

2023 VCE Food Studies external assessment report

General comments

The 2023 Food Studies examination assessed Units 3 and 4 of the *VCE Food Studies Study Design 2023–2027*. All of the key knowledge and key skills that underpin the outcomes in Units 3 and 4 and the ‘Cross-study specifications’ found on pages 9–12 of the study design are examinable. Section A comprised 20 multiple-choice questions worth one mark each. Section B comprised five short-answer questions, with multiple parts worth 60 marks, and one extended-answer question worth 10 marks. The examination included questions reflecting the interconnectedness of different areas of study as well as the relationship between key knowledge and key skills in the study design.

This report should be read in conjunction with the 2023 VCE Food Studies examination.

In Section B, some students were unable to tailor the content of their responses to the focus of the questions, or demonstrate the key skills linked to related areas of study. Students should consider the command term when constructing their response. Many questions required students to discuss, but students often did not present a clear and balanced argument within their response. This was particularly evident in Questions 2c., 2e., 5a. and 6.

Many students did not utilise the information provided in the question stimulus and were therefore unable to effectively address the focus of the question, resulting in non-specific answers. This was particularly evident in Question 2c. Students are advised to read questions carefully to ensure they are using the information appropriately to what is being asked. In Question 6, students often relied too heavily on the stimulus, without providing their own knowledge to support the information provided.

Where students had to apply key knowledge to a given context or scenario, many were unable to make meaningful connections or provide relevant examples to support their response. This was particularly evident in responses to Questions 2a., 2b., 2c., 2e. and 3b.

Students are reminded to consider the mark allocation to assist in determining how much detail is required for each response. They should read the questions carefully and plan their responses so that they are clear and that they answer what is being asked.

When extra space for writing is required, it is essential that students do not write into the space of other questions or in the margins of the paper. Students should use an additional answer book to continue their response, clearly indicating that the response is continued in the second book, and clearly state in the second book the question number being addressed.

Specific information

Note: Student responses reproduced in this report have not been corrected for grammar, spelling or factual information.

This report provides sample answers or an indication of what answers may have included. Unless otherwise stated, these are not intended to be exemplary or complete responses.

The statistics in this report may be subject to rounding, resulting in a total of more or less than 100 per cent.

Section A – Multiple-choice questions

The following table indicates the percentage of students who chose each option. The correct answer is indicated by bold text and shading.

Question	Correct answer	% A	% B	% C	% D	Comments
1	A	62	0	25	13	
2	B	7	80	9	4	
3	C	11	2	77	10	
4	A	25	14	50	11	The liver, gall bladder and pancreas are accessory organs that aid in the digestion of fat. The liver produces bile which is stored by the gall bladder and released into the small intestine. The pancreas produces enzymes to further digest fat. Bile is a digestive fluid, rather than an enzyme. So A is the correct response and B is incorrect, as enzymes are not produced by all of the stated accessory organs.
5	C	84	2	13	1	Consumer activism is listed as a political influence within Unit 3 of the study design. The stimulus provided focuses on government mandates for accurate labelling of free-range eggs for transparency on ethical egg production. The push for mandates and transparency in marketing is a form of political influence on food choices. Consumer awareness of farming practices is within the stimulus, but this does not relate to health, therefore response A does not best answer the question.
6	B	3	67	20	9	
7	C	12	31	41	15	Students needed to draw from the stimulus to inform their response selection. Responses A, B and D are incorrect as they are contextual and there is no information provided about health awareness, a lower availability of fresh meat or increased access to home delivery services in the stimulus. Meat is considered a good source of protein, therefore C is relating to the stimulus and best answers the question.
8	B	18	73	7	1	
9	D	4	12	1	82	
10	A	42	6	49	3	Systematic literature reviews use repeatable methodology to assess and synthesise existing literature on a specific topic in order to answer a clearly formulated question. This best aligns with response A, as the process checks consistency of findings across numerous studies. Response C, re-analysing data for accuracy, is different to a systematic literature review in relation to the scope, methodology and intended use. The re-analysis of data is conducting statistical analysis to assess validity.

