Unit 1.1.6

Industrialisation, Technologies and Globalisation

Key Knowledge and Key Skills

Key Knowledge 1.1.6

The effect of industrialisation, technologies and globalisation on food availability, production and consumption and the implications for health.

Key Skills 1.1.1

Explain factors that have influenced the emergence of distinctive food cultures and cuisines throughout the world.

Key Skills 1.1.4

Research and explain key historical factors and developments in global food production systems.

Key Skills 1.1.5

Identify foods that can be traced back to early cultures and through practical activities demonstrate, observe and critique their uses and adaptations in contemporary recipes.

Key Skills 1.1.6

Undertake practical activities to analyse the origins and cultural roles of food.

V.C.E. Food Studies Study Design p. 13 and 14

Key Terms and Definitions

Agrarian is a term used to describe land that is used for agriculture.

An **agricultural revolution** occurs when farming techniques change significantly within a relatively short period of time.

Industrialisation is a term used to describe the time when farming changed from being focused on primary agriculture to one based on manufacturing goods.

The **industrial revolution** was from around 1760 to 1840, when a significant amount of manual labour was replaced by mechanised mass production.

Preservation is the term used to describe the treatment and handling of food that slows down spoilage and prevents the multiplication of food poisoning bacteria.

Technology describes any practice where knowledge and skills are used to make something practical and/or resources are invented to solve problems.

Industrialisation, Technologies, and Globalisation

Industrialisation

Industrialisation is a term used to describe the time when the focus of farming shifted from primary agriculture to manufacturing goods. The industrial revolution occurred from around 1760 to 1840. This period was characterised by a change from small-scale farming to one dominated by industry and machinery. The agricultural revolution occurred just before the start of the industrial revolution.

The Effect of Industrialisation on Food Availability and Production

From the time that agriculture began until the early 1700s, people lived in agrarian societies. Agrarian societies consisted of groups of people in villages or towns where just enough food was produced to feed their people.

The way people farmed, however, changed during industrialisation. The industrial revolution marked an era where fewer people were required on farms to produce food, and goods were less likely to be made by people in small villages. Instead, food and goods were produced using machinery in factories in the city. These factories enabled much larger amounts of food products and household goods to be made. Many people who once worked on farms or in small villages were forced to move to cities in search of work. Many of these people ended up working in factories.

Land Enclosures

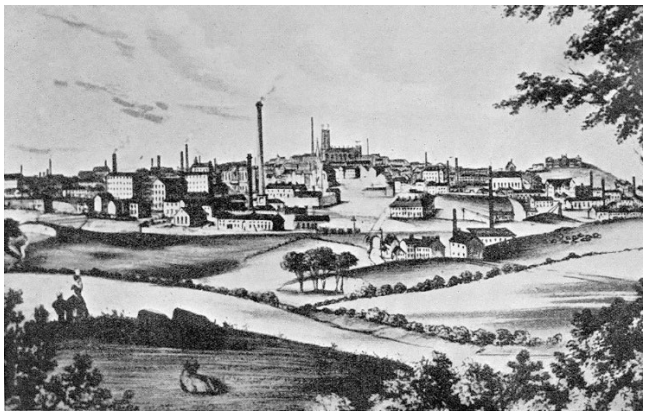
While the industrialisation revolution was beneficial in some ways and helped contribute to the world we know today, it negatively impacted many people, particularly poorer farmers.

Before the industrial revolution, people were permitted to farm small strips of land owned by wealthy landowners. However, around the time of the industrial revolution, wealthy landowners no longer allowed people to do this. Instead, each landowner combined all their land to create one large area, which would enable them to produce more crops at a more economical cost. This practice was called enclosure.

Enclosures resulted in many farmers that previously worked the land for themselves now farming it for the wealthy landowners, often for a meagre wage rather than for profit. Many farmers were unhappy and left to seek work in larger cities.

