Written Activity One

Question Time

Answer the following questions:

Food Packaging: Pathways to Environmental Sustainability

1. What are the environmental impacts associated with food packaging? How do they contribute to climate change and pollution?

The environmental impacts of food packaging include the extraction and processing of fossil fuels for packaging materials, which release greenhouse gases and contribute to global warming. The production of packaging materials is energy-intensive, further adding to carbon emissions. Plastics and polystyrene used in packaging can produce hazardous gases and chemicals when degrading in landfills, polluting the environment. Incineration of waste packaging leads to the release of greenhouse gases and toxic pollutants. Discarded packaging ending up in oceans and waterways threatens marine life and water quality.

2. What is bioplastic packaging? Why is it considered sustainable? Are there any drawbacks to using bioplastic packaging?

Bioplastic packaging refers to plastics made from renewable resources like tapioca or cornstarch.

It can be composted and have lower carbon emissions compared to conventional plastics. Bioplastics contribute to environmental sustainability by reducing reliance on fossil fuels and minimizing greenhouse gas emissions during production. They can break down naturally, reducing pollution and environmental harm.

Bioplastics made from crude oil and emitting greenhouse gases during production are not as sustainable as those made from renewable resources.

3. What is edible packaging? Why is edible packaging considered an effective solution in reducing waste and minimising environmental impacts? Provide examples.

Edible packaging is made from edible things like plant fibres or seaweed.

It eliminates the need for traditional single-use plastics and promotes a circular economy.

Instead of being thrown away, edible packaging can be consumed along with the food it holds. An example is an edible coffee cup made from coconut oil, flour, oats, sugar, water, and wheat, which remains firm for about 40 minutes and can break down in a compost system if not consumed within two weeks.

4. Why is polystyrene considered unsustainable? Why is low-grade wool being considered as a sustainable packaging option to replace polystyrene?

Packaging materials, particularly plastics, and polystyrene, produce hazardous gases and chemicals when degrading in landfill sites. These toxic emissions can contribute to the greenhouse effect, potentially contaminating groundwater reservoirs and polluting the soil, posing health risks to ecosystems and humans.

Using low-grade wool as insulated packaging in the food industry provides several benefits and contributes to sustainability. Wool is a natural, renewable resource that offers excellent thermal insulation and protection for food during transport. By replacing polystyrene with wool, companies can reduce their reliance on non-renewable materials and decrease the environmental impact of packaging waste. It provides a sustainable

alternative that helps maintain product quality, reduces waste, and supports an eco-friendlier approach to packaging.

5. What kind of plant-based packaging materials are used in the food industry? What are the benefits and concerns related to using plant-based packaging?

Plant-based packaging materials derived from renewable plant sources like sugarcane, cornflour, or bamboo, offer an eco-friendly alternative to traditional packaging made from fossil fuels. They are recyclable and biodegradable, reducing the environmental impact of packaging waste. However, the increased use of plant resources for packaging materials may have implications for food security. If significant amounts of plant resources are diverted for packaging, it could potentially reduce the availability of food for consumption.

Food Transportation: Pathways to Environmental Sustainability

6. What are the environmental impacts associated with food transportation, and how do they contribute to climate change and pollution?

Food transportation contributes to climate change through the emission of greenhouse gases, such as carbon dioxide, from burning fossil fuels. The extraction of crude oil for fuel production can lead to habitat destruction, and diesel and petrol fuels emit carbon dioxide and pollutants into the atmosphere, exacerbating global warming. Oil spills from ships can harm marine life and ecosystems, impacting food quality and poisoning the environment.

7. How can electric trucks contribute to reducing the environmental impact of food transportation?

Electric trucks offer a more sustainable option for food transportation by not emitting carbon dioxide and pollutants into the atmosphere like diesel or petrol vehicles. They utilize electric batteries, reducing reliance on non-renewable resources. Swappable batteries, such as those developed by Janus Electric in Australia, enable almost non-stop travel between destinations, further enhancing efficiency and sustainability.

8. In what ways can food retailers and food service providers reduce the distance their food takes to get to their In what ways can food retailer and food service providers reduce the distance their food takes to get to their consumers?

Food retailers and food service providers can help reduce the environmental impact of food transportation by offering grocery and meal-kit delivery services that optimize routes and minimise distances travelled. Sourcing food from local providers reduces transportation distances. Additionally, using drones and electric bikes for food delivery reduces fuel costs and carbon emissions associated with individual deliveries.

9. How can the marketing industry ensure its practices are sustainable?

They can raise awareness about environmental issues, promoting sustainable products and behaviours, and driving consumer demand toward more sustainable options.

The use of QR codes on product packaging can provide consumers with detailed information about a product's environmental impact. Highlighting local, seasonal, organic, fair-trade, or plant-based options can also drive demand toward more sustainable choices.