Question	Correct answer	% A	% B	% C	% D	Comments
11	B	18	60	17	5	
12	B	0	96	2	2	
13	D	2	3	9	86	
14	D	16	1	1	82	
15	B	10	62	5	22	
16	A	59	7	30	4	
17	C	2	2	87	10	
18	C	14	31	44	11	Food citizenship emphasises that individuals are not consumers at the end of food systems, but actively participate in the food system as a whole. Collaborating with others to create a communal vegetable garden demonstrates an active involvement and shared responsibility in local food production, promoting community resilience and sustainability. Food sovereignty focuses on collective empowerment and control over food systems. Food sovereignty seeks to challenge the control of the food supply by large corporations, promoting the right for people to democratically determine their own food and agricultural systems. Although the community garden may align with the principles of food sovereignty, it does not address autonomy and self-governance over food systems.
19	A	89	3	5	3	
20	D	5	19	10	66	

Section B

Question 1a.

Marks	0	1	2	3	Average
%	32	35	23	10	1.1

Responses needed to focus on the physiology of an intolerance to lactose, providing one reason why a person with lactose intolerance can consume small amounts of cow's milk. Students needed to demonstrate an understanding of why the body has an inability to digest lactose and the impact this has.

A suitable response could have included the following:

- Lactose intolerance happens when your small intestine does not make enough of a digestive enzyme called lactase.
- Lactase breaks down lactose so the body can absorb it.
- If a lactose-intolerant person consumes too much milk, the milk sugars (lactose) remain undigested, which can result in symptoms such as bloating, abdominal pain and diarrhoea.
- If only small amounts are consumed, the body may have sufficient amounts of enzymes to avoid symptoms.

Many students were unable to provide a reason why small amounts of cow's milk can still be consumed.

The following is an example of a high-scoring response.

Lactose intolerance is a chemical reaction in the body to the lactose due to lack of enzyme lactase in the body. When products containing lactose is consumed there isn't enough lactase in the body to break it down into glucose and galactose for it to be absorbed in the small intestine. Instead, the lactose passes undigested through the large intestine where it ferments and causes intolerance symptoms, i.e. flatulence, diarrhoea, etc. An individual with a lactose intolerance can still consume small amounts of milk because they still have some lactase in their body to break down the lactose, alternatively they can take lactase supplements.

Question 1b.

Marks	0	1	2	3	4	Average
%	24	10	31	27	9	1.9

Students needed to select a lactose-free milk with a similar nutritional profile to full-cream cow's milk and justify their response with the use of data. A high-scoring response provided three or more relevant comparisons between the full-cream cow's milk and the most suitable substitute, soy milk, using data throughout to support the response, as well as stating that soy milk does not contain lactose.

A suitable response could have included the following:

- Full-cream cow's milk and soy milk have similar kilojoules, 259 kJ and 250 kJ, respectively.
- They are similar in carbohydrate composition, with soy milk containing 0.6 g more than full-cream cow's milk.
- Both milks contain the same amount of protein per 100 mL, at 3.4 g.
- They have a similar calcium profile: full-cream cow's milk at 118 mg compared to soy milk at 110 mg.
- Soy milk does not contain lactose, making it suitable for a person with lactose intolerance.

Explicit information taken from the table was required to be awarded full marks. Many students did not effectively refer to data throughout their response.

The following is an example of a high-scoring response.

Soy milk has a similar nutritional profile to full cream milk, therefore one with a lactose intolerance will still get the nutrients they need. Both have similar kJ (259kJ for full-cream and 250kJ for soy), same protein content (3.4g) and soy milk has the closet fat content compared to the rest of the alternative milks (3.4g for full cream and 2.9g for soy). They also have similar calcium content (118mg for full cream and 110mg for soy). Furthermore, soy milk doesn't contain any lactose as it is a plant based milk, making it suitable for someone with lactose intolerance.

Question 2a.

Marks	0	1	2	3	4	Average
%	13	28	47	7	5	1.7

Responses needed to state two distinct environmental benefits of removing transportation.

A suitable response could have included two of the following:

- Removing a stage of transportation from the farm to a factory reduces the amount of fuel being used, and fuel is a non-renewable resource that emits gases such as carbon dioxide.
- Refrigerated transport will not be required as the vegetables will be processed on the farm into a powder, which reduces the amount of methane gas emission associated with energy use. This also results in fewer trucks on the roads, leading to a reduction in traffic congestion and carbon emissions.

