# Government of South Australia LogoSACE Board Logo2024 Nutrition Subject Assessment Advice

Overview

Subject assessment advice, based on the 2024 assessment cycle, gives an overview of how students performed in their school and external assessments in relation to the learning requirements, assessment design criteria, and performance standards set out in the relevant subject outline. They provide information and advice regarding the assessment types, the application of the performance standards in school and external assessments, and the quality of student performance.

The Subject Renewal program has introduced changes for many subjects in 2025, these changes are detailed in the change log at the front of each subject outline. When reviewing the 2024 subject assessment advice, it is important to consider any updates to this subject to ensure the feedback in this document remains accurate.

# School Assessment

Teachers can improve the moderation process and the online process by:

* ensuring that making decisions are based on the current subject outline and the current performance standards when assessing their students’ work
* ensuring the task design allows for multiple opportunities to display student competency against the performance standards and is rigorous enough to discourage AI use
* providing evidence to support the grade awarded in tasks, such as a rubric, marking on a SAT or annotations on the student work.

Assessment Type 1: Investigation Folio (30%)

For a 20-credit subject, students conduct one design practical investigation and one investigation with a focus on science as a human endeavour (SHE).

When submitting student work online, it is important to include the relevant task sheet and the highlighted performance standards that correlate with the grade allocated for each task. The development of clear, well-structured, and informative task sheets that allow students to demonstrate knowledge and apply understanding of concepts to real life scenarios is also advised.

Teachers can elicit more successful responses by:

* encouraging students to directly use and apply Stage 2 Nutrition specific coursework and terminology to data provided
* creating a task design that allows students to demonstrate their own authentic understanding of course material whilst embedding key ideas throughout
* allowing multiple opportunities for students to demonstrate deep and broad knowledge of nutrition specific terminology and evaluate their understanding of course specific nutrition concepts with logical justifications
* creating a task design that discourages AI use.

Science as a Human Endeavour

SHE investigations were displayed in multimodal format, including articles and videos but the most popular was via a traditional report structure. Students selected contemporary topics (within the last two years) which were directly relevant to the Stage 2 Nutrition course.

The more successful responses commonly:

* identified one, or at most two SHE key concepts and the interaction between science and society (KA3)
* demonstrated a clear and deep understanding and critical analysis of the interaction between science and society, along with the inverse relationship of the impacts of society on science
* focused the report on the discussion of the interaction between nutrition science and society, and showed evidence of this (KA3) embedded in the SHE key concepts (KA1)
* cited a variety of appropriate, current, and credible academic resources as evidence for statements and/or claims made in the SHE task, along with an integrated understanding for the impacts against the SHE concepts of choice
* provided an appropriately formatted list of references (KA4)
* selected a topic or question that offered a range of opportunities to explore the interaction between science and society, critically, linking them to the SHE key concept(s) (KA3, KA4).

The less successful responses commonly:

* lacked clarity around which SHE key concepts they were talking about when discussing the interaction between science and society (KA4)
* provided broad understandings of SHE concepts but lacked depth
* lacked the inclusion of relevant nutrition science linked to the course
* identified issues but lacked supporting evidence of the potential influence that science has on society and *vice versa* (KA3)
* selected topics that prevented students from providing a depth of understanding of the interaction between science and society (KA3)
* selected topics that were not relevant to nutrition science, so the background science tended more towards a discussion of chemistry or biology
* provided a report that lacked the research enabling students to demonstrate a deep understanding of the topic and how science and society interacts (KA4)
* described the historical developments of the topic, rather than discussing the interaction between nutrition science and society
* focused more on answering a question posed, rather than exploring the interaction between nutrition science and society.

Design Practical Investigations

Teachers are encouraged to take time at the start of the year to provide guidance and scaffolding for students to be able to successfully analyse and interpret results and apply nutritional theory to their findings, and thus, present correct reports.

The more successful responses commonly:

* provided a considered justification for the choice of independent variable, dependent variable(s), and steps of the procedure that would directly impact the validity and reliability of the data (IAE1)
* considered how factors could be held constant (IAE1)
* managed safety risks and accounted for ethical considerations in the choice of materials and method (IAE1)
* clearly described how the data would be collected, providing a blank results table with appropriate column and row headings (IAE1)
* provided justifications to any changes made to the original design and justified (IAE1)
* presented data graphically in an appropriate format, including but not limited to column/bar graphs, star charts, and scatter plots. Graphs were large enough to clearly see trends and differences. Figure headings or titles were descriptive and included enough information to clearly convey what they were showing (IAE2)
* summarised data using appropriate descriptive statistics, including but not limited to averages, ranges, and medians (IAE2)
* analysed quantitative data by identifying clear trends and patterns, often stating percentage differences as an objective measure of any differences (IAE3)
* interpreted quantitative data effectively, demonstrating a knowledge of nutrition concepts to explain patterns or trends in the data (IAE3)
* stated a clear conclusion in the context of the hypothesis which was qualified in terms of its limitations (IAE3)
* identified clear evidence of random errors in the data and discussed their impact on the reliability with specific use of data (IAE4)
* identified evidence of systematic errors in the data and discussed their impact on accuracy (IAE4)
* discussed the presence of a control and its impact on the validity of the data (IAE4)
* evaluated the methodology in terms of its impact on the validity, reliability, precision, and accuracy (IAE4)
* demonstrated a clear understanding of the differences between validity, reliability, precision, and accuracy.