Food Disposal or Recycling and Repurposing: Pathways to Environmental Sustainability

10. What are the environmental implications of food disposal in landfills, and how can we address this issue?

Food disposal in landfills contributes to greenhouse gas emissions, particularly methane, which is a potent greenhouse gas. It also leads to habitat loss, land degradation, and contamination of soil and groundwater. Addressing this issue involves reducing waste transportation to landfills, promoting waste-to-energy technologies, implementing recycling and repurposing initiatives, and educating the public about the importance of proper food waste management.

11. What are some strategies that households can employ to reduce food waste and contribute to environmental sustainability?

Households can employ several strategies, including repurposing leftovers, composting organic waste, meal planning, freezing or canning excess food, and utilizing online platforms and apps for meal suggestions. Proper storage and portion control also play a role in reducing food waste. Innovations such as smart fridges and appliances can further assist in managing food supply and minimising waste.

12. How can the food service industry contribute to reducing food waste and promoting environmental sustainability?

The food service industry can reduce food waste and promote environmental sustainability through practices such as meal planning, inventory management software, food donation programs, and smart waste tracking systems. These strategies help minimise overstocking, redirect surplus food to those in need, and provide data-driven insights for waste reduction. Additionally, repurposing food waste into value-added products, as seen in upcycling initiatives, can further contribute to sustainability.

Written Activity Two

Case Studies: Food Processing and Manufacturing, Retailing and Consumption

Working in small groups, select one of the case studies and answer the questions provided.

After completing the questions, report your findings to the class.

Case Study 1: Food Packaging Innovation

A large food manufacturing company is exploring sustainable packaging options for their products. They are considering transitioning from single-use plastic packaging to more environmentally friendly alternatives, such as compostable packaging made from plant-based materials. However, they are concerned about the cost implications and the impact on product shelf life.

Questions:

1. What are the environmental challenges associated with single-use plastic packaging?
2. Discuss the potential benefits of transitioning to compostable packaging made from plant-based materials.
3. How might transitioning to sustainable packaging affect the company's product shelf life and overall costs?
4. What ethical considerations should the company consider when making packaging decisions?
5. What other innovative approaches could the company consider to reduce the environmental impact of packaging?

Case Study 2: Food Transportation Efficiency

A grocery delivery service is looking for ways to improve the efficiency of their food transportation system. They currently use a fleet of delivery trucks, but they are interested in exploring alternative options to reduce fuel consumption and carbon emissions. They are considering implementing electric delivery vehicles and optimising their delivery routes using advanced algorithms.

Questions:

1. What are the environmental challenges associated with traditional delivery trucks powered by fossil fuels?
2. Discuss the potential benefits of transitioning to electric delivery vehicles.
3. How can optimising delivery routes using advanced algorithms help reduce fuel consumption and carbon emissions?
4. What ethical considerations should the grocery delivery service consider when making these changes?
5. What other innovative approaches could the grocery delivery service explore to improve the environmental sustainability of their transportation system?

Case Study 3: Food Waste Reduction in Restaurants

A popular restaurant chain is committed to reducing food waste in their operations. They want to implement strategies to better manage their food inventory, reduce overproduction, and repurpose leftover ingredients. They are considering implementing inventory management software, donating surplus food to local charities, and creating new menu items using food that would otherwise go to waste.

Questions:

1. What are the environmental challenges associated with food waste in restaurant operations?
2. Discuss the potential benefits of implementing inventory management software in reducing food waste.
3. How can food donation programs help minimise food waste and contribute to sustainability?
4. What ethical considerations should the restaurant chain consider when managing food waste?
5. What other innovative approaches could the restaurant chain explore to further reduce food waste and promote sustainability?

Case Study 4: Sustainable Food Choices

A group of friends are passionate about promoting sustainable food choices among their peers. They are organising an event to raise awareness about the environmental impact of food consumption and encourage individuals to make more sustainable food choices. They plan to showcase plant-based alternatives, locally sourced ingredients, and the benefits of reducing food waste.

Questions:

1. What are the environmental benefits of choosing plant-based alternatives over animal-based foods?
2. Discuss the advantages of sourcing ingredients locally in terms of reducing the carbon footprint of food.
3. How can individuals reduce food waste in their daily lives, and what impact does this have on sustainability?
4. What ethical considerations should individuals consider when making sustainable food choices?
5. What other innovative approaches could the group explore to promote sustainable food choices among their peers?

Case Study 5: Recycling and Repurposing Food Waste

A community organisation is implementing a food waste recycling and repurposing program in their local area. They collect food waste from households, restaurants, and supermarkets and convert it into compost for community gardens. They also repurpose surplus food by creating packaged meals for those in need.