Many responses were unable to provide two clear explanations and at times focused on processing vegetables rather than the removal of transportation. Many students were unable to show variation between the benefits.

The following is an example of a high-scoring response.

No longer needing transport means that energy and fuel used to power vehicles that may not be renewable are not used and put into the atmosphere, decreasing carbon dioxide emissions.

Takes away the need for packaging during transport that may not be biodegradable that otherwise is disposed of in landfill, preventing further greenhouse gas emissions.

Question 2b.

Marks	0	1	2	3	4	Average
%	12	41	34	9	5	1.6

The focus of the question was on the benefits of repurposing food. The response needed two distinct benefits to demonstrate breadth of knowledge.

Benefits could have included two of the following:

- Repurposing damaged and irregular food means that the resources required for their production, such as fertilisers and water, have not gone to waste.
- Repurposing food means less waste ends up in landfill where it breaks down, producing greenhouse gases, contributing to global warming.
- Food is not sent to landfill as it is repurposed; therefore hazardous run-off from these sites is not polluting local waterways.

- Repurposing food decreases the need for disposal methods such as incineration, which emit methane and carbon dioxide into the atmosphere.
- Repurposing fresh produce into powders increases their shelf life; therefore resources such as energy required for cooling and refrigeration are decreased.
- Repurposed food could be utilised in the food system to enrich soil health by returning nutrients into the soil, reducing the need for synthetic chemicals.

The following is an example of a high-scoring response.

Reduced methane production due to less food waste entering landfill and food breaking down, reducing greenhouse gas emissions.

Prevents the wastage of resources such as land and water that was used to produce food, allows for environmental sustainability.

Question 2c.

Marks	0	1	2	3	4	Average
%	64	18	13	4	1	0.6

Responses needed to draw from the stimulus at the beginning of Question 2. Many students did not use this information within their response. For full marks students needed to provide a balanced argument for managing biosecurity risks by relating it to environmental sustainability.

A suitable response could have included the following:

- Workers who harvest the vegetables work across multiple farms. This increases the risk of transferring biohazards such as pests and diseases between farms.
- Movement of workers across multiple farms could result in contamination of primary produce by transporting biological threats on their shoes, clothing or machinery.
- Biosecurity risks must be identified and managed in order to protect primary food production from infectious disease, pests and other biological threats.
- Effectively washing machinery, eliminating the sharing of equipment between farms and establishing contact-tracing measures in workers reduces hazards. This reduces soil degradation occurring from disease outbreak.
- When biosecurity risks are managed, the likelihood of the need for crops or livestock removal/destruction is reduced, since when there is a biosecurity hazard on a farm, crops or herds may need to be destroyed to stop the spread of a disease.
- Biosecurity measures add significant costs to production, and should workers be prevented from working in multiple farms, this could result in more food waste as there are not enough people to harvest.
- Destroying crops/livestock to manage biosecurity risks is not environmentally sustainable due to the input of resources such as water, soil, energy and fertilisers which all are essentially wasted.
- Establishing biosecurity measures such as sanitation protocols can be timely and costly.

This question was not well answered. Many responses did not provide points for and against managing biosecurity risks.

Question 2d.

Marks	0	1	2	3	Average
%	16	37	37	11	1.4

Responses needed to provide context on how or why a child may be conditioned to prefer a packet of Crispy Pumpkin Snacks. Responses needed to focus on the conditioning of appetite of a child, not on the concerns a parent might have such as the health benefits of steamed pumpkin over the packaged snacks.

A suitable response could have included the following:

- Children may associate packaged foods that look and sound like the Pumpkin Snacks with other foods they have previously enjoyed, such as potato chips. The appearance and sound may trigger their appetite, increasing the desire of the foods over a serve of steamed pumpkin which they may associate with dinner rather than a snack.
- Children may associate steamed pumpkin with a negative food experience, such as being made to eat it during dinner time, so the sight of this food can decrease their desire to eat. The Crispy Pumpkin Snacks resemble potato chips, which children may associate with a pleasurable 'treat' or snack, therefore increasing their desire to try the chips as they are associating them with another food experience.

Many students focused their response on explaining appetite, rather than how appetite is conditioned, therefore not correctly addressing the question.

The following is an example of a high-scoring response.