Other farmers found themselves without work because the increasing use of agricultural inventions meant that their labour was no longer needed; machines instead of people were being used to do the work. These farmers also had to move to the cities to find work in the newly established factories. However, city life was not perfect either; very soon, the cities became polluted and overcrowded. Factory working conditions were dangerous, and people, even young children, worked long hours and were poorly paid.

The land enclosure boundaries can be seen in the image below.



Industrialisation; 19th c. town in Lancashire, England

Child Labourer in city factory.

Technologies

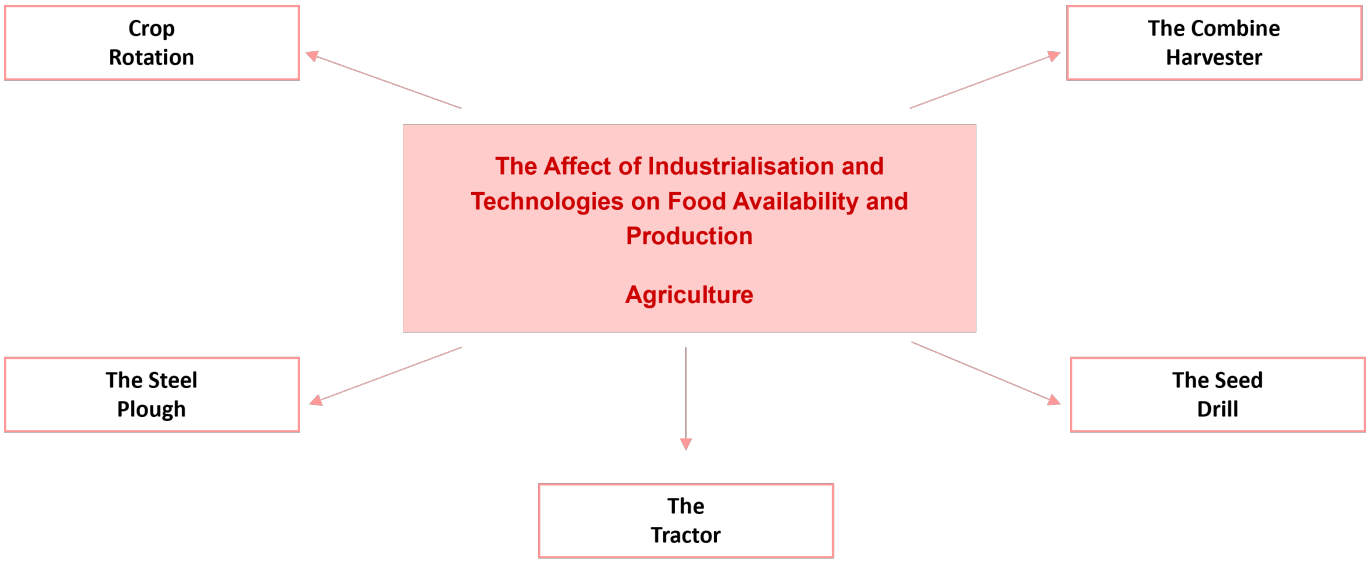
Technology describes any practice where knowledge and skills are used to make something practical and/or resources are invented to solve problems. It involves using innovation to modify resources or the environment to help humans meet their needs and/or wants. New inventions and technological innovations changed how farmers farmed and contributed to the industrial revolution. Industrialisation and the advancement of technology resulted in various technical devices being used in food production.

Watch this video to develop further understanding of industrialisation: https://youtu.be/3Efq-aNBkvc or https://youtu.be/xLhNP0qp38Q

The Effect of Technologies on Food Availability and Production

Agriculture

The mind map below highlights some of the technologies developed due to industrialisation, making farming less labour intensive and increasing the amount of food produced.