Questions:

1. What are the environmental benefits of recycling and repurposing food waste?
2. Discuss the challenges and potential solutions for collecting and managing food waste from various sources.
3. How can composting food waste contribute to sustainable gardening and soil health?
4. What ethical considerations should the community organization consider when implementing the recycling and repurposing program?
5. What other innovative approaches could the organization explore to further reduce food waste and maximize its environmental impact?

Written Activity Two

Case Studies: Food Processing and Manufacturing, Retailing and Consumption

In this activity, you will form groups of 3 to 5 students.

1. Read the case study carefully.
2. Discuss the questions within your group, considering possible answers based on the knowledge and concepts covered in the chat. These case studies are designed to encourage critical thinking and group discussion. The answers to the questions are not explicitly provided in the text but require you to analyse the information given, think creatively, and share your ideas with your group members. There may be multiple valid answers to the questions.
3. Take notes or document your group's discussions, recording the key points and insights shared.
4. Share your group's findings and listen to other groups' perspectives and consider different viewpoints.

Case Study 1: Food Packaging Innovation

A large food manufacturing company is exploring sustainable packaging options for their products. They are considering transitioning from single-use plastic packaging to more environmentally friendly alternatives, such as compostable packaging made from plant-based materials. However, they are concerned about the cost implications and the impact on product shelf life.

Questions:

1. What are the environmental challenges associated with single-use plastic packaging?

   Single-use plastic packaging contributes to plastic waste, which takes hundreds of years to decompose and can end up in landfills or pollute ecosystems such as oceans and rivers. Plastic packaging production also requires the extraction of fossil fuels and the emission of greenhouse gases, contributing to climate change. Additionally, the improper disposal of plastic packaging can harm wildlife and marine life through ingestion or entanglement.

2. Discuss the potential benefits of transitioning to compostable packaging made from plant-based materials.

   Compostable packaging is designed to break down into organic matter under specific conditions, reducing waste and environmental pollution. Plant-based materials used in compostable packaging are renewable resources, reducing dependence on fossil fuels.

3. How might the transition to sustainable packaging affect the company's product shelf life and overall costs?

   The transition to sustainable packaging, specifically compostable packaging made from plant-based materials, may affect the company's product shelf life and overall costs. Compostable packaging can have different properties compared to traditional plastic packaging, such as permeability to air and moisture. Depending on the product, this can impact shelf life and require adjustments to packaging design and storage conditions. Additionally, the cost of sustainable packaging materials and manufacturing processes might be higher initially. However, economies of scale, advances in technology, and increasing consumer demand for sustainable products may help drive down costs over time.

   This is a thinking question – students will need to research this information.

4. What ethical considerations should the company consider when making packaging decisions?

   - Choosing packaging that minimises harm to the environment, reduces waste, and promotes sustainability.
   - Considering the efficient use of resources such as energy, water, and raw materials during packaging production and disposal.
   - Ensuring that packaging materials and processes do not pose health risks to consumers.

5. What other innovative approaches could the company consider to reduce the environmental impact of packaging?

- Exploring packaging design techniques that minimise material usage.
- Reducing the weight of packaging materials without compromising functionality and safety.
- Implementing recycling programs or utilising recycled packaging.
- Investigating new materials with lower environmental footprints, such as bio-based plastics, paper-based alternatives, or innovative biodegradable materials.

Case Study 2: Food Transportation Efficiency

A grocery delivery service is looking for ways to improve the efficiency of their food transportation system. They currently use a fleet of delivery trucks, but they are interested in exploring alternative options to reduce fuel consumption and carbon emissions. They are considering implementing electric delivery vehicles and optimising their delivery routes using advanced algorithms.

Questions:

1. What are the environmental challenges associated with traditional delivery trucks powered by fossil fuels?

   Food transportation contributes to environmental degradation through the emission of greenhouse gases, habitat destruction, noise and air pollution, and oil spills. Potential solutions include using electric vehicles and renewable fuel sources, optimising transportation routes, promoting local sourcing, and improving logistics and supply chain efficiency.

2. Discuss the potential benefits of transitioning to electric delivery vehicles.

   Food packaging has environmental implications such as increased waste generation and resource consumption. Sustainable packaging options, such as using recyclable, compostable, or minimal packaging, can help reduce waste, conserve resources, and minimise the environmental impact of food packaging.

3. How can optimising delivery routes using advanced algorithms help reduce fuel consumption and carbon emissions?

   Marketing plays a significant role in driving consumer demand and influencing food choices. It can promote sustainable food choices by raising awareness, promoting eco-friendly products, and providing transparent information. However, marketing practices can also hinder sustainability by promoting overconsumption, unsustainable practices, or misleading claims about product sustainability.

4. What ethical considerations should the grocery delivery service consider when making these changes?

   Strategies to reduce food waste and contribute to environmental sustainability at home include meal planning, proper storage and organization, creative use of leftovers, composting, and supporting food donation programs. These actions help minimise food waste, conserve resources, and reduce greenhouse gas emissions.