Children may have their appetite conditioned through observational learning. This may apply to the pack of pumpkin chips compared to the real pumpkin as the child sees their friends and role models such as parents modelling the unhealthy behaviour of eating the chips as opposed to pumpkin which makes them learn that the chips are better and therefore conditions their appetite to want the chips over the pumpkin.

Question 2e.

Marks	0	1	2	3	4	5	6	Average
%	42	20	22	11	3	1	0.3	1.2

Responses needed to provide a balanced argument for regarding ethical factors relating to the manufacturing and marketing of the Crispy Pumpkin Snacks. A high-scoring response provided a balanced argument for both manufacturing and marketing.

A suitable response could have included the following:

- Processing irregular pumpkins may reduce food sent to landfill, aligning with consumers' environmental values, however it is normalising the repurposing of irregular foods. Consumers may view these as normal and would prefer more irregular vegetables in supermarkets as they often come at a cheaper price. Marketing this product may normalise the consumption among children of vegetables in an ultra-processed form, which is not as nutritionally beneficial as fresh pumpkin, however it may encourage consumers who are normally opposed to these foods to eat more vegetables.

This question was not well answered. Many students focused on environmental sustainability but did not link this to ethics, and so did not effectively address the question.

Question 3a.

Marks	0	1	2	Average
%	24	42	34	1.1

Responses needed to show a detailed account of the relationship between increased brain size and the 'Australian Guide to Healthy Eating', relating to findings in the study.

A suitable response could have included the following:

- The study states that people who consume a healthy variety of plant-based foods and healthy fats, such as vegetables, fruits, grains and good oils, have a larger brain size. These foods are examples of a wide variety of nutritious foods represented in the 'Australian Guide to Healthy Eating' food groups.
- The study states that people who consume a healthy variety of plant-based foods and healthy fats have a larger brain size. This aligns with 'Australian Guide to Healthy Eating' recommendations as vegetable and grain (cereal) foods are two of the largest proportions in the food model, and the inclusion of fruit represents three of five food groups within the model.
- The study finds that eating a healthy variety of foods, including plenty of vegetables, fruit, grains and good oils leads to larger brain volume. These food groups / foods are strongly represented in the 'Australian Guide to Healthy Eating', which promotes the consumption of plant-based foods in three of five food groups, as well as consuming healthy fats in small amounts.

The following is an example of a high-scoring response.

The Australian Guide to Healthy Eating recommends that daily consumption should include proportions of the 5 food groups, consuming a varied diet that has the intake of a range of nutrients found in different sources to maintain good health. This is supported in the above study as adults who follow this recommendation and have a variety of fruits, vegetables, wholegrains and good oils have better brain volume than those who do not.

Question 3b.

Marks	0	1	2	3	4	5	6	Average
%	29	26	22	12	7	3	0.6	1.5

Responses needed to include examples from the information in the case study and determine the quality of the information provided by giving clear examples from the stimulus in order to validate both criteria. The importance of diet in maintaining brain health needed to be addressed for both context and presentation of evidence.

A suitable response could have included the following:

- Context
 - The findings within the article were published in a peer-reviewed journal in 2021. Therefore, the currency of the findings is high, as it uses recent research with results recently undergoing peer review. The findings can be deemed as significant, emphasising the importance of healthy eating habits in middle-aged people to maintain the size and health of their brains.
 - Circumstances relating to the research and publication of the article can be linked to an ageing population. With this there is greater need to address the health of middle-aged people (40–65 years) to ensure their brain health is maintained as they age. As the research is aiming to address the concern, the legitimacy of the information is increased. The findings show that consuming a

healthy plant-based diet, including good oils, by middle-aged people does result in a larger brain volume than those who consume less of these foods.

- Presentation of evidence
 - The evidence presented within the study came from a large sample size (19 184 people) within a relevant age group (40–65 years) for the target population of middle-aged people. Medical scans were used to measure brain size, improving accuracy of the results. This increases the legitimacy of the findings that diet quality and brain size are correlated due to the large participant size and standardised medical scans.
 - The study required participants to keep food diaries in order to assess their daily food intake. With a large number of participants (19 184) it can be hard to distinguish if effective education on how to track food occurred, as well as accuracy in their daily diaries. This may decrease the validity of the evidence. Also participants may have falsified their food diaries, therefore correlations between brain size and diet may be due to other factors not considered within the study.