Crop Rotation

Before the industrial revolution, two- and three-year crop rotations were used by farmers. During the agricultural revolution, a landowner, Charles Townshend, introduced a new type of crop rotation system to England that was already revolutionising the agricultural industry in Holland. This was called the four-year crop rotation system. In this system, fields were divided into four, and four different types of produce were grown in each field. After each season, farmers would move one crop into the next field and so on. Planting different plants in each field in cycles improved the nutritional quality of the soil and prevented weeds and pests from spoiling the crops. However, not just any crops could be planted; a particular variety and sequence were required. For example, after harvesting a crop that absorbed nitrogen from the soil, farmers needed to plant a crop that gave nitrogen back to the soil, for example, a legume.

In England, farmers were encouraged to plant wheat in the first field, clover in the second, oats or barley in the third, and turnips or swedes in the fourth. Turnips were a fast-growing crop that tolerated Britain's cold climate. Turnips were used as feed for animals in winter because they were considered an undesirable vegetable for people at the time, often referred to as 'food for peasants' but highly suitable as animal feed. Clover, a type of legume, was used in the system because it added nitrogen back to the soil. Animals would graze on the clover and produce good quality manure, which fertilised the field.

Before the agricultural revolution, farmers produced enough food to feed themselves with little, if any, food leftover. Changes in how food was produced during the agricultural revolution meant that much larger volumes of food could be produced. The fact that more food was being produced resulted in a population increase. These people were then employed in the factories during the industrial revolution.

Watch this video to learn more about crop rotation and land enclosures: https://youtu.be/pIJSisZ23p4

The Combine Harvester

This piece of machinery completed the three necessary functions of harvesting a grain – reaping (collecting the crop), threshing (removing the edible part of the grain from the stalk it has grown on), and winnowing (removing the grain from the chaff).

Watch this video to find out how a modern combine harvester works: https://youtu.be/KwQKKaZzrK4

The Seed Drill

This agricultural machine could drill a hole, drop a seed, and cover the seed in one action. This made the planting process much quicker and easier.

Watch this video to discover more about the seed drill: https://youtu.be/Ofw5-YafPnc

The Steel Plough

This plough had a steel blade and was easier to use than the traditional wooden plough, which was challenging to manoeuvre.

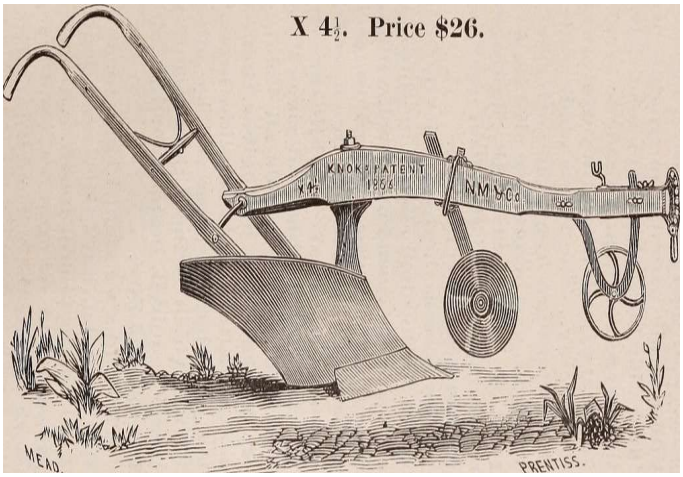
Watch this video to discover more about the invention of the steel plough in 1837: https://youtu.be/Gfhrnx6FYv8

Tractor Machinery

A tractor is a powerful piece of machinery used at low speed to pull heavy pieces of equipment. Early tractors were used to assist in the cultivation of crops. The first steam-powered tractor was developed in 1869.