5. What other innovative approaches could the grocery delivery service explore to improve the environmental sustainability of their transportation system?

   Innovations and technologies in food processing, retailing, and food service can help minimise food waste and promote sustainability through automation, precision machinery, waste-to-energy technologies, repurposing food waste, inventory management systems, smart waste tracking, and food waste apps. These advancements improve efficiency, reduce overproduction, optimize inventory management, and facilitate the repurposing of food waste.

Case Study 3: Food Waste Reduction in Restaurants

A popular restaurant chain is committed to reducing food waste in their operations. They want to implement strategies to better manage their food inventory, reduce overproduction, and repurpose leftover ingredients. They are considering implementing inventory management software, donating surplus food to local charities, and creating new menu items using food that would otherwise go to waste.

Questions:

1. What are the environmental challenges associated with food waste in restaurant operations?
    - Food waste contributes to landfill waste, emitting greenhouse gases like methane, which is a potent contributor to climate change.
    - Producing food that goes to waste involves the unnecessary consumption of resources like water, energy, and agricultural inputs.
    - Wasted food requires land for its production, leading to the use of additional land and natural resources.
    - The disposal of food waste can contaminate soil and water, affecting local ecosystems and biodiversity.
2. Discuss the potential benefits of implementing inventory management software in reducing food waste.
    - Software can track ingredient inventory levels, enabling better planning and reducing the risk of overstocking or understocking.
    - Software can analyse historical data and trends to make accurate predictions about demand, allowing restaurants to order and prepare the right amount of food.
    - With accurate inventory information, restaurants can reduce overproduction, ensuring that food is prepared and served in optimal quantities.
    - By monitoring inventory, restaurants can prioritise the use of ingredients nearing expiration, reducing the likelihood of spoilage and waste.
3. How can food donation programs help minimise food waste and contribute to sustainability?
    - Donating surplus food instead of discarding it reduces the amount of food that ends up in landfills, thereby reducing greenhouse gas emissions.
    - Donated food can provide nourishment to individuals and communities in need, helping combat food insecurity.
    - By donating food, restaurants demonstrate their commitment to social and community well-being, fostering a positive reputation and social impact.
    - Diverting edible food from waste means conserving the resources (water, energy, and labour) that went into producing that food.
4. What ethical considerations should the restaurant chain consider when managing food waste?
    - The restaurant chain should consider the impact of their food waste on the community and the well-being of individuals who may be food insecure.
    - Communicating honestly with customers about their efforts to reduce food waste and the methods used to repurpose or donate surplus food.
    - Ensuring that surplus food is distributed equitably to those in need, considering factors such as accessibility, cultural preferences, and nutritional requirements.
    - Engaging with local charities, food banks, and community organizations to develop effective food waste reduction strategies that align with their values and needs.
5. What other innovative approaches could the restaurant chain explore to further reduce food waste and promote sustainability?
    - Analysing customer preferences, portion sizes, and ordering patterns to develop menus that minimise food waste and optimise ingredient usage.

- Implementing smart waste tracking systems to monitor and analyse food waste patterns, identifying areas for improvement and setting waste reduction goals.
- Implementing on-site composting systems to divert non-edible food waste and kitchen scraps from landfills and create nutrient-rich compost for gardening or local agriculture.
- Partnering with local farmers or food producers to repurpose or utilise food waste in innovative ways, such as creating value-added products or animal feed.
- Educating customers about food waste reduction, portion control, and the importance of sustainable consumption through signage, menu information, or social media campaigns.

Case Study 4: Sustainable Food Choices

A group of friends are passionate about promoting sustainable food choices among their peers. They are organising an event to raise awareness about the environmental impact of food consumption and encourage individuals to make more sustainable food choices. They plan to showcase plant-based alternatives, locally sourced ingredients, and the benefits of reducing food waste.

Questions:

1. What are the environmental benefits of choosing plant-based alternatives over animal-based foods?

   Plant-based alternatives generally have a lower carbon footprint compared to animal-based foods, as the production of meat and dairy involves significant energy consumption, deforestation, and methane emissions from livestock.
   Plant-based alternatives require less water compared to animal agriculture, which demands substantial water resources for livestock hydration and feed production.
   Plant-based alternatives use land more efficiently, as meat and dairy production require large areas of land for grazing and feed crops. Choosing plant-based options helps conserve land and reduce deforestation.
   Plant-based alternatives help protect biodiversity by reducing the destruction of natural habitats caused by animal agriculture.