This question was not well answered. Many responses were unable to demonstrate their understanding of context, often referring to the source of the information instead.

The following is an example of a high-scoring response.

Context: The context of this information was that a recent study was conducted by Dr Helen Macpherson on the brain volume of 40-65 year olds at Deakin University. The findings had been published in 2021 by peer-reviewed journals in order to understand how eating habits can impact the brain of middle-aged brain people. Due to the clear context of the information as it obtains a clear purpose and reason for writing the piece. Additionally, as the information was published quite recently, it indicates that the information is quite relevant and aligns with its context, adding to the validity of the information.

Presentation of evidence: The information collected in the study indicates that it has been graphed and thoroughly analysed to make key connections to the study. Through this data was validated as it had been rigorously checked and appropriately recorded. Additionally, the information indicates a large sample size within the study as “19 184 people aged 40 to 65 yrs...” were studied. This indicates that the evidence was conducted and collected in an extensive manner. Alongside this “medical scans” had been used to accurately measure the brain volume of participants, further enhancing the information’s validity.

Question 4a.

Marks	0	1	2	Average
%	32	35	33	1

A suitable response could have included the following:

- Being a food citizen means making ethical and environmentally sound decisions about what to buy and eat because of an understanding of the impact of one’s decisions on sustainability and ethics.
- It is a person who actively engages and takes responsibility for their role in the food system. They make conscious and informed choices based on an understanding of environmental, social and ethical implications of their food choices.
- It is a person who actively makes ethical, social and environmentally responsible decisions relating to their food choices, such as considering their impact on sustainability, food justice and animal welfare.
- It is a person who recognises their role and responsibility within the food system, understanding that their choices and behaviours have implications on issues relating to social justice, environmental sustainability and animal welfare.

The following is an example of a high-scoring response.

A food citizen is an individual whom is aware of the processes in the food system and associated ethical, social, environmental and political issues and so makes an effort to consciously behave and make food choices and engage in activism that is most beneficial, ethical and sustainable for food.

Question 4b.

Marks	0	1	2	Average
%	26	43	31	1.1

Responses needed to provide a detailed account of the relationship between shopping at a farmers' market and food citizenship by providing an example of how they support ethical, environmental and/or social issues.

A suitable response could have included the following:

Choosing to buy at a farmers' market could be more sustainable because the food on offer could be locally grown. This supports the ethical and environmentally driven decisions of a good food citizen due to:

- the reduction of food miles, which means less greenhouse gases and longer-lasting produce because it is fresher
- supporting local farms and producers, sustaining local agriculture and food economies
- often being produced organically or through sustainable farming methods, such as the reduced use of synthetic chemicals
- animal products in these markets coming from ethical farming practices such as free-range rather than intensive means, therefore aligning with consumers' values of protecting animal welfare
- purchasing foods in season rather than shopping at major supermarkets that import produce from global markets. This reduces their environmental impact and enhances the local economy
- foods on offer having less plastic and packaging, thus reducing their impact on the environment as less resources are required
- fostering community engagement and connection, supporting local producers rather than multinational corporations, promoting a sense of collective responsibility within the community.

The following is an example of a high-scoring response.

By shopping at an accredited farmers market, consumers ensure they are purchasing local produce that has not been highly processed, compared to big corporations. Food citizens would thus contribute to lower environmental impacts by purchasing local than if they purchased foods with large food mileage, which increases emissions.

Question 4c.

Marks	0	1	2	3	Average
%	26	31	28	15	1.3

Sustainability is presented throughout this study as a complex, holistic concept comprising three dimensions: environmental, economic and social.

Responses needed to focus on a positive sustainability outcome and provide an accurate description of the qualities of the ethical shopping pyramid that help achieve it. Students could refer to sustainability as a holistic concept or focus their response on one of the three dimensions.

