
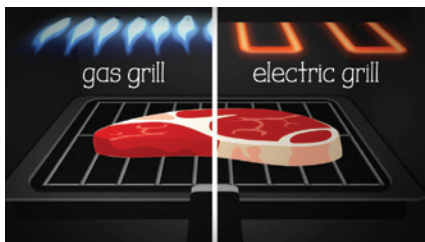
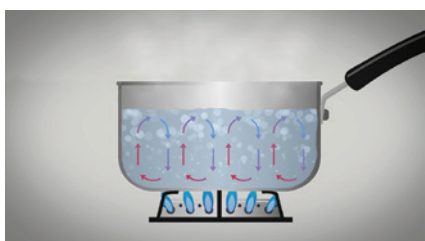


## Cooking of food and heat transfer

Below are two practice questions; the first question shows students responses and examiner feedback; the second question is for you to try yourself.

### Chapter 3: Practice question 1 (with student responses and examiner feedback)

a) Name the method of heat transfer shown in the diagrams below.

Image	Method of heat transfer
	
	
	

(3 marks)

b) Explain each method of heat transfer that has been identified in the table. (6 marks)

c) Explain the reasons why food is cooked. (9 marks)

### Responses parts a) and b)

The following responses were provided by students. One is a basic or low-level response and the other is a high-level response. The level and detail within the responses increases. More examples, with reasons, have been provided that allow students to achieve higher marks. The use of subