge in size if the temperature fluctuates • produces undesirable changes in texture or emulsification destabilisation or recrystallisation of sugars or ice 	
<ul style="list-style-type: none"> • frozen goods should be packaged appropriately • improperly packaged frozen goods lose small amounts of moisture during storage • surface dehydration or freezer burn or loss of colour occurs 	
<ul style="list-style-type: none"> • non blanched fruits and vegetables retain enzymes or enzymes released following precooking in meat and poultry • accelerate deterioration reactions • cause flavour or colour change 	
<ul style="list-style-type: none"> • cell damage or protein and starch interactions occur during freezing • a frozen food starts to degrade once it is produced • causes drip or loss of/softening of cell structure upon thawing 	

Question 23

(9 marks)

Identify **three** macronutrients found in the list of ingredients for the minestrone soup.
Describe **two** processes of chemical digestion for each of the macronutrients.

Description		Marks
For each macronutrient:		
Identify the macronutrients.		1
Subtotal		3
For each of the macronutrients:		
Describes two processes of chemical digestion for each of the micronutrients.		2
Makes a statement about two processes of chemical digestion for each of the micronutrients.		1
Subtotal		6
Total		9
Answers may include, but are not limited to the following:		
Macronutrient	Chemical Digestion	
Lipids	<ul style="list-style-type: none"> • stomach: gastric juices containing hydrochloric acid break down food to thick liquid (chyme) • small intestine: bile emulsifies fats • the enzyme lipase converts fat into fatty acids and glycerol. 	
Protein	<ul style="list-style-type: none"> • stomach: gastric juices containing hydrochloric acid break down food to thick liquid (chyme) • digestion of protein by the enzyme pepsin produces amino acids • small intestine: trypsin breaks down protein into single amino acids for absorption through the intestinal lining. 	
Carbohydrate	<ul style="list-style-type: none"> • mouth: enzymes (amylase or ptyalin) in saliva begin to digest starch • stomach: gastric juices containing hydrochloric acid and enzymes break down food to a thick liquid known as chyme • small intestine: amylase secreted by the pancreas or intestinal cells breaks down carbohydrate to glucose or maltose. 	

Section Three: Extended answer

30% (40 Marks)

Question 24

(20 marks)

- (a) Explain how **two** Australian Dietary Guidelines relate to the nutritional needs of population groups. Include **one** example of how each can aid a population group in the prevention of diet-related health disorders. (6 marks)

Description		Marks
For each Australian Dietary Guideline:		
Explains how the Australian Dietary Guideline relate to the nutritional needs of population groups and provides one example of how each can aid in the prevention of diet related health disorders.		3
Describes how the Australian Dietary Guideline relate to the nutritional needs of population groups and provides one example of how each can aid in the prevention of diet related health disorders.		2
Makes a statement about an Australian Dietary guideline.		1
Subtotal		3
Total		6
Answers may include, but are not limited to the following:		
ADG	Explanation	
To achieve and maintain a healthy weight	<ul style="list-style-type: none"> • be physically active • physical activity is an important part of a healthy active life • healthy weight is associated with a reduced risk of chronic disease 	
	<ul style="list-style-type: none"> • unhealthy weight refers to being underweight or overweight or obese • children or adolescents should be physically active every day to ensure energy intake equals energy output • children and adolescents should have their growth checked regularly to ensure growth and development is normal 	
	<ul style="list-style-type: none"> • choose amounts of nutritious food and drinks to meet energy needs • older people should eat nutritious foods to ensure adequate nutritive intake or a healthy weight • older people should keep physically active to help maintain muscle strength or a healthy weight 	
Enjoy a wide variety of nutritious foods from the five groups every day	<ul style="list-style-type: none"> • vegetables, fruit, grain, protein foods, dairy and/or their alternatives • provides a range of different nutrients to the body • promotes good health and can help reduce the risk of diet related diseases such as anaemia or osteoporosis or malnutrition 	
	<ul style="list-style-type: none"> • keeps a diet interesting with different flavours or textures • reduced fat milks are not suitable for children under the age of 2 years • children under the age of 2 years need fat in their diets for a variety of reasons including healthy brain development 	
Limit intake of foods containing saturated fat, added salt, added sugars and alcohol	<ul style="list-style-type: none"> • consumption of energy dense or nutrient poor discretionary foods and drinks should be limited • elderly have reduced energy requirements so should choose nutritive dense foods • all population groups benefit to prevent diet related diseases such as malnutrition or obesity or cardiovascular disease or Type 2 diabetes 	

	<ul style="list-style-type: none"> • read labels to choose lower sodium options among similar foods • do not add salt to foods in cooking or at the table • high salt diet contributes to hypertension or stroke • limit intake of foods high in saturated fats or drinks containing added sugars • replace high fat foods which contain predominantly saturated fats with foods which contain predominantly polyunsaturated or monounsaturated fat or includes confectionary, sugar-sweetened soft drinks and cordials, fruit drinks, vitamin waters, energy or sports drinks • leads to a greater accumulation of fat which is a contributor to Type 2 diabetes or heart disease or cardiovascular disease
	<ul style="list-style-type: none"> • if you choose to drink alcohol, limit intake • for women who are pregnant or planning a pregnancy or breastfeeding not drinking alcohol is the safest option • prevents some foetal complications
Encourage, support and promote breastfeeding	<ul style="list-style-type: none"> • breastmilk contains many unique compounds • reduces the risk of infection • provides immunity or protects against conditions such as diarrhoea <hr/> <ul style="list-style-type: none"> • breastfeeding provides major health benefits to infants or their mothers • breastmilk does not stress the baby's kidneys • accelerates mother's recovery from childbirth <hr/> <ul style="list-style-type: none"> • breastmilk provides all the nutritional requirements to support the growth or development of infants up to six months of age • the composition of breastmilk changes to meet the needs of babies as they grow • protects against obesity or hypertension or some chronic diseases later in life

Question 24 (continued)

- (b) Describe why **one** population group may be of greater risk of developing anaemia. (2 marks)

Description		Marks
Describes why the population group may be of greater risk of developing anaemia.		2
Makes a statement about why the population group may be of greater risk of developing anaemia.		1
Total		2
Answers may include, but are not limited to the following:		
Children	<ul style="list-style-type: none"> • increased iron requirement • due to growth and development • often consume a lot of dairy • dairy lacks iron or calcium inhibits the absorption of iron 	
Adolescents	<ul style="list-style-type: none"> • increased iron requirement • due to growth or menstruation 	
Pregnant woman	<ul style="list-style-type: none"> • increased iron requirement • due to foetal requirements 	
Malnourished people	<ul style="list-style-type: none"> • decreased iron absorption • due to disease or surgery or inflammation 	
Vegetarians/Vegans	<ul style="list-style-type: none"> • decreased iron intake • due to food choices or lack of knowledge 	
Elderly	<ul style="list-style-type: none"> • decreased iron intake • lack of funds or lack of motivation to prepare protein foods 	

- (c) Analyse Jacinta's food diary and identify **three** areas in which her diet can be improved to meet the nutritional requirements of the adolescent population group. For **each** improvement, explain the health benefit of the change. (12 marks)

Description		Marks
For each:		
Identifies an area in which her diet can be improved to meet the nutritional requirements of the adolescent population group.		1
Subtotal		3
For each improvement:		
Explains the health benefit of the change to her diet.		3
Describes the health benefit of the change to her diet.		2
Makes a statement about the health benefit of the change to her diet.		1
Subtotal		9
Total		12
Answers may include, but are not limited to the following:		
Increase lean meats and alternatives or decrease dairy and alternatives or discretionary foods	<ul style="list-style-type: none"> Jacinta consumed too many serves of dairy and alternatives or discretionary foods can lead to weight gain or deficiency in other nutrients such as fibre or may take the place of some of the serves from the high fibre food groups or limit those foods which contain added sugar Jacinta can maintain a healthy weight or be at reduced risk of weight related disorders or deficiency diseases or prevent complications from constipation 	
Increase intake of grains or vegetables	<ul style="list-style-type: none"> Jacinta consumed too few grains or vegetables wholegrain cereals are rich in complex carbohydrates or B vitamins or fibre or vegetables are nutrient dense or generally low in fat or high in fibre or vitamins or minerals or carbohydrates provide protection against coronary heart disease or stroke 	
Swap processed meat (salami) for grilled or roasted meats	<ul style="list-style-type: none"> processed meats contain high levels of fat or salt saturated fat or salt are linked with cardiovascular disease Jacinta can maintain a healthy weight or be at reduced risk of cardiovascular disease 	
Drink more water	<ul style="list-style-type: none"> Jacinta consumes most liquids in the form of milk and a fruit juice drink or water is constantly lost from the body and needs to be replaced water is needed for digestion or absorption and transportation of nutrients or elimination of waste or regulation of body temperature drinking plain water is the most effective way to stay hydrated without undesired energy intake 	

Question 25

(20 marks)

- (a) Describe **three** innovative developments that alter the nutrition of and increase the availability of food. (6 marks)

Description		Marks
For each development:		
Describes an innovative development that alters the nutrition of and increases the availability of food.		2
Identifies the development that alters the nutrition of and increases the availability of food.		1
Subtotal		2
Total		6
Answers may include, but are not limited to the following:		
Value-added food	<ul style="list-style-type: none"> additional processing or handling of a product that makes it more appealing or convenient to the consumer additional processing of a product that improves the nutritional value 	
Functional food	<ul style="list-style-type: none"> the addition of extra nutrients that already exist in the processed product. Nutrients can be replaced when they are lost during processing and to improve the nutritional value of the product is altering an existing product from its natural state in order for the product to be more appealing to health-conscious consumers or by reducing fat or carbohydrate or salt or allergens 	
Genetically modified food	<ul style="list-style-type: none"> direct manipulation of the genes of an organism plant or animal generally to improve its characteristics. introduce desired traits such as drought resistant or disease resistant plants or increased yield in crops or delayed ripening or improved nutritional value. 	
Microencapsulation	<ul style="list-style-type: none"> one or more active ingredients are contained in a film of food grade material forming a capsule the film must be made of a material suitable for the purpose e.g to be broken down by saliva or to withstand the heat of baking 	

- (b) Identify and explain **two** innovative developments that alter the atmosphere inside packages to extend the shelf life of foods. (8 marks)

Description		Marks
For each development:		
Identifies and explains an innovative development in the packaging that alters the atmosphere inside the packaging to extend the shelf life of foods.		4
Identifies and describes an innovative development in the packaging that alters the atmosphere inside the packaging to extend the shelf life of foods.		3
Outlines an innovative development in the packaging that alters the atmosphere inside the packaging to extend the shelf life of foods.		2
Makes a statement about an innovative development in the packaging that alters the atmosphere inside the packaging to extend the shelf life of foods.		1
Subtotal		4
Total		8
Answers may include, but are not limited to the following:		
Barrier specific packaging	<ul style="list-style-type: none"> the respiration of fresh food produces water this can cause changes in the gases in the container in which the food is packaged the barrier properties of the packaging material admit some gases and exclude others 	
Vacuum packaging	<ul style="list-style-type: none"> the air surrounding the food is removed this creates a vacuum around the food the packaging fits tightly around the food before sealing 	
Gas packaging	<ul style="list-style-type: none"> gas mixtures are tailored to the requirements of each food they are used to replace the air in the headspace of the container before sealing the permeability of the packaging material is important for maintaining the correct gas balance 	
Active packaging	<ul style="list-style-type: none"> active packaging is able to modify the environment inside the packaging as changes occur to the food plastic film incorporating a chemical agent that allows for the movement of gases and water in and out of the package pouches containing reactive materials or chemical scavengers are used to absorb gases that form as the product ages 	

Question 25 (continued)

- (c) Identify and explain **one** technology used to alter the nutrient composition of milk. Identify **two** milk products produced using this process. (6 marks)

Description		Marks
Identifies and explains one technology used to alter the nutrient composition of milk.		4
Identifies and describes one technology used to alter the nutrient composition of milk.		3
Identifies and outlines one technology used to alter the nutrient composition of milk.		2
Identifies the technology used to alter the nutrient composition of milk.		1
Subtotal		4
Identifies two milk products produced using the process described.		2
Identifies one milk product produced using the process described.		1
Subtotal		2
Total		6
Answers may include, but are not limited to the following:		
Ultrafiltration	<ul style="list-style-type: none"> the fluid milk is pumped over membranes which have minute pores that hold back large molecules such as protein or allow smaller molecules such as water and lactose to pass through the natural components of milk can be separated without chemical change can enhance the nutrient content of milk such as reduced fat or increased calcium or increased protein 	
Reverse osmosis	<ul style="list-style-type: none"> similar to ultrafiltration but the fluid flow is caused by osmosis the pores of the membrane are smaller used to filter skim milk leaving a milk concentrate that has an increased protein and calcium content 	
Food products	Ultrafiltration <ul style="list-style-type: none"> nutrient modified milks such as reduced fat or increased protein or calcium low fat dairy products such as low-fat cheese or yoghurt 	
	Reverse osmosis <ul style="list-style-type: none"> concentrated milk products whey protein powders 	

Question 26

(20 marks)

(a) Outline **four** techniques used to adapt recipes.

(4 marks)

Description	Marks
For each technique:	
Outlines the technique used to adapt recipes.	1
Total	4
Answers may include, but are not limited to:	
<ul style="list-style-type: none"> • substitute commodities • alter the nutritional content • change the processing techniques • alter portion size • adapt the presentation or packaging • reduce or increase the cost 	

(b) Describe **two** criteria used to analyse a food product during production.

(4 marks)

Description	Marks
For each criteria:	
Describes the criteria used to analyse a food product.	2
Outlines the criteria used to analyse a food product.	1
Subtotal	2
Total	4
Answers may include, but are not limited to:	
Criteria	Description
Compliance	<ul style="list-style-type: none"> • does the product comply with the product proposal • product developers must know the product specifications
Sensory properties	<ul style="list-style-type: none"> • qualitative analysis such as taste testing or consumer testing is carried out during the product development • this will determine the appeal of the product to consumers
Processing techniques	<ul style="list-style-type: none"> • quantitative tests are used to measure physical properties or size or weight or nutrient content or shelf life • these provide a benchmark against which the product can be compared
Functional properties	<ul style="list-style-type: none"> • have appropriate functional properties been used • the product must perform as described in the product proposal

Question 26 (continued)

- (c) Explain how **each** of the following food processing techniques is used to control the performance of food: (12 marks)

- pH level
- addition of chemicals
- removal of moisture
- control of temperature.