The less successful responses commonly:

* lacked the inclusion of quantitative data in their analysis, with minimal inclusion of comparing data values and trends and did not link directly to nutrition concepts
* featured a deconstruction (not requirement in Nutrition) which meant the design was brief and poorly justified (IAE1)
* did not include justifications within their design component (IAE1)
* did not clearly identify the independent and/or dependent variable(s) in the design or how factors would be held constant (IAE1)
* represented data in tables that did not follow scientific conventions, e.g. lacking a descriptive title/figure heading, incorrect units, incorrect number of significant figures, presenting all the raw data without calculating averages if appropriate (IAE2)
* represented data in graphs that did not follow scientific conventions, e.g. lacking a descriptive title/figure heading, incorrect units, incorrect scale on axes, axes not labelled or lacking units (IAE2)
* summarised what the results showed instead of interpreting them using nutritional understanding (IAE3)
* presented conclusions that were inconsistent with the data and did not refer to any limitations of the conclusion (IAE3)
* discussed random and systematic errors without referring to any evidence of them in the data (IAE4)
* confused random and systematic errors. Confused accuracy, validity, reliability, and precision or used these terms interchangeably (IAE3) or left these out completely and only discussed strengths and weaknesses (no longer required).

Assessment Type 2: Skills and Assessment Tasks (40%)

For a 20-credit subject, students must complete either two or three skills and application tasks, one which must be a case study. The skills and applications tasks should be designed to enable students to apply their science inquiry skills and demonstrate knowledge and understanding of key nutrition concepts and learning.

Teachers can elicit more successful responses by:

* ensuring that SATS are well-designed and include some science inquiry skills and Science as a Human Endeavour questions. SATs should feature questions that enable them to demonstrate their understanding across all levels, including instructions such as: identify, describe, explain, analyse, evaluate, and discuss (KA1, KA2, KA3, KA4)
* encouraging students to directly use and apply Stage 2 Nutrition specific coursework and nutrition specific terminology to data provided in case study and design practical
* using task design that allows students to demonstrate their own authentic understanding of course material
* providing opportunities for students to demonstrate deep and broad knowledge of nutrition specific terminology and application in responses.

The more successful responses commonly:

Case Study

* used key information from the case study which was extracted and clearly summarised (KA4)
* accurately presented data about current and recommended macronutrient, micronutrient, water, alcohol intake, and energy balance in graphs and/or tables to compare against Australian specific nutrient reference values (e.g. RDI, AI, UL) (IAE2)
* used graphs and data to support written material and provided clear and comprehensive justifications as to dietary and lifestyle recommendations.
* linked data collected in the report to course content, risk factors for the client and presented clear future recommendations that were appropriate and
* followed appropriate scientific conventions in the presentation of data, including units, labels, and titles (IAE2, KA4)
* demonstrated a deep knowledge and understanding of underlying course specific nutrition concepts related to protective and risk factors for diet-related disorders (KA1)
* applied nutrition concepts to recommend appropriate dietary and lifestyle changes, considering the case study’s individual needs, e.g. lactose intolerance, vegan diet, living in a remote area, etc. Strong justification of the recommendations was presented (KA2) with links to both macro and micronutrients
* structured the case study response clearly with appropriate sub-headings and effective use of nutrition terminology (KA4)
* included references where appropriate and cited in the correct notation (KA4).

Tests

* provided responses that were clear, concise, and used nutrition terminology accurately (KA4)
* demonstrated a deep knowledge and understanding of nutrition (KA1)
* showed proficiency in applying nutrition concepts to answer unfamiliar and/or complex questions (KA2)
* demonstrated an ability to apply scientific inquiry skills in test settings (IAE2, 3, 4)
* demonstrated a high level of knowledge and understanding of the Science as a Human Endeavour concepts (KA3)
* managed time effectively to attempt every question and give a considered response to each question.

The less successful responses commonly:

Case Study

* repeated the same points several times in the response, which was an ineffective use of the word count
* did not link course material
* used terminology inaccurately
* formulated conclusions about the case study that were not supported by the data (IAE3)
* ignored the social and/or cultural profile of the case study when making recommendations (KA2)
* summarised and represented data in (a) tables that lacked clear column or row headings, included incorrect units, non-specific figure headings/titles and/or (b) graphs with inappropriate scales for the data presented (e.g. graphing iron and sodium intake on the same set of axes), or lacking units or appropriate figure headings/titles (IAE2).