2. Discuss the advantages of sourcing ingredients locally in terms of reducing the carbon footprint of food.

   Sourcing ingredients locally minimises the need for long-distance transportation, which reduces carbon emissions associated with food transportation. Local sourcing supports shorter supply chains and decreases the reliance on fossil fuels.
   Locally sourced ingredients often undergo shorter travel times, preserving freshness and nutritional value. This can contribute to better-tasting food and a higher nutrient content.
   Choosing local ingredients supports local farmers and businesses, contributing to the local economy and promoting food security within the community.
   Local sourcing fosters a sense of connection to the region's food producers, allowing consumers to learn about the farming practices and build relationships based on trust and transparency.

3. How can individuals reduce food waste in their daily lives, and what impact does this have on sustainability?

   Planning meals in advance helps individuals buy only what they need and reduces the likelihood of food waste. Practicing portion control and being mindful of serving sizes can also prevent leftovers from being discarded.
   Storing food properly, using airtight containers, and keeping track of expiration dates can help extend the shelf life of ingredients and reduce the chances of food spoilage.
   Finding creative ways to use leftover food can minimize waste. Leftovers can be transformed into new meals, used as ingredients in other dishes, or frozen for later consumption.
   Composting food scraps can divert organic waste from landfills, reduce methane emissions, and create nutrient-rich soil for gardening.
   Individuals can donate surplus food to local food banks or community organizations, ensuring that edible food doesn't go to waste and helps those in need.

4. What ethical considerations should individuals consider when making sustainable food choices?

Considering the ethical treatment of animals in food production, individuals can choose plant-based alternatives or opt for meat and dairy products from sources that prioritize animal welfare.
Supporting fair trade and ethically sourced products ensures that farmers and workers are treated fairly and paid a living wage.
Being aware of food equity issues and supporting initiatives that promote access to healthy and sustainable food for all individuals, regardless of socio-economic background.
Choosing food options that minimize environmental impact and promote sustainability aligns with ethical considerations, as it contributes to preserving ecosystems and reducing resource consumption.

5. What other innovative approaches could the group explore to promote sustainable food choices among their peers?

Organise interactive cooking workshops that focus on plant-based or sustainable recipes, teaching participants how to prepare delicious and environmentally friendly meals.
Partner with local restaurants to create special menus or events that highlight sustainable and locally sourced dishes, exposing a wider audience to sustainable food choices.
Develop educational materials, such as brochures or videos, to raise awareness about the environmental impact of food consumption and provide practical tips for making sustainable food choices.
Initiate or participate in community gardening projects, encouraging individuals to grow their own food and connect with nature while promoting sustainable practices.

Organise food waste reduction challenges among peers, encouraging individuals to track their food waste and find creative ways to minimise it, with prizes or incentives for participants.

Case Study 5: Recycling and Repurposing Food Waste

A community organisation is implementing a food waste recycling and repurposing program in their local area. They collect food waste from households, restaurants, and supermarkets and convert it into compost for community gardens. They also repurpose surplus food by creating packaged meals for those in need.

Questions:

1. What are the environmental benefits of recycling and repurposing food waste?

By diverting food waste from landfills, it reduces the production of methane, a potent greenhouse gas that contributes to climate change.
Recycling and repurposing food waste reduce the need for virgin materials, such as synthetic fertilizers or packaging, resulting in resource conservation.
Composting food waste creates nutrient-rich compost that enriches soil, improves its structure, and promotes sustainable gardening practices.

2. Discuss the challenges and potential solutions for collecting and managing food waste from various sources.

Managing logistics, including separate collection containers, transportation, and scheduling pickups.
Contamination and odour control can also be a challenge.
Establish partnerships with waste management companies, educate participants about proper waste separation, implement odour control measures, and invest in adequate storage and processing facilities.

3. How can composting food waste contribute to sustainable gardening and soil health?
Compost adds organic matter, nutrients, and beneficial microorganisms to the soil, improving its fertility and structure.
Compost helps the soil retain water, reducing the need for irrigation and conserving water resources.
Composting reduces the reliance on synthetic fertilisers, promoting more sustainable agricultural practices.

4. What ethical considerations should the community organisation consider when implementing the recycling and repurposing program?

Ensure equitable access to the benefits of the program, such as fresh produce or packaged meals, within the community.

Establish protocols to handle and manage donated food with care, ensuring confidentiality and respecting the dignity of food donors.

Maintain transparency in program operations, communicate outcomes and impact, and establish accountability measures to ensure ethical and efficient program management.

5. What other innovative approaches could the organization explore to further reduce food waste and maximize its environmental impact?

Conduct educational initiatives to raise awareness about food waste prevention, including meal planning and proper storage.
Establish partnerships to redirect food waste as animal feed, creating a closed-loop system.
Explore opportunities to recover and repurpose food waste into energy sources or bio-based materials.

Organise cooking demonstrations, workshops, or awareness campaigns to actively engage residents and businesses in reducing food waste.