Watch this video to find out how the tractor changed the world of agriculture: https://youtu.be/sqK8Q2Y5ZvM

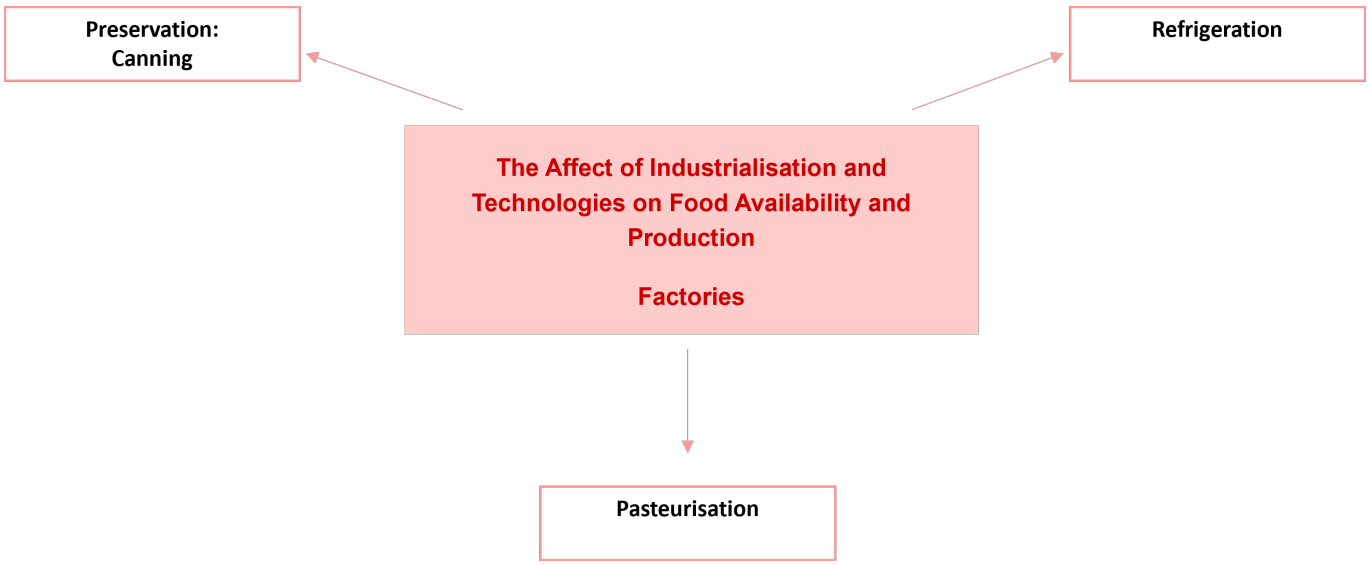
Advertisement for seed drill.



Advertisement for a type of steel plough.

Factories

The mind map below highlights the various technologies that were further developed due to industrialisation, which facilitated food production in factories and increased food availability.



Canning and Preservation

Advances in agriculture resulted in more food being produced for a rising world population. However, an additional problem arose; some countries were farming too much food, and it was going off before it could be distributed to people. People, therefore, began preserving food to keep food for longer.

For a long time, people had been preserving food by drying, freezing, salting, and smoking it; however, canning became the first major industrial form of food preservation. Canning preserves the food by using heat to kill food poisoning bacteria; the can is then sealed once the oxygen inside has been removed.

Canning was first developed in 1809 by a French man, Nicolas Appert. At this time, Napoleon (a French military leader who became an Emperor) offered a cash reward to anyone who could invent a way for food to be preserved for his army to eat. Appert won the money for discovering that heating food in sealed glass bottles preserved it. Over the years, the process of canning was further refined. During the industrial revolution, this form of preservation became popular. Companies such as Nestlé and Heinz began developing new canned products and exciting new food labels.

Watch this video to discover more about canning: https://youtu.be/5jSXPK73pps and https://youtu.be/68y6y8sN4bY

Refrigeration

The rate of bacterial growth and spoilage in food slows dramatically when stored at a low temperature. The people of ancient civilisations preserved and kept their food cold in snow and ice or cool places such as caves. Others stored their food in nearby lakes, streams, and wells.