A suitable response could have included one of the following:

- Reduction in food miles – Locally produced food requires less transportation and packaging. Less transportation could reduce CO₂ emissions that contribute to global warming. Less packaging (especially plastics) reduces the use of non-renewable resources, energy use required to recycle packaging or the environmental effects of landfill.
- Reduction in the use of chemicals – Organic farming does not use synthetic/artificial chemicals during primary food production. Organic methods promote soil health, supporting biodiversity and attracting beneficial insects to regenerate.
- Farmers have more control (food sovereignty) – When farmers sell to large supermarkets, they have to do so at a price set by the supermarket, which often sees farmers turn to intensive farming practices to make enough money. Selling independently means more choice for the farmer in terms of what they grow, the methods used and the price set. More of the profit goes to the farmer rather than the retailer.
- Reduction in food waste – Those who grow their own food are more likely to be aware of the resources required and challenges involved. Therefore, they may be less likely to waste food. Food swaps provide an opportunity for excess food to be exchanged for other wanted items, reducing food going into landfill. Scraps can be composted in the kitchen garden, reducing food sent to landfill.

The following is an example of a high-scoring response.

Economical sustainability – the ethical shopping pyramid allows for an enhanced diversity of food choices available through food hubs and bulk food stores for example to provide more jobs and economical growth opportunities for the locality to ensure people can have a greater source of income and access to higher quality, nutritional and safe foods.

Question 4d.

Marks	0	1	2	3	4	5	6	Average
%	18	16	22	18	17	7	2	2.3

Responses needed to analyse relevant components of both income and accommodation which could influence the purchase of an organic food box and clearly demonstrate the implications of these factors on a possible purchase.

A suitable response could have included the following:

- Income
 - Organic produce is often more expensive than non-organic fruit and vegetables due to the increased cost to the farmer (lower crop yield, maintaining accreditation). Therefore, people with higher income may be more inclined to purchase the boxes compared to low-income households. Lower-income households may opt for non-organic options or frozen/canned fruits and vegetables as they may prioritise more budget-friendly options.
 - An organic food box may have a higher price-point than non-organic produce, especially if the food box is delivered to the household, resulting in transportation costs. Therefore, this may only be financially viable for high-income households as lower-income consumers may opt for cheaper alternatives.
- Accommodation
 - Organic fruit and vegetables boxes are perishable in nature; therefore, the accommodation must have adequate storage for the produce so it does not spoil. This can involve cool, dark cupboards for some vegetables and refrigerator space for fruits such as berries. People with adequate storage facilities may be more inclined to purchase the organic produce boxes.
 - Purchasing a box of produce requires adequate storage space within the household, such as a refrigerator. People who live in small accommodation or share houses where they need to share

their space may not have the means to safely store the box, therefore reducing their likelihood of purchasing. Smaller accommodations such as student accommodation or studio apartments may not have the required equipment, such as knives/stoves/ovens, to effectively prepare the foods within this food box, therefore reducing the household's likelihood of purchasing.

Question 4e.

Marks	0	1	2	Average
%	37	42	21	0.9

Responses needed to provide a detailed account of one relationship between purchasing a food box and healthy living by referencing a cause and effect of consuming the produce box and healthy living.

A suitable response could have included the following:

- Vegetable and fruit boxes contain a variety of nutrients, which promotes a healthy diet. The nutritional rationale of the 'Australian Guide to Healthy Eating' emphasises that a variety of types and colours of fruits and vegetables should be consumed to reduce the risk of diet-related disease.
- Buying a box could promote increased consumption of vegetables and fruits as they are in the home. This may improve the household's diet as family members opt to snack on a piece of fruit or vegetable over other foods such as discretionary items. This practice may establish nutritious food behaviours within the household and normalise the daily consumption of a wide variety of fruits and vegetables, particularly among children, fostering healthy dietary habits from a young age.
- Fruit and vegetables are high in fibre: purchasing a box may increase a person's consumption of these foods, therefore reducing their risk of diet-related diseases such as cardiovascular disease as they are increasing their fibre intake.

The following is an example of a high-scoring response.

By purchasing a box full of fruits and vegetables of different types and colours, individuals may see health benefits. This is because they provide different nutrients such as fibre, vitamins such as Vitamin C and antioxidants and phytochemicals which can reduce the risk of obesity and other diet related diseases.

Question 5a.

Marks	0	1	2	3	Average
%	25	44	26	5	1.1

Responses needed to provide a balanced argument, showing points for and against the headlines, and why they do not support the recommendations of the *Australian Dietary Guidelines*. Responses needed to reference both protein and carbohydrates in their discussion, as both macronutrients are referenced in the headlines.