Tests

* provided responses that were confused or did not address the focus of the question
* misunderstood the assessment verb (e.g. state, describe, explain, and discuss) which lead to key points or important information being left out of the response
* did not write to the mark scheme and provided answers that were lengthy, unfocused and had lots of information, at times incorrect, without addressing the key points of the question.

# External Assessment

Teachers can elicit more successful responses by encouraging students to:

* identify the verb(s) in the question, such as state, explain, discuss, and respond accordingly
* practice more questions that involve them applying nutrition concepts in unfamiliar contexts
* ensure they read the question stem more clearly and answer what is explicitly asked
* provide new information in their answers and not just repeat information provided in the stems and questions
* use data in questions when asked to do so and not to just refer to a source
* explain their answers in detail and not be too succinct with their responses
* provide different answers for each question
* not provide multiple answers when asked to state or describe one answer.

Assessment Type 3: E-Examination

The subject outline indicates that Stage 2 science inquiry skills and nutrition understanding from all Stage 2 Nutrition topics will be assessed in the examination.

It also states that questions will:

* include case studies and/or scenarios
* involve application of knowledge and skills to different contexts
* require analysis and interpretation of data or information.

The electronic exam (e-exam) has a time length of 130-minutes, with a total mark of 100 and was made up of seven questions.

Section 1

Question 1

(a)(i) (ii) The more successful responses commonly:

* + identified two main micronutrients required to reduce bone mineral density loss such as calcium, vitamin D or phosphorus
	+ provided one good *food* source for each micronutrient identified that was suitable for an individual who was lactose intolerant (i.e. dairy free products).

 The less successful responses commonly:

* + did not identify two main micronutrients required to reduce bone mineral density loss such as calcium, vitamin D or phosphorus
	+ identified one or two macronutrients instead of micronutrients
	+ identified ‘food groups’ such as *leafy green vegetables* or *meat*, instead of specific food sources, such as *spinach* or *chicken*
	+ stated sunlight as a *food* source for vitamin D instead of an oily fish-like salmon.

(iii) The more successful responses commonly:

* + identified a group other than the lactose intolerant and astronauts and clearly explained why the group, like vegans, were at risk, such as a lack of dairy products in the diet which are a rich source of calcium.

 The less successful responses commonly:

* + did not explicitly identify a group of individuals at risk of bone mineral density loss
	+ did not explain in enough detail why an identified group was at risk of bone mineral density loss
	+ correctly identified pregnant women as an ‘at risk’ group, but incorrectly explained that they require more calcium.
1. *The more successful responses commonly:*
* clearly identified caffeine as a diuretic and explained link to calcium loss through increased urine excretion
* clearly explained how caffeine inhibits calcium absorption and that this results in less available calcium for bone formation.

The less successful responses commonly:

* did not refer to calcium in their response
* often stated ‘*affects absorption’* without explaining if calcium absorption is increased or decreased and why
* stated that caffeine decreases calcium absorption but did not expand on their answer
* stated two reasons but did not explain either.

*(c) The more successful responses commonly:*

* explained that full body or weight bearing exercise puts pressure on bones and that this pressure results in bone synthesis (or prevents bone resorption)
* identified that full body or weight bearing exercise increases nutrient rich blood flow to bones that are required for bone synthesis to occur.

*The less successful responses commonly:*

* did not explain *how* full-body exercise assists astronauts to maintain bone mineral density
* restated the question, such as repeating ‘*maintain bone mineral density’* from the question without explaining how exercise does this
* discussed strengthening muscle without applying the relationship to bone density
* identified that full body or weight bearing exercise puts pressure on bones or increases nutrient rich blood flow to bones but did not explain that this was important for bone synthesis.

Question 2

(a) *The more successful responses commonly:*

* identified that developing good habits throughout childhood and adolescence increases likeliness of these healthy habits continuing in adulthood and reducing the risk of developing diet-related disorders
* identified that nutritional knowledge can be passed on during the sharing of healthy family meals and this can contribute to reducing the risk of developing diet-related disorders.

The less successful responses commonly:

* tended to discuss importance of good health for adolescents without linking it to the importance of preventing diet related disorders
* stated two reasons but did not explain either
* repeated the same point multiple times without explaining it
* often missed the link into adulthood.

(b) The more successful responses commonly:

* identified a probable reason, such as pension/low income, and provided an explanation related to consuming less nutritious meals
* provided a reason beyond ‘more less nutritious’ such as processed foods, that contain more saturated fat, sugar etc.