Description	Marks
For each processing technique:	
Explains the food processing technique used to control the performance of food.	3
Describes the food processing technique used to control the performance of food.	2
Makes a statement about the food processing technique used to control the performance of food.	1
Subtotal	3
Total	12
Answers may include, but are not limited to the following:	
Food processing technique	Explanation
pH level	<ul style="list-style-type: none"> • acids cause proteins to denature • sour cream or yoghurt or vinegar are acidic ingredients that can be added to meat marinades • the acids act as a tenderiser by breaking down the connective tissue and converting collagen to gelatin
	<ul style="list-style-type: none"> • acids decrease the ability of starches to thicken • acids break down the starch grains into smaller particles • acids should be added to starch mixtures after gelatinisation has occurred
	<ul style="list-style-type: none"> • vinegar added to the water for poaching eggs will speed up the coagulation process by lowering the temperature at which coagulation occurs • egg white will coagulate quickly • sensory properties are improved
	<ul style="list-style-type: none"> • the setting of jam relies on the correct proportions of acid, sugar and pectin • acid from the fruit is responsible for the smooth texture of jam • acid helps prevent crystallisation during storage
	<ul style="list-style-type: none"> • some fruits or vegetables will oxidise when cut • enzymes in the fruit or vegetables oxidise when exposed to oxygen • an acid such as lemon juice will delay enzymatic browning
	<ul style="list-style-type: none"> • bicarbonate of soda is an alkali which when added to an acid in the presence of water produces carbon dioxide • it can be combined with cream of tartar or sour milk or golden syrup • when heated the carbon dioxide expands and causes the mixture to rise
	<ul style="list-style-type: none"> • salt preserves food by drawing moisture from food cells • salt dissolves in this moisture raising the salinity level • bacteria cannot multiply in this environment

	<ul style="list-style-type: none"> • brine is a solution of salt and water • during osmosis brine passes through the cell walls of food • food can be preserved using brine as it inhibits bacterial growth
	<ul style="list-style-type: none"> • strong concentrations of sugar will inhibit the growth of micro-organisms • sugar has a dehydrating effect similar to salt • in jam making the natural sugar level of the fruit is increased to prevent microbial growth
	<ul style="list-style-type: none"> • sugar helps retain the colour of fruit in jam making • this is due to its capacity to attract and hold water • sugar prevents the fruit from absorbing water which would cause colour loss due to dilution
Removal of moisture	<ul style="list-style-type: none"> • dehydration is a process used to remove all moisture • enzymes and microbes need water to be active • dehydration is used to preserve food
	<ul style="list-style-type: none"> • evaporation removes most of the water from foods • they still contain a high moisture content • this makes them susceptible to mould growth
Control of temperature	<ul style="list-style-type: none"> • when food is heated enzymatic action increases and micro-organisms are activated • when the optimum temperature for each is reached metabolism slows and the heat destroys them • cooking or canning or pasteurisation use heat to sterilise or preserve food
	<ul style="list-style-type: none"> • freezing is a preservation method that involves the storage of food at below $-18\text{ }^{\circ}\text{C}$ • reducing enzymatic or microbial activity • micro-organisms can survive freezing and multiply when conditions are favourable

ACKNOWLEDGEMENTS

- Question 21** Adapted from: Coeliac Australia. (n.d.). *Coeliac disease*. Retrieved September, 2021, from <https://www.coeliac.org.au/s/coeliac-disease>
- Question 24(a)** Adapted from: National Health and Medical Research Council. (2013) *Australian dietary guidelines*. Retrieved September, 2021, from https://www.eatforhealth.gov.au/sites/default/files/content/n55_australian_dietary_guidelines.pdf
Used under a Creative Commons Attribution 4.0 International licence.

This document – apart from any third party copyright material contained in it – may be freely copied, or communicated on an intranet, for non-commercial purposes in educational institutions, provided that it is not changed and that the School Curriculum and Standards Authority is acknowledged as the copyright owner, and that the Authority's moral rights are not infringed.

Copying or communication for any other purpose can be done only within the terms of the *Copyright Act 1968* or with prior written permission of the School Curriculum and Standards Authority. Copying or communication of any third party copyright material can be done only within the terms of the *Copyright Act 1968* or with permission of the copyright owners.

Any content in this document that has been derived from the Australian Curriculum may be used under the terms of the Creative Commons [Attribution 4.0 International \(CC BY\)](https://creativecommons.org/licenses/by/4.0/) licence.

An *Acknowledgements variation* document is available on the Authority website.

*Published by the School Curriculum and Standards Authority of Western Australia
303 Sevenoaks Street
CANNINGTON WA 6107*