In the 1700s, people started using ice boxes to store their perishable foods. As the name suggests, an icebox was a box with a block of ice that kept high-risk foods, like ham, in the icebox cold.

An early refrigeration system was developed in the late 1740s by William Cullen, a Scottish professor. In 1805, the first refrigerator was designed but wasn't built until 1844. Refrigerators continued to be developed, and by the late 1800s, the meat and brewing industries widely used refrigeration. However, refrigerators were not widely available in homes until the 1920s.

Watch this video to find how refrigerators developed over time: https://youtu.be/Bm9fjlYbwhc

Pasteurisation

We discussed earlier that Appert discovered that heating foods in sealed glass bottles preserved them. Appert thought the lack of oxygen in the jar killed the pathogens present; however, it was heating the contents that killed the disease-causing bacteria.

In 1864, Louis Pasteur, a French scientist, discovered that heating beer to a specific temperature for a short time killed the microbes that made beer go bad. The process would come to be known as pasteurisation. Over time, beer, wine, milk, and other foods and liquids would be pasteurised, increasing the shelf-life of the products and making more food available to more people.

Watch this video to find out how pasteurisation was first discovered: https://youtu.be/0OmWbRKW4K8

The Effect of Globalisation on Food Availability, Production, and Consumption and the Implications for Health

Globalisation is the term used to describe the spread of people, products, information, ideas, and jobs across cultures, countries, and international borders. Globalisation has changed the type of food available to people. Aircraft, automobiles, steamships, the rail network, and improved roads have helped move cuisines, food products, ideas, equipment, and even utensils from one area to another. Other innovations, such as telephones and the internet, have also enabled food to be transported around the globe more efficiently.

Watch this video to further your understanding of globalisation: https://youtu.be/dD_vyptah-g

Food Availability

Globalisation has played a significant role in changing the type of food available for people to eat. People now consume ingredients and foods from all over the world. In Australia, Mexican tacos have become popular, Italian pizza is a typical take-away food, and Asian stir-fries have become a quick and easy weeknight meal. Even one of Australia's all-time favourites, the chicken schnitzel, has European origins. As a result of globalisation and the movement of people worldwide, we now have a greater variety of ingredients and cuisines available.

Globalisation has also enabled people to access foods that may not be in season in their location. Some people are concerned that transporting food from one place to another increases carbon emissions, which can impact global warming and climate change.

Food Production and Consumption

Globalisation has increased the amount of food available worldwide and changed how it is produced. Many years ago, families raised chickens and grew fresh produce in their backyards. Swapping produce with their neighbours for foods they did not grow was commonplace. People knew how their food was grown, how the soil was nourished, and how the pests were kept away. They also made a lot of their food from scratch and knew the ingredients used to make it. The industrialisation of the food industry has resulted in an abundance of food being processed outside the home. People are not as informed of the ingredients and the quantities of these ingredients used in processed foods. Many processed foods contain high amounts of fat, salt, sugar, and very little dietary fibre. This raises concerns about the impact of the food we now eat on our health.

Unfortunately, globalisation has also negatively impacted the type of food available in developing countries. Some fast-food chains, such as McDonald's and KFC, are establishing a marketplace in poorer countries. The diets of many people living in these countries are often already inadequate. The consumption of fast food, high in saturated fat, salt, and sugar, further contributes to their poor health. This makes them susceptible to dietary-related diseases such as cardiovascular disease, type 2 diabetes, and some cancers, as well as conditions like obesity and being overweight.

Watch this video to find out more about the impact of fast food on people's diets in developing countries, and some of the measures being taken to address the issue: https://youtu.be/fJGPM94iKKQ

Written Activity One

Choose Your Own Adventure ~ Food Item

Choose one of these key foods:

- ☐ Eggs
- ☐ Fruit (of choice)
- ☐ Grain (of choice)
- ☐ Legume or nut (of choice)
- ☐ Meat (of choice)
- ☐ Vegetable (of choice)

Select one of these:

- ☐ Globalisation
- ☐ Industrialisation
- ☐ Technology

Select one of these:

- ☐ Availability
- ☐ Consumption
- ☐ Production

Your task is to create a fact sheet or develop a presentation about your chosen key food and how each of the factors you selected impacted the key food.