The less successful responses commonly:

* identified a probable reason but did not link back to question with a valid explanation or did not link explanation to being more likely to eat less nutritious meals
* identified a valid reason but linked the reason to fast food, without distinguishing fast food as being less nutritious (as it can be nutrient-dense)
* provided two different reasons with no discussion
* made unsupported generalisations, such as people over 65 years old are lazy, do not care about appearance, eat lollies, etc.

(c) The more successful responses commonly:

* identified two different reasons and linked them to detailed steps in the development of type 2 diabetes such as blood glucose spikes to insulin resistance to impaired pancreas function (beta cell reduction) or visceral fat accumulation to pancreas functioning.

The less successful responses commonly:

* repeated answers previously mentioned in part (b)
* did not explain in detail why type 2 diabetes is more common in over 65s
* identified a reason, such as sedentary lifestyle or lack of exercise, but did not go on to explain how this contributes to developing type 2 diabetes
* discussed what was known about type 2 diabetes, without specifically relating it to the question
* were very short and lacked detail.

Question 3

1. *The more successful responses commonly:*
* used data that aided in their comparison of the protein in the two types of rice
* correctly identified and explained that hybrid ‘beef rice’ had a higher biological value as it contained all essential amino acids (EAA), whereas white rice was an incomplete source of protein that was missing at least one EAA.

The less successful responses commonly:

* did not use data
* only compared the amount of protein and did not compare the biological value of protein
* only referred to ‘amino acids’ without referring to ‘essential amino acids’
* did not explicitly state that the hybrid ‘beef rice’ had a higher biological value (i.e. compare) and explain that this was because of it being an animal source
* incorrectly linked higher biological value to more protein in hybrid ‘beef rice’
* supplied nutritional information relating to haem iron being absorbed more readily instead of addressing the question specifying ‘protein’
* did not understand the concept ‘*biological value of protein’*, and instead referred to carbon dioxide data.

(b)(i) *The more successful responses commonly:*

* calculated the energy provided by protein only in the 100g of hybrid ‘beef rice’

The less successful responses commonly:

* calculated the total energy per 100g instead of the energy provided by just the protein per 100g
* calculated the energy provided by the protein in the standard white rice instead of the hybrid ‘beef rice’
* chose to round answer but rounded off incorrectly.

 (ii) *The more successful responses commonly:*

* recognised that source 2 presented the information for hybrid ‘beef rice’ per 100g and is therefore the values provided are already expressed as a percentage by mass – therefore, provided the 3.89% value for protein.

The less successful responses commonly:

* calculated protein as a percentage of the total energy content instead of percentage of protein by mass.

(c) *The more successful responses commonly:*

* clearly discussed the benefit of one macronutrient (or total energy) using data from sources 2 and 3 to compare
* used data from source 2 and the per 100g column in source 3 when comparing the nutritional benefit.

*The less successful responses commonly:*

* only compared the data but did not discuss the nutritional benefit
* did not use data in their discussion as instructed in the question
* discussed more than one nutritional benefit but did not discuss any of them in enough detail to extract the full three marks
* discussed other benefits such as environmental instead of a nutritional benefit.

(d) *The more successful responses commonly:*

* used the provided information in the sources as a stimulus but gave additional depth beyond the sources and clearly linked it to increased/decreased acceptance/use
* discussed two different factors in great detail rather than superficially.

*The less successful responses commonly:*

* only used information from the sources provided without adding any new information/ideas/theory
* did not address the question and discussed how hybrid beef rice could influence society generally rather than how its future use and acceptance could be influenced
* discussed nutritional factors when asked to discuss two non-nutritional factors
* provided a SHE concept other than influence, such as communication and collaboration
* often identified a broad factor, such as cheaper or less carbon dioxide emissions, but did not explain it in enough detail to warrant marks or simply restated information given in the source.

Question 4

1. *The more successful responses commonly:*
* identified and explained one benefit to the manufacturer, such as food acid being used as a preservative which increases shelf life and therefore a greater chance for the product to be sold increasing manufacturer’s profits.

*The less successful responses commonly:*

* did not explain a benefit to the manufacturer
* explained more than one benefit but did not explain any of them in enough detail to extract the full three marks
* incorrectly explained that adding food acid increased pH instead of decreased pH
* explained why food acid must be declared in the ingredients, which was not relevant to the question, instead of discussing a benefit to the manufacturer
* stated that adding food acid would ‘affect’ shelf life but did not explain what type of affect (i.e. increase or decrease).

(b)(i) (ii) *The more successful responses commonly:*

* + chose an easy ingredient to substitute for hypertension, such as mineral salts for herbs or spices
	+ suggested a suitable substitution to reduce salt (sodium), saturated/trans fats or sugar and justified their substitution by explaining the link between the chosen macronutrient of concern and its link to hypertension
	+ provided a logical progression in development of hypertension such as of sodium retaining water and therefore increasing water volume in blood leading to hypertension.

