

READING PASSAGE 1

You need to answer **Questions 1-13**, which are based on Reading Passage 1 on pages 2 and 3

Clarence Birdseye and the Development of Frozen Food

Born in 1886 in New York, the American naturalist Clarence Birdseye had an instinctive curiosity, a love of food, and a strong entrepreneurial streak. At the age of ten, he was hunting, selling live animals, and teaching himself taxidermy, the art of preserving and mounting the skins of animals. He studied science in college, but had to drop out because tuition was too expensive. Forced to support himself, he moved west, where he worked in Montana as an assistant naturalist, capturing small mammals to study the parasites that they often carried in their fur. Eventually, partly as a result of this research, the source of a prevalent disease was isolated.

Within a few years, Birdseye moved to the arctic tundra of Labrador, in what is now northern Canada, where he worked for several years as a fur trader. He spent much of his time among the local trappers who worked year-round in the icy wilderness, and he rode long journeys with a nine-dog sled to purchase goods that were exported to a company in New York. It appeared that Birdseye relished the challenge that came with the cold climate and rugged landscape of Labrador.

However, the food in Labrador left a great deal to be desired. The bleak climate meant that everything he ate during the winter was either from cans or frozen. When the frozen food was thawed, Birdseye found it to be tasteless. What's more, the texture of the food became mushy and unappealing. Other than fish, there were no fresh sources of food, so the naturalist took up ice fishing with some of the local Inuit people, carving holes in frozen lakes and casting a line for trout. With air temperatures so far below zero, a fish pulled out of the lake would freeze solid in a matter of seconds. But when he thawed out the frozen trout, Birdseye found it tasted far fresher than the usual food he was used to eating. Unwittingly, the young adventurer had made a powerful discovery. He would come to realize that the dramatic difference in taste was all due to the speed of the freezing process, or what we call 'flash freezing', and that by recreating the science, he could make high-quality frozen food.

In the first decades of the 20th century, the frozen-food business was considered to be the very bottom of the barrel. Frozen food was terrible. In fact, it was even banned in New York State prisons for being beneath the culinary standard of convicts. A key problem was that the food was being frozen at relatively high temperatures, often just a few degrees below freezing. A slow freeze allowed ice to form larger crystals that broke the membranes surrounding and protecting each of the cells within the food. When the food was defrosted, the ice crystals melted and the juice would leak out. But flash freezing avoided this problem, plus scientific advances had made it possible to artificially produce temperatures that were much like Birdseye had experienced in

Labrador. By the early 1920s, Birdseye had created a flash-freezing process using cartons of fish, stacked and frozen at minus 40 degrees Celsius.

Birdseye was also concerned about eliminating the little air pockets that in whole fish could harbor bacteria and lead to decomposition. So a key part of his original 1924 process called for removing the bones, which allowed the fish parts to be tightly packed into rectangular fiberboard boxes. Birdseye had to pioneer almost everything else in his process as well. This included inventing a glue for the packaging boxes to withstand the changes in temperature, as well as a waterproof ink for the labels. He found that just about anything he froze with his method — fruit, meat, vegetables — would be remarkably fresh after thawing.

Frozen food was still more than a decade away from becoming common in the average diet across the United States. This required a critical mass of freezers — in supermarkets and home kitchens — that wouldn't be available until the late 1940s. But Birdseye's experiments were so promising that in 1929, his company, General Seafood, was acquired by the Postum Cereal Company. His adventures in ice fishing had made him a multimillionaire.

In our current age of locally sourced food production, frozen food has fallen out of favor with the public. But the advent of flash-frozen food had a positive impact on the American economy and the health of everyday people. It extended distribution across the entire country so that fish caught in the North Atlantic could be eaten in distant cities like Denver or Dallas. And produce harvested in summer could be consumed months later. By the mid-20th century, frozen food was a worldwide phenomenon.

In fact, while nutritionists today would prefer we eat fresh food grown locally, they acknowledge the value of frozen food. And scientists at the University of Chester in England came to the same conclusion after performing tests on the nutritional value of frozen produce. They found in many cases that frozen fruits and vegetables are more nutritious and healthier than the regular unfrozen variety sold in stores. This is because the minute a fruit or vegetable is harvested, it begins to decay. But, as most frozen fruits and vegetables are flash-frozen within hours of their harvest, at their peak of ripeness, this locks in many of the important nutrients. Meanwhile, the unfrozen produce can undergo change while being transported thousands of kilometers over several days. In one report, the vitamin C content in raspberries frozen for a year was compared to that of unfrozen raspberries stored in a refrigerator for three days. Their levels of vitamin C were nearly the same.

Questions 1 – 7

Complete the notes below.

Choose **ONE WORD ONLY** from the passage for each answer.

Write your answers in boxes 1-7 on your answer sheet.

Clarence Birdseye and the Frozen Food Industry

Early adventures

- Birdseye grew up hunting and selling animals
- he left 1..... for financial reasons
- his work in Montana was a factor in finding the cause of a widespread 2.....
- he moved to Labrador, where he bought furs for a New York company
- he enjoyed the 3..... of living in such a harsh environment

A better way to freeze food

- Birdseye realised that the process of freezing and thawing food changed its taste and texture
- While fishing with the Inuit, he made a 4..... that could improve frozen food
- In the early 20th century, the quality of frozen food was so poor that even some 5..... couldn't serve it
- Birdseye found that when food was flash-frozen, the 6..... of the cells were kept intact
- Taking out bones from whole fish minimised the air content of the packaging
- Birdseye also created a new kind of 7..... and glue for packaging
- Because supermarkets and kitchens lacked freezers, frozen food was not part of the typical American diet before the late 1940s

Questions 8 – 13

Do the following statements agree with the information given in Reading Passage 1?
In boxes 8-13 on your answer sheet, write

TRUE	<i>if the statement agrees with the information</i>
FALSE	<i>if the statement contradicts the information</i>
NOT GIVEN	<i>if there is no information on this</i>

- 8 The public today has a positive view of frozen foods.
- 9 Most North Atlantic fish are caught during the summer.
- 10 Nutritionists and university scientists disagree about whether frozen food is beneficial.
- 11 Produce can lose nutrients soon after being picked.
- 12 Most produce that is going to be frozen is picked when it's perfectly ripe.
- 13 Raspberries are among the best sources of vitamin C.