Summary Activity

Food Processing and Manufacturing, Retailing and Consumption & the Environment

What is the main idea about this key knowledge & key skill? (Two or three sentences in your own words)	
The main idea of the key knowledge and key skills is the environmental effects of various stages of the food system in Australia, including food processing and manufacturing, retailing, consumption, and disposal/recycling. It focuses on the impacts of activities such as food packaging, transportation, marketing, retailing, and food service on the environment. The key skills associated with this topic involve evaluating the contributions of innovations and technologies to food security in terms of ethics and sustainability, as well as different issues and assessing potential pathways to improve environmental sustainability within the food systems.	
What are some innovative approaches and technologies being implemented in Australia to address energy and water consumption challenges in the food system?	
Energy	Food companies are investing in renewable energy sources, such as large-scale solar power systems, to reduce their reliance on non-renewable energy. Businesses are implementing energy-efficient lighting, motors, and refrigeration systems to optimise energy consumption. Technology is being utilised to convert organic waste into renewable energy.
Water	Food processing companies are implementing water recycling and reuse systems. Food processing facilities are adopting water-efficient equipment and processes to conserve water.
Identify three environmental concerns that relate to the use of packaging.	
The extraction and processing of fossil fuels, such as crude oil that are used to create packaging materials contribute to the release of significant greenhouse gases.	
The production of packaging materials is energy-intensive, further contributing to global warming. Energy consumption during the manufacturing phase mainly comes from non-renewable sources, which also contribute to our carbon footprint.	
Packaging materials produce hazardous gases and chemicals when degrading in landfill sites. These toxic emissions can contribute to the greenhouse effect, contaminate groundwater supplies and pollute the soil.	
Provide two examples of environmentally sustainable packaging and describe each.	
Food Processing and Manufacturing	Edible packaging, as the name suggests, refers to packaging materials that are safe for consumption.
Food Retail and Service	Compostable packaging is designed to break down in an industrial compost centre, not people's compost systems in their backyards.

Identify three environmental concerns that relate to the transportation of food.	
Crude oil used in the production of fuel is extracted from the Earth and underground supplies at sea. Drilling these areas to obtain oil can destroy natural ecosystems.	
Diesel and petrol are derived from fossil fuels and non-renewable resources such as crude oil. These fuels emit carbon dioxide and pollution into the atmosphere, which increases global warming.	
Food is usually transported in massive vehicles; the bigger and heavier the transport vehicle, the more emissions are released.	
Provide two examples of how to reduce the impact of transportation on the environment.	
Food Processing and Manufacturing	Using electric trucks to transport food may help decrease the environmental impact of food transportation.
Food Retail and Service	Offering grocery and meal-kit delivery is how food retailers can help reduce the impact of transporting food on the environment.
Identify three environmental concerns that relate to the marketing of food.	
Traditional forms of marketing such as print media contribute to deforestation and waste, while also using energy and resources in their production and distribution	
Marketing plays a substantial role in driving consumerism. By creating demand for new products, it encourages overconsumption, leading to increased production, resource use, and waste.	
Marketing can encourage unsustainable practices either by promoting products with high environmental footprints or by misleading consumers into believing a product is sustainable when it is not.	
Provide two examples of how to reduce the impact of marketing on the environment.	
Food Processing and Manufacturing	Packaging is an essential aspect of food marketing, and many companies are exploring sustainable options such as compostable packaging or minimal packaging strategies.
Food Retail and Service	The marketing of food can adopt sustainable practices in various ways, with technology playing a crucial role to communicate with customers about product information.
Identify two environmental concerns that relate to food consumption.	
Different foods carry different environmental impacts. Diets high in meat have more of a negative impact on the environment than plant-based diets.	
Processed foods tend to have more of an environmental impact due to the energy, water and resources used in their production.	
Provide two examples of how to reduce the impact of food consumption on the environment.	

A dietary shift towards more plant-based or flexitarian diets (a predominantly plant-based diet with occasional meat consumption) can lessen the environmental impact of our food consumption.
Planning meals in advance, preparing a comprehensive shopping list, and minimising the number of shopping trips can reduce the carbon emissions tied to sourcing our food.
Identify three environmental concerns that relate to food disposal or recycling and repurposing.
Developing landfill sites requires clearing land, leading to habitat loss, land degradation, and reduced biodiversity.
Resources used in food production, such as energy, fertilisers, pesticides, and water, are wasted when food ends up in a landfill.
Transporting waste to landfill sites consumes fuel and releases additional carbon dioxide and pollutants into the environment.
Provide two examples of how to reduce the impact of food waste on the environment.