The less successful responses commonly:

* + chose a poor substitution for hypertension, such as iodised salt
	+ provided a modification instead of a substitution (e.g. remove salt)
	+ did not justify their answer to (b)(i)
	+ provided a justification to (b)(i) that was very short and did not supply enough detail for 3 marks
	+ did not make a link to how hypertension is caused and thus a reason for the substitute
	+ only justified salt/fat/sugar content of substitution and not why/how that is good for hypertension
	+ did not understand that hypertension and high blood pressure are the same thing.

(c) *The more successful responses commonly:*

* identified one limitation of the investigation’s conclusion, such as testing on bacteria in a laboratory and the results have not been reproduced in humans and linked to reduced validity (or could not be applied to all humans yet)
* used practical skills terms correctly.

*The less successful responses commonly:*

* did not understand what a limitation of a conclusion was and wrote a conclusion instead
* simply paraphrased the source and did not supply a limitation and explain why it was a limitation
* commented on accuracy and reliability when the question was about drawing a valid conclusion
* described the negative effect to the human microbiome rather than limitations of the data itself
* incorrectly identified the testing of six nisin-like antibiotics (six treatments) as a sample size of six - stating that this was a low sample size
* provided a limitation that was not relevant to the conclusions for this investigation.

(d) *The more successful responses commonly:*

* discussed one probable unexpected health consequence, such as a decreased diversity in the gut microbiome which could lead to less synthesis of vitamin K
* discussed one effect of a decreased gut microbiome outlined in the subject outline in detail.

*The less successful responses commonly:*

* re-stated information from the source (e.g. harmful to the human gut microbiome) but did not go on to explain the loss of good bacteria/loss of biodiversity or the negative health consequence
* did not link a decreased gut microbiome to an appropriate health consequence
* did not discuss the unexpected health consequence and provided very little information in their response.

(e) *The more successful responses commonly:*

* selected sweet potato from the drop-down box, correctly identified that it was a prebiotic and explained that it is a source of food for some gut bacteria, which can increase their division to replace bacteria killed by nisin
* selected reduced fat yoghurt from the drop-down box, correctly identified that it was a probiotic and explained that it is a source of new beneficial bacteria that can be delivered to the gut where they colonise and divide replacing bacteria killed by nisin.

*The less successful responses commonly:*

* selected a food from the drop-down box but incorrectly stated it was a prebiotic or probiotic (mixed up the two terms)
* did not explain what a prebiotic or probiotic
* did not explain how the prebiotic or probiotic could reverse the potential effects of nisin
* provided nutrients in the foods and then a function of this nutrient, which was irrelevant to the question
* explained both prebiotics and probiotics often mixing the two up, instead of explaining one that was relevant to the food chosen in the drop-down box.

Section 2

Question 5

1. The more successful responses commonly:
* stated two ways that water is lost from the body; common examples were sweat (or perspiration), urine, breathing, faeces, talking.

The less successful responses commonly:

* only identified one way that water is lost instead of two
* used a generic response; stated ‘excretion’ as an example of how water is lost without specifying how.
1. The more successful responses commonly:
* clearly identified one function of water, such as thermoregulation, maintaining blood volume, cushioning joints, solvent action, or lubrication, and provided a good explanation of its role:
	+ Water acts as a lubricant: water is a key component of synovial fluid, which lubricates the joints, reducing friction between bones during movement and enabling smooth, pain-free motion.
	+ Water provides cushioning: by maintaining fluid pressure in areas such as the brain (cerebrospinal fluid) and joints (synovial fluid), absorbing shocks and protecting delicate structures from impact.

The less successful responses commonly:

* provided unclear and vague answers, such as "keeps the body hydrated" instead of being specific: "maintaining blood volume," and "lubrication of joints" instead of "cushioning of joints"
* provided an explanation that did not match the function, e.g. lubrication confused with cushioning: "Water cushions the joints by coating them in fluid, which helps them move more easily without friction," rather than saying "Water lubricates the joints by reducing friction between bones during movement"
* confused cushioning with lubrication: "Water lubricates the brain by absorbing shocks and protecting it from injury," rather than saying "Water cushions the brain by acting as a shock absorber through cerebrospinal fluid"
* provided more than one function but only one function was correct.

(c) The more successful responses commonly:

* explained that individuals who were less active or in colder climates may not lose as much water through sweat hence their water requirement is less than 8 glasses of water
* explained that individuals with a smaller body size may produce less sweat due to a less surface area and decreased metabolic heat during physical activity, hence their water requirement will be less
* explained that many fruits, vegetables, and other foods contain substantial amounts of water and contribute to daily hydration, making it unnecessary to strictly consume eight glasses of water per day.

The less successful responses commonly:

* explained that individuals may need *more* than eight glasses rather than referring to “why eight glasses may not be necessary”. Example: explained that individuals who were more active or in hotter climates may lose more water through sweat.