For example, you may choose to research how globalisation has impacted the availability of rice. Alternatively, you may choose to investigate how industrialisation has impacted how we consume chicken.

Written Activity Two

Is Globalisation of the Food System a Good Thing?

Is globalisation of the food industry good or bad for people?

When you think about this question, consider not only how globalisation of the food industry makes your life better or worse, but reflect on how it impacts people from other countries.

Conduct some further research about the positive or negative impact the globalisation of the food system has had on people worldwide.

You may like to use these resources as a starting point.

https://theconversation.com/the-global-food-system-still-benefits-the-rich-at-the-expense-of-the-poor-81151

https://youtu.be/VcL3BQeteCc

Once you have conducted some research, complete the sentence stems below.

The impact of globalisation on the food systems has been good because…
An example of this is when…
The impact of globalisation on the food systems has been negative because…
An example of this is when…
In summary, globalisation has had more of a *positive/negative (circle one)* impact on our food system because…

Written Activity Three

Impact of Current Technology

Rapid advances in technology have had a huge impact on the availability of food, as well as how it is produced and consumed.

Conduct some research to find out three ways that technology positively and/ or negatively impacts food availability, production, and consumption today.

These URLs may be a good starting point.

- https://www.techrepublic.com/article/10-ways-technology-is-changing-our-food/
- https://www.forbes.com/sites/nicolemartin1/2019/04/29/how-technology-is-transforming-the-food-industry/?sh=1d0d0e0120a3
- https://easternpeak.com/blog/how-technology-is-transforming-the-food-industry/
- https://techraptor.net/guides/8-ways-technology-is-changing-our-food-habits
- https://idealnutrition.com.au/how-does-technology-influence-eating-habits/
- https://scoopempire.com/three-ways-technology-has-changed-the-way-we-eat/

The effect of technology	How has technology had a positive impact?	How has technology had a negative impact?
Availability		
Production		
Consumption		

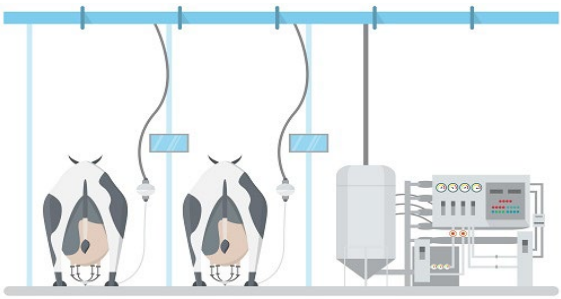
Practical Activities

Practical Activity: Can You Tell the Difference?

Technology has had a significant impact on the availability and production of a variety of food products. Milk is an example of a food that is now more widely available and consumed due to technology.

Milk can be purchased in many forms.

Many people believe they can tell the difference between different types of milk. What about you? Can you tell the difference?



In this practical activity, you will research how technology is used to make various types of milk, anaylse the chemical and physical properties of milk, and decide which one you prefer to use in cooking and consumption.

Part A: Research

For each milk type below, outline how technology is used to collect, produce and/or package the milk.

Type of milk	How is technology used to collect, produce and/or package this milk?
Fresh homogenised Milk	
Fresh unhomogenised Milk	
Evaporated Milk	
Ultra-high treated (UHT) Milk	
Dehydrated Milk	

Part B: Time to taste

Conduct a sensory analysis of the different samples of milk listed below.

- Fresh Homogenised Milk
- Fresh Unhomogenised Milk
- Evaporated Milk
- Ultra-high treated milk
- Dehydrated milk

Describe the sensory characteristics of each type of milk.