A suitable response could have included the following:

The *Australian Dietary Guidelines* emphasise a holistic approach to healthy eating that focuses on consuming a variety of foods rather than just specific nutrients such as protein or carbohydrate. They do not support extreme dietary approaches such as 'low-carbohydrate' or 'high-protein' diets as they may disrupt the balance of consuming a diverse range of foods from the five food groups, leading to the exclusion of other nutritious foods.

Question 5b.

Marks	0	1	2	Average
%	40	35	24	0.9

Responses needed to provide the characteristic of an emotional or psychological response to food that the headlines may elicit.

A suitable response could have included the following:

- Individuals may feel motivated to change their own diets after reading these headlines as they may be driven by the belief that these diets are associated with positive changes in athletic performance and muscle gain.
- These headlines may trigger a negative response from individuals as they criticise their own body through negative self-talk due to the fact their diet does not reflect that of athletes.
- People may feel anxiety after reading the headlines due to the pressure to conform to these suggested dietary approaches, which may result in severe and unnecessary food restrictions such as eliminating carbohydrates.
- People may feel validated after reading the headlines as their own diets reflect that of an athlete, having already increased their protein intake and being committed to these dietary practices.
- People may be more critical about the foods they consume after reading the headlines, which may result in them tracking their macronutrient intake to ensure they are consuming a high-protein/low-carbohydrate diet.

The following is an example of a high-scoring response.

These headlines may elicit an emotional response of shame or sadness in individuals as they may want to be athletic and believe their healthy consumption of carbohydrates is not correct or ideal to become an athlete.

Question 5c.

Marks	0	1	2	3	4	Average
%	18	35	31	13	3	1.5

Responses needed to analyse how the headlines may shape food information in an individual and the implications this information has on food choices. High-scoring responses needed to reference components of the headlines such as 'athlete', 'fitness' and/or 'muscle gain', alongside references to low-carbohydrate and high-protein choices.

A suitable response could have included the following:

- The headlines imply that athletes rely upon high-protein and low-carbohydrate diets to improve their bodies and that muscle development is linked solely to diet – in particular carbohydrates and protein. It also implies that athletes are attributing their performance to these foods. The implications may be attractive as a role model to some who have issues with body image. This along with the headlines linking the athlete to protein may elicit the belief that protein is the way to build muscle, or that a high-protein intake is essential for muscle development and a low-carbohydrate diet is good for achieving a good body image, influencing a person to adapt their diet to cater to these nutrient recommendations.
- The headlines promote a message that in order to have an athletic physique a person must consume a high-protein and low-carbohydrate diet. An individual may take this information as truth; however, the relationship between athleticism/muscle mass and diet is far more complex than simply monitoring carbohydrate/protein intake. This information may influence their food choices as they adopt these

messages into their daily diet, tracking their macronutrient intake and restricting carbohydrate-based foods, which are required for a healthy diet.

- By reading these headlines an individual may believe that a person's diet is the key factor in athleticism/gaining muscle, whereas these attributes need to be coupled with frequent exercise and training. If an individual believes the message promoted in these headlines, they may heavily restrict their diet in order to adopt the same approach, thus cutting out carbohydrate-based foods and increasing their protein intake.

Question 6

Marks	0	1	2	3	4	5	6	7	8	9	10	Average
%	26	20	15	12	10	8	4	3	1	0.2	0.1	2.3

Students needed to draw from the information provided in the stimulus to support their response. Responses needed to address all three dot points; a high-scoring response provided a clear and balanced argument for each point. The stimulus needed to be used throughout the response, with students utilising the information to support their own knowledge. Many students rewrote the stimulus without demonstrating their own understanding of the content within the response.

Responses could have included some of the following information that relates to each of the three dot points in the stem.

The role of high-carbohydrate foods in influencing gut microbiota

- Gut microbiota refers to microorganisms in a person's gastrointestinal system that include bacteria, fungi and viruses.
- High-carbohydrate foods such as whole grains, fruits, legumes and vegetables provide fibres that serve as prebiotics.
- Prebiotics are non-digestible fibres that serve as a food source for probiotics, the beneficial bacteria in the gut.
- Prebiotics support the growth and activity of beneficial gut bacteria, contributing to microbial diversity.
- These prebiotics/fibres help produce short-chain fatty acids (SCFAs) that may promote a healthy gut microbiota
 - legumes and whole grains contribute to the production of SCFAs.
- High-carbohydrate foods which are low in fibre, such as sugars, may have a detrimental effect on the gut microbiota
 - reduce diversity
 - promote harmful bacteria which feed on the sugar, resulting in an imbalance.