(d) The more successful responses commonly:

* identified that the poster only refers to colour, not volume and then explained that urine volume was also an indication of hydration level
* explained that the poster assumes that urine colour is a reliable indicator of hydration status, but certain foods (like beetroot or vitamins e.g. B vitamins) can alter urine colour, potentially leading to misinterpretation
* explained that the poster doesn’t consider that other things, like diet or health conditions, might change urine colour even if someone is hydrated.

The less successful responses commonly:

* explained that the ‘very dehydrated’ and ‘dehydrated colours’ on the poster were too similar with no other explanation
* gave an explanation which did not refer to the poster within the response
* explained that the poster doesn’t really tell you exactly how much water you need, just that your pee should look a certain way, without providing an example or an expanded response
* responded with vague points such as: “Some people might think they’re really dehydrated just because of what they ate, not because they actually need more water”, without being specific
* discussed alcohol or caffeine as a diuretic, without explaining effects on colour of the urine or hydration levels.

(e)(i) The more successful responses commonly:

* responded with breast milk or
* responded with baby formula

The less successful responses commonly:

* just stated ‘milk’ instead of ‘breast milk’
* stated boiled water/filtered water.

(e)(ii) The more successful responses commonly:

* explained what boiling water does and clearly linked this to the baby’s immune system; that boiling would kill/destroy/remove the potential bacteria in water and necessary to prevent infants from getting sick from bacterial infection including vomiting/diarrhoea because infants have weaker/underdeveloped immune systems, or
* explained that over time, stored water can become contaminated with bacteria or other microorganisms, especially if it has been exposed to air or stored in an unsealed container, hence boiling is necessary as it kills harmful pathogens, making the water safe to drink.

The less successful responses commonly:

* did not explain the need for boiling
* did not refer to the infant’s immune system or did not link the boiling to the need for boiling to the baby’s immune system
* referred to mineral concentration/ or other contaminants and said that boiling would remove these, not mentioning pathogens.

(f) *The more successful responses commonly:*

* discussed how the manufacturer could change the material of their bottles or of their filters, suggesting an alternative material such as metal interior/ aluminium, steel or bioplastic, and the effect on the environment
* explained the benefit to individuals as well to other sectors such as medical fields; and suggested this knowledge could improve marketing and profits for the company
* discussed the application of the technology used for detecting the nano plastics to be used to identify unsafe water (in bottles) which allow manufacturers to then change the material of the bottled water that it is sold in to make it safer.

The less successful responses commonly:

* only suggested to change filter with something not plastic, but did not name the material
* repeated the information from the article
* did not address the science and society connection in anyway
* discussed using imaging to test the bottles they have and then putting warning labels on their products without explaining the reasons and links to society / environment.

(g) *The more successful responses commonly:*

* used the term “mammal” or referred to a specific mammal and spoke about the impact of a mammal consuming plastics or getting trapped in a type of plastic
* explained that if plastic bottles are not disposed of properly, they can end up in natural environments where mammals may mistake them for food- ingesting plastic can lead to blockages, malnutrition, or internal injuries
* explained that improper disposal of plastic bottles can contribute to land and water pollution, damaging ecosystems- this can reduce food sources, contaminate drinking water that mammals rely on, or create physical hazards for mammals.

The less successful responses commonly:

* did not connect the bottle being in the environment with a specific effect on a mammal
* referred to fish consuming bottles with no connection to mammals
* stated that mammals were impacted without saying how they were impacted.

(h) *The more successful responses commonly:*

* described using a reusable bottle made of metal and refilling it from the tap or drinking from a water bubbler straight from the tap without using bottles.

The less successful responses commonly:

* suggested using a reusable bottle but did not mention what material the bottle is made of
* repeated the question ‘Drink from the tap’ instead of suggesting refilling bottles with water from the tap.

(i)(i) The more successful responses commonly:

* stated that FSANZ governs consumer safety issues and explained a role they play in maintaining food standards with connection to plastic from bottles, such as organizing recalls when plastics re found in bottles or set limits that are acceptable for human consumption that must be adhered to.

The less successful responses commonly:

* did not identify FSANZ or explain their role
* correctly identified FSANZ but did not elaborate on the role or incorrectly described their role.

(i)(ii)*The more successful responses commonly:*

* clearly outlined the progression from obesity to the development of CVD; explained that excess fat, particularly around the abdomen, reduces cells’ ability to respond to insulin. Insulin resistance increases the risk of type 2 diabetes, which damages blood vessels and the heart
* explained that obesity is linked to insulin resistance, leading to higher blood glucose levels and an increased risk of type 2 diabetes, which is a major risk factor for CVD
* explained that extra body fat compresses blood vessels, increasing resistance and causing high blood pressure. High blood pressure (hypertension) strains the heart and damages blood vessels over time, making them more prone to plaque build-up (atherosclerosis).