Guess which type of milk you think each sample is.

Sample	Appearance	Texture	Aroma	Taste	Ranking	What type of milk do you think this is?
1						
2						
3						
4						
5						

Which sample did you like the best? Why? Which sample did you like the least? Why?

Part C: The Big Reveal

Your teacher will reveal which milk was which.

Part D: Time to Compare

Conduct a nutritional analysis of the different kinds of milk.

Study the packaging of each type of milk and **record** the nutritional content of each milk per 100ml.

Nutritional Content of milk per 100ml									
Sample	**Energy**	**Protein**	**Fat, total**	**Fat, saturated**	**Carbohydrate**	**Carbohydrate - sugars**	**Dietary Fibre**	**Sodium**	**Calcium**
Fresh Homogenised Milk									
Fresh Unhomogenised Milk									
Evaporated Milk									
Ultra-high treated milk									
Dehydrated milk									

Part E: Evaluation

Were you surprised by the results from the sensory and nutritional analysis?

How might the sensory and nutritional analysis results change your selection and consumption of milk in the future?

How has this activity helped you understand the impact technology has on food production and availability?

Extension: Try making this batch of Portuguese custard tarts with your top-rated milk.

https://www.taste.com.au/recipes/portuguese-custard-tarts-2/1rivYY0V

Summary Activity

Answer the questions below.

What is the main idea about this key knowledge and key skills?
Write two or three sentences in your own words.
What is meant by the term 'technology'?
Provide examples of how technology has been used to increase food availability.
Outline how the industrial and agricultural revolutions changed food production.
Summarise how globalisation has impacted the foods available to us today.
Outline how globalisation has changed the way we consume food.

Exam Preparation

Multiple-Choice Questions (5 marks)

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

1. The seed drill was beneficial to farmers because it:
   a. Enabled farmers to grow a variety of crops.
   b. Ensured a higher crop yield.
   c. Reduced the need for expensive irrigation systems.
   d. Saved farmers' time.

2. One positive impact of the land enclosures was:
   a. Farmers were no longer permitted to have farmland owned by wealthy landowners.
   b. Landowners were able to produce more crops at a more economical cost.
   c. Both a. and b.
   d. Many farmers had to leave to seek work in the city.

3. Pasteurisation increased food availability because it:
   a. Made food cheaper to purchase.
   b. Increased shelf life of foods.
   c. Made food taste better.
   d. Made food easier to store.

4. Technology has played a role in food production since the:
   a. Time of the hunter-gatherers.
   b. Agricultural revolution.
   c. Invention of computers.
   d. 1980's.

5. The practice of crop rotation is used to:
   a. Grow a specific crop.
   b. Keep soil fertile.
   c. Provide plenty of food for the community.
   d. Enable farmers to use less farming equipment.

Short Answer Questions (20 marks)

Question 1 (3 marks)

Section B: Short Answer Questions

Question 1

Identify one technological advancement in agriculture and explain how it has increased food availability. (3 marks)

Question 2 (3 marks)

Identify one technological advancement in factories and explain how it has increased food availability. (3 marks)

Question 3 (4 marks)

In the table below, identify one negative and one positive impact of the globalisation of food. (4 marks)

Negative	Positive

Question 4 (4 marks)

Outline how globalisation has changed the way we consume food. (4 marks)

Question 5 (2 marks)

Explain how improvements in transport over time have led to increased food availability. (2 marks)

Question 6 (4 marks)

Did the industrial revolution negatively or positively impact food production and availability?

Justify your opinion. (4 marks)

Exam Preparation

Multiple-Choice Questions (5 marks)

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

1. The seed drill was beneficial to farmers because it:
   a. Enabled farmers to grow a variety of crops.
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3. Pasteurisation increased food availability because it:
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4. Technology has played a role in food production since the:
   a. Time of the hunter-gatherers.
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   c. Invention of computers.
   d. 1980's.