Food Processing and Manufacturing	CSIRO and Fresh Select have partnered to establish a new food manufacturing company, Nutri V. They use advanced food processing techniques to convert vegetables that would typically be discarded for not meeting retailers' quality standards into nutritious vegetable powders.
Food Retail and Service	Automation in food processing can help streamline operations, reduce overproduction, and ensure consistency, thereby reducing waste. For example, Marley Spoon, a meal kit provider in Australia, uses automated production lines to pre-portion ingredients, reducing the risk of overproduction and waste.
Consumption	Store fruits and vegetables properly to increase their lifespan. Some fruits and vegetables produce gases as they ripen that can cause other produce to spoil faster.

Exam Preparation

Multiple-Choice Questions (5 marks)

Choose the response that is correct or that **best answers** the question.

1. When food that is not consumed is thrown away, what else could potentially be wasted?

   a. Money

   b. Water

   c. Energy

   d. All of the above

   The correct answer is D. All the above.
   Money: Discarding unconsumed food means wasting the money spent on purchasing that food.
   Water: The production and processing of food require significant amounts of water. When food is wasted, the water used in its production also goes to waste.

   Energy: Growing, harvesting, processing, packaging, and transporting food all require energy. When food is wasted, the energy expended throughout the food supply chain is also wasted.

2. Which statement is incorrect?

   a. Landfills can create dangerous levels of gas emissions

   b. Leachate, the liquid mass produced in landfills, has the potential to contaminate groundwater supplies.

   c. Rotting fruit in landfill produces methane gas as a result of lack of oxygen and sunlight.

   d. Methane gas produced in landfills is less potent than carbon dioxide.

   The correct answer is D. Methane gas produced in landfills is less potent than carbon dioxide.

   This statement is incorrect because methane gas is more potent as a greenhouse gas than carbon dioxide. Methane has a higher global warming potential. It traps heat more effectively in the atmosphere, contributing to climate change.

3. Melbourne-based company has introduced an edible coffee cup made from coconut oil, flour, oats, sugar, water, and wheat. The cup remains firm for about 40 minutes when filled with coffee and can break down in a garden or home compost system if not consumed within 2 weeks.

   Identify the option that raises a valid concern regarding the development of products like the Edicup and the environment:

   a. The amount of energy used to make the Edicup contributes to the use of fossil fuels and contributes to global warming.

   b. The Edicup is made from edible material that could be used to feed people impacted by food security.

   c. The Edicup reduces the use of single-use plastic cups, reducing plastic waste.

   d. The Edicup provides a unique and enjoyable coffee-drinking experience.

   The correct answer is A as it specifically addresses the concern regarding the energy used in the manufacturing process and its contribution to fossil fuel usage and global warming, which is directly related to the development of products like the Edicup and their environmental impact.

   Answer B is more focused on potential implications for addressing food security rather than environmental factors.

   Answer C highlights a positive aspect of the Edicup, which is its potential to reduce plastic waste by replacing single-use plastic cups. It is not a valid concern related to the environmental impact of the Edicup's development.

   Answer D is incorrect as it does not raise any concerns about the environmental impact of the Edicup's development.

4. Study the data in the table below:

Emission factors for freight by transport mode (kilograms of CO_2eq per tonne-kilometre)		
Transport Mode	**Ambient transport (kg CO_2eq per tonne-kilometre)**	**Temperature-controlled transport (kg CO_2eq per tonne-kilometre)**
Road Transport	0.2	0.2 to 0.66
Rail Transport	0.05	0.06
Sea/ Inland Water Transport	0.01	0.02
Air Transport	1.13	1.13

(Ritchie, H., 2020. Whether food travels by sea or air makes all the difference. *Our World in Data.*

Zheng, S. S., 09. *RMIT University, Misconceptions of food packaging aggravates food waste problem.* [Online] Available at: https://www.rmit.edu.au/news/all-news/2023/may/food-waste [Accessed 11 July 2023].

Refer to the data provided in the table and select the food product that is the most sustainable based on the given emission factors for freight by transport mode?

a. Fresh vegetables transported by road in temperature-controlled containers.

b. Fresh fish transported by rail in ambient conditions.

c. Frozen meat transported by sea/inland water in temperature-controlled containers.

d. Fresh fruits transported by air in ambient conditions.

The correct answer C.

Frozen meat transported by sea/inland water in temperature-controlled containers. Based on the given data, sea/inland water transport has the lowest emission factor per tonne-kilometre for both ambient transport (0.01 kg CO_2eq) and temperature-controlled transport (0.02 kg CO_2eq). Therefore, transporting frozen meat by sea/inland water in temperature-controlled containers would result in the least environmental impact compared to the other options.

5. How can the use of QR codes on food packaging contribute to the reduction of global warming?

a. Manufacturers could include information on QR codes, such as recipe ideas, that they might normally include on leaflets, thereby reducing the amount of print material generated and lowering carbon emissions from production and disposal.

b. QR codes can provide information about nutrition, which may help consumers make healthy food choices.

c. QR codes provide an opportunity to incorporate additional information on food packages that they would normally not give to consumers.

d. Manufacturers could include videos from their social media platforms via QR codes, thereby reducing their advertising costs.