The less successful responses commonly:

* provided an explanation of how an individual develops obesity through dietary/ lifestyle choices, instead of starting their explanation with already having obesity and outlining a progression to CVD
* described obesity and CVD but did not provide a link.
1. *The more successful responses commonly:*
* described the function of the gallbladder; stores/releases bile
* described the function of bile, that bile emulsifies fat OR physically digests fats (mechanical digestion) into smaller droplets, and with less bile available, less fat digestion can occur and more passes through digestion system (is excreted rather than absorbed)
* included an explanation that chemical digestion by enzyme (lipase) takes place after emulsification occurs
* explained that emulsification of fats with bile increases the surface area of fats molecules increasing the action of enzyme lipase for further break-down.

The less successful responses commonly:

* did not describe the function of the gallbladder
* incorrectly stated that bile is produced by the gallbladder or that the gallbladder produces enzymes for fat digestion
* did not connect the concept that poorly digested fats will lead to poor absorption of small molecules, ‘fatty- acids’ and glycerol in the small intestine.

Question 6

(a)The more successful responses commonly:

* referred to the information provided in source 1 in the response; source 1 shows that the bran (fibre rich) is removed in the refined grain/ or the germ is removed (hence removing healthy fats and micronutrients)
* accurately identified two potential health risks and explained how consuming refined flour contributes to their development of the health risk, as well as how consuming wholewheat flour could help reduce these risks
* clearly explained that refined wheat flour products could lead to constipation due to low fibre content; *diverticulitis* risk is increased with low-fibre diets like those heavy in refined wheat
* thoroughly explained how refined wheat flour products, such as white bread and pastries, have a higher glycaemic index than whole wheat flour products, causing them to digest quickly and spike blood sugar levels. Regular consumption of these refined products over time can contribute to insulin resistance and elevate the risk of developing *type 2 diabetes*
* highlighted that removing the outer layer of wheat leads to a lack of micronutrients consumed, including healthy fats, which may lower HDL levels, potentially increasing LDL levels and promoting plaque buildup, which can lead to *atherosclerosis*.

The less successful responses commonly:

* did not mention the evidence from source 1
* only discussed one health risk
* correctly stated a health risk/disease but did not clearly link the disease with the nature of refined wheat; just stated that refined grain lacked healthy micronutrients which led to that disease
* recognised that refined wheat lacks fibre, which can contribute to constipation and diverticular disease, but did not explain how increased fibre intake from whole wheat benefits gut health.

(b)(i) The more successful responses commonly:

* + accurately used information from source 1 to explain that Vitamin E, a fat-soluble micronutrient, is stored in the germ of whole wheat but is lost during the refining process when the germ is removed
	+ correctly identified that fat-soluble vitamins can only be stored in the germ, not the endosperm, as the germ contains fats necessary for their retention.

The less successful responses commonly:

* + only stated that refined wheat flour has lower vitamin E content than whole wheat flour and included data, despite data not being required for this part of the question
	+ mentioned that vitamin E is found in the germ but did not explain that it is fat-soluble and therefore absent in refined flour
	+ did not recognise that fat-soluble vitamins cannot be stored in the endosperm, as it consists of carbohydrates and proteins but lacks fats, making it unable to retain vitamin E
	+ mistakenly used data, misinterpreting "refer to sources" as requiring data, which then led to omitting data in the following question.

(b)(ii) The more successful responses commonly:

* + accurately used data from source 2 to compare folate levels across all three types of flour, correctly recording the differences. Effectively incorporated the required three data points and used comparative language such as "more" or "less" to highlight the variations.
	+ whole wheat flour is 90-110%,
	+ refined wheat flour is approximately 50-65% and
	+ fortified wheat flour is approximately 660-690%., therefore, refined wheat flour has 40% less folate than whole wheat flour and enriched wheat has approximately 560% more folate than whole wheat flour.

The less successful responses commonly:

* only stated the data percentages but did not use comparative language such as "more" or "less" to highlight the differences between the three flours
* did not use data but described that one flour has more or less than the other
* only identified 1 or 2 differences but forgot to include all three flours in the response.

(b)(iii) The more successful responses commonly:

* + correctly linked folate to its role in red blood cell (RBC) and DNA synthesis, explaining why it is important for teenage girls experiencing blood loss during menstruation
	+ recognised that folate is fortified in staple foods like bread, making it more accessible to the general population
	+ explained that because teenagers may experience unplanned pregnancies, it is important to ensure adequate folate intake through diet and fortification. Since teens are still growing and already have high nutrient needs, maintaining optimal folate levels is especially crucial for their own health and the baby's development, particularly for red blood cell production and DNA synthesis.