5. The practice of crop rotation is used to:
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   b. Keep soil fertile.
   c. Provide plenty of food for the community.
   d. Enable farmers to use less farming equipment.

Short Answer Questions (20 marks)

Question 1 (3 marks)

Section B: Short Answer Questions

Question 1

Identify one technological advancement in agriculture and explain how it has increased food availability. (3 marks)

Sample answers are provided below:

Crop Rotation – A large field was divided into four sections; different crops were planted in each area, and one of the crops would put nitrogen in the soil. The crops would be rotated each growing season. This improved the condition of the soil and the quantity/quality of the crops.

The steel plough – This plough had a steel plough rather than a wooden one. This made it easier to move around. This made farming easier; more crops could be planted in less time.

The seed drill – This machine could drill a hole, drop a seed and cover the seed in one action. This made planting crops much easier and quicker. This enabled more food to be produced and available.

Question 2 (3 marks)

Identify one technological advancement in factories and explain how it has increased food availability. (3 marks)

Sample answers are provided below:

Canning and Preservation – The food in the cans were heated; this killed all the bacteria and created a seal that formed when the oxygen inside the can was removed. This allowed any surplus food to be preserved and available for later consumption and use.

Refrigeration was invented, first in the form of an icebox. These had a block of ice in them that kept food cold. The ice would need replacing when it melted. This helped to keep food at a colder temperature, and it wouldn't spoil as quickly. This meant it was available for longer.

Pasteurisation involves heating food to a really high temperature for a very short period of time to kill bacteria. This increased the shelf life of the food and meant it could be available for longer.

Question 3 (4 marks)

In the table below, identify one negative and one positive impact of the globalisation of food. (4 marks)

Negative	Positive
The more food is transported around the world; the more carbon emissions are being released, which causes global warming and climate change. Or Fruits and vegetables that are out-of-season can be transported worldwide. This means people may not consume a variety of seasonal produce. Seasonal produce is usually higher in nutrients and cheaper.	Globalisation has resulted in more food being transported and shared throughout the world. This has resulted in more diverse food being available to people. Or Globalisation has meant that people without food can now have it transported to them. This meanT that they might not have suffered from malnutrition.

Question 4 (4 marks)

Outline how globalisation has changed the way we consume food. (4 marks)

A long time ago, people grew a lot of their own produce. This meant they knew how food was grown and what was used when it was made.

People also may have swapped or traded fresh produce with their neighbours enabling us to connect with them.

Due to globalisation, we are less likely to grow our own food. We no longer really know what is used on the produce when it grows. We don't know how this might impact our health.

We also buy a lot of our food from supermarkets where food is transported, often over long distances. This means we lack a connection with the producer.

Question 5 (2 marks)

Explain how improvements in transport over time have led to increased food availability. (2 marks)

A range of vehicles can now be used to transport food, such as aircraft, trains, and ships. This means that more food can travel further distances – often quite quickly.

Some of these transport vehicles have refrigerators, meaning high-risk food can be transported further and for more extended periods. This has increased the amount of food available.

Question 6 (4 marks)

Did the industrial revolution negatively or positively impact food production and availability?

Justify your opinion. (4 marks)

The student must justify their response. They can decide whether to respond with a negative, positive or mixed response.

The industrial revolution had a negative impact on food production but a positive impact on availability.

People were no longer really growing their own produce. For this reason, they were not really aware of how safely their food was being grown and what chemicals were being used. This may have impacted their health negatively.

People had to begin buying food rather than trading or swapping produce within their communities. If they did not have enough money for food, then they may have experienced hunger.

On the other hand, industrialisation could have impacted food production positively. New preservation techniques like refrigeration, pasteurisation, and canning meant food would not spoil as quickly and could remain in better condition for longer. This meant it was available for longer.

It also meant that farm machinery was invented to make farming easier and quicker – with less labour. This resulted in more crops being grown to feed people and more food available.