The correct answer is A. Manufacturers could include information on QR codes, such as recipe ideas, that they might normally include on leaflets, thereby reducing the amount of print material generated and lowering carbon emissions from production and disposal. This answer highlights the potential environmental benefit of using QR codes on food packaging by reducing the need for printed materials and, consequently, lowering carbon emissions associated with their production and disposal.

The wrong answers to the question are options b, c, and d. These options do not directly address how the use of QR codes on food packaging can contribute to the reduction of global warming.

Short Answer Questions (15 marks)

Question 1 (3 marks)

"Recent Research by RMIT University revealed most Australians think food packaging waste is a bigger environmental issue than food waste – but the opposite is true.

Zheng, S. S., 09. RMIT University, Misconceptions of food packaging aggravates food waste problem. [Online] Available at: https://www.rmit.edu.au/news/all-news/2023/may/food-waste [Accessed 11 July 2023].

Outline three ways that consumers can reduce the amount of food they waste. 3 marks

Some suggested answers are recorded below:

- They can practice meal planning and smart shopping.
- They can ensure proper storage and organisation.
- They can follow the "first in, first out" principle.
- They can practice portion control.
- They can creatively utilise leftovers.
- They can compost food scraps.
- They can donate excess food.
- They can educate themselves.
- They can reduce impulse buying.
- They can spread awareness.

Question 2 (4 marks)

The food retail or service sector refers to businesses that sell and provide food to consumers. This includes grocery stores, restaurants, cafes, and food delivery services.

a. Explain why food might be wasted during food retail and the service component of the food system. 2 marks

b. Describe what could be done to overcome the issue identified in part a. 2 marks

Any of the following responses could have been provided.

Explain why food might be wasted during this component of the food system.	*Describe what could be done to overcome these issues.*
Sometimes retail food shops might miscalculate their stock needs and order too much food. They might throw out food because it goes off because customers do not purchase it.	To overcome this, retailers can use computer programs to analyse data to determine what stock they need. To overcome this, retailers could use stock rotation practices (first in, first out).
Packaging defects or damage during transportation, storage, or handling can result in food waste. If packaging is compromised, products may spoil or become unattractive to consumers.	Retailers can work closely with suppliers to ensure proper packaging standards, improve handling procedures, and implement quality control measures to minimise packaging-related waste.
In the food service sector, plate waste occurs when customers leave uneaten food on their plates. Inadequate portion control and oversized servings contribute to this issue.	To tackle plate waste, establishments can offer flexible portion sizes, encourage customers to order based on their appetite, and provide options for taking leftovers home.

Inefficient storage and handling practices can lead to early food spoilage. Factors such as poor temperature control, inadequate rotation of perishable items, and insufficient monitoring of expiration dates can contribute to waste.	Implementing proper storage protocols, training staff on food safety and handling practices, and regularly monitoring inventory to identify and prioritise items nearing expiration can help reduce food spoilage and waste.

Question 3 (4 marks)

A food processing company that makes vegetable-based chips wants to minimise the environmental impact of its packaging. The company also has a zero "food waste policy," which aims to minimise food waste and efficiently use resources.

a. Explain what the company could do to ensure that its food packages are sustainable. 2 marks

Any of the following responses were accepted:

- The company may use recyclable, compostable, or biodegradable materials sourced from renewable resources. This decision will reduce the overall carbon footprint and promote eco-friendliness.
- This can involve creating packaging sizes that match the product volume and minimising excess space so that more products can be transferred at once.
- They could use efficient sealing methods to prolong shelf life, reduce spoilage and reduce food wastage.

b. Explain what the company could do to ensure it meets its "zero food waste" policy. 2 marks

Any of the following responses were accepted:

- Establishing partnerships with local food banks, charities, or organizations can facilitate the donation or redistribution of surplus food. Instead of discarding excess or unsold products, the company can redirect them to those in need, reducing food waste and contributing to community support.
- The company can develop new product lines by using vegetable peelings or other by-products as ingredients. For example, they can explore producing fruit jams or pastes by incorporating the peelings from fruit in their chip flavours.

Question 4 (4 marks)

Provide two environmental reasons why an increasing number of consumers choose to supply their own reusable containers and shopping bags when doing their grocery shopping.

Reason One

- By using reusable containers and bags, they can actively contribute to reducing the consumption of single-use plastics, preventing them from entering landfills and polluting the environment.
- By using reusable containers and bags, consumers can reduce their carbon footprint by reducing the need for manufacturing and transportation associated with disposable alternatives.
- Single-use packaging and bags require resources for their production, including water for manufacturing processes and fossil fuels for energy. By opting for reusable options, consumers decrease the demand for resource-intensive manufacturing and contribute to resource conservation.

Reason Two