The less successful responses commonly:

* + discussed folate and neural tube defects even though the questions asked for one ‘other’ advantage
	+ failed to recognise that folate is fortified in staple foods like bread, and therefore did not make the connection to fortification in their response
	+ did not discuss the importance of folate that relates directly to teenage pregnancy
	+ a common misconception was that folate can be stored for future pregnancy needs
	+ incorrectly explained the role of iron instead of folate, showing confusion between the two nutrients
	+ a common misconception was that folate can be stored in the body until needed for pregnancy.

(c) The more successful responses commonly:

* used the information provided in source 3 and clearly explained how B vitamins help convert glucose into energy, directly linking this to metabolism
* correctly identified that a deficiency in B vitamins results in reduced energy production, leading to fatigue, tiredness, or low motivation
* identified specific B vitamins (e.g., B1, B2, B3) and their roles in ATP production
* used source 3 to describe how the metabolism pathway was disrupted and that it would lead to less energy being released with a clear example of the effect on the person such as: fatigue, weakness, increased feeling of exhaustion after minimal physical activity; poor concentration, memory issues, and mental fatigue.

The less successful responses commonly:

* paraphrased the question without adding relevant detail
* simply stated that B vitamins are "needed for energy" without explaining how they contribute to metabolism
* used source 3 to describe how the metabolism pathway was disrupted and that it would lead to less energy being released but did not then relate to impact/symptom of person.

Question 7

Dot point 1:

The more successful responses commonly:

* provided more than one piece of evidence that linked B12 deficiency; the removal of the ileum, the site of B12 absorption, and, also identified that the lack of red meat in the diet contributed to low B12 levels.
* referred to the evidence from sources 1, 2 and 3 to justify answers.

The less successful responses commonly:

* simply stated B12 deficiency without linking it to the removal of the ileum or lack of red meat
* had a common misconception that B12 is found in fruits and vegetables.

Dot point 2:

The more successful responses commonly:

* identified common symptoms of B12 deficiency, such as feelings of fatigue, headaches, and anaemia.
* accurately linked these symptoms to their physiological causes, such as reduced red blood cell (RBC) production leading to anaemia and fatigue due to inadequate oxygen transport. Also explained the role of B12 in DNA synthesis, highlighting its connection to hair loss and other cellular functions connected nerve function impairment to B12 deficiency.

The less successful responses commonly:

* listed symptoms of B12 deficiency but failed to explain the underlying physiological causes
* veered off-topic, discussing iron metabolism and haemoglobin rather than focusing on B12 deficiency
* had incomplete or unclear explanations of nerve function impairment.

Dot point 3:

The more successful responses commonly:

* referenced source 4 to support the identification of iron deficiency (due to low ferritin levels) and vitamin C deficiency, using evidence from sources 1 and 2. Provided explanations linking iron deficiency to reduced red meat consumption and vitamin C deficiency to limited fruit intake, also noting the impact of ileum removal
* correctly identified vitamin D and zinc as additional micronutrient concerns. Vitamin D deficiency was linked to the absence of oily fish in the diet and limited sun exposure. Zinc deficiency was attributed to the patient's avoidance of red meat due to nausea, reducing intake of key animal-based sources
* referred to sources as evidence for the claims made.

The less successful responses commonly:

* incorrectly identified calcium and folate as nutrients of concern, despite no supporting evidence in the sources
* mistakenly classified protein as a micronutrient
* displayed confusion around vitamin D explanations was common, with some responses inaccurately stating that the body "gets" vitamin D from the sun rather than synthesising it through sunlight exposure in the skin
* contained errors related to vitamin A and zinc, with incorrect assumptions about their levels in the diet.

Dot point 4:

The more successful responses commonly:

* suggested appropriate diet modifications, such as incorporating non-haem iron sources (e.g., spinach) alongside vitamin C sources (e.g. raw capsicum, raw tomatoes, lemon juice) to enhance absorption
* featured responses that justified dietary modifications, with reference to micronutrient absorption and bioavailability.

The less successful responses commonly:

* listed and described modifications that included either red meat (for iron and B12) or fruits (for vitamin C); however, these foods were identified in the case study as exacerbating the patient’s symptoms (as per source 1)
* made general diet modification suggestions without linking them to specific nutrient concerns (e.g., "add spinach" without explaining its role in iron intake)
* swapped coffee for orange juice, and did not explain the role of caffeine as an inhibitor of micronutrient absorption
* suggested increasing fruit intake as a general modification but failed to justify how it would address specific micronutrient deficiencies
* lacked justification for dietary modifications or did not align with the evidence provided in the sources, for example, suggested increasing certain fruits or vegetables for their fibre content but did the modification did not link to the question
* addressed non-existent deficiencies
* provided correct lifestyle recommendations, such as increasing sun exposure to improve vitamin D synthesis, however lifestyle recommendations were not awarded marks as the question only asked for dietary recommendations.