The influence of a low-FODMAP diet on gut microbiota

- Restricting fermentable carbohydrates may result in reduced diversity of gut microbiota by limiting the substrates available for fermentation.
- It is essential that these foods are slowly reintroduced to enable gradual restoration and more diverse gut microbiota to be established / are also tolerated by Luca.
- Fermentable sugars lead to fermentation and gas production:
 - oligosaccharides (wheat, rye, onion, garlic, beans and some vegetables)
 - disaccharides (dairy)
 - monosaccharides (fructose)
 - polyol (artificial sweeteners).

- If all FODMAP foods are cut out for an extended period of time, this limits the amount of prebiotics/fibre a person is consuming.
- Cutting out dairy may mean that fermented dairy such as yoghurt is eliminated, reducing the consumption of probiotics.
- For diet it is important to recognise the specific foods causing concern, so balance can be restored to the gut microbiota.
- Diarrhoea can reduce the diversity/health of the gut microbiota; therefore, introducing a low-FODMAP diet is required to ensure this balance/diversity is maintained

The relationship between gut microbiota and Luca's physical health

- A healthy gut microbiota is needed for nutrient absorption and immune function.
- Imbalances of microbiota can result in bloating and irregular bowel movement, contributing to greater discomfort for Luca if he is still consuming foods high in FODMAPs.
- Imbalances can result in inflammation and a leaky gut; this can result in harmful substances entering the bloodstream as well as general discomfort.
- Changes in the gut microbiota are linked to obesity and insulin resistance.
- Regular physical activity increases the health of one's gut microbiota.

The following is an example of a high-scoring response.

The gut microbiota is the collection of microorganisms that reside in the gut. High carbohydrate foods play a central role in gut microbiota health. For example, dairy products such as Yakult and Greek yoghurt that are probiotics and high in lactose, provide the gut microbiome with live, healthy bacteria that prevent it from going into dysbiosis. Foods high in dietary fibre such as wholegrains (wheat, barley, etc.) contain both soluble and insoluble fibre. Fibre provides bulk to the diet, and along with prebiotics such as garlic and onion that are high in oligosaccharides (inulin) provide food for organisms in the gut microbiota. They are broken down into short chain fatty acids, and are used as a food source. However, it should be noted that some high carbohydrate foods such as discretionary choices can negatively impact the gut microbiota. These foods can cause dysbiosis, where bad bacteria outnumber good bacteria, being detrimental for gut microbiota health. Also, those with FODMAP intolerance, means some high FODMAP foods are detrimental to the microbiota. These foods absorb water as they pass through the intestines and then ferment in the gut, producing methane gas that causes the bowels to swell and damage to the gut microbiota.

As a result, a low FODMAP diet can have detrimental impact on the gut microbiota. By not providing enough prebiotics and probiotics and fibre which is found in high FODMAP foods, the gut microbiota begins to fall out of balance and good bacteria begin to die in the gut. This increases the risk of foods fermenting in the gut, damaging epithelial cells and causing severe discomfort. As a low FODMAP diet may reduce Luca's symptoms of bloating, flatulence and irregular bowel movements, it is essential this diet is only carried out for 4 to 6 weeks, or long term damage to the biodiversity of bacteria in the gut is at an increased risk.

The gut microbiota has a direct relationship to physical health. It helps to prevent obesity by slowly digesting foods, leading to satiety. This means that less food throughout the day is consumed and thus less energy, resulting in a decreased risk of obesity and related lifestyle diseases such as type 2 diabetes and cardiovascular disease. Cancers such as bowel cancer, by preventing foods from fermenting in the gut and damaging epithelial cells that can cause cancer cells to be produced. The gut microbiota is also responsible for strengthening the immune system, helping to protect Luca from disease and sickness.

In turn, whilst high FODMAP foods are necessary for the health of Luca's gut microbiota, some are damaging, this it's important to determine which high FODMAP foods Luca can eat so his physical health is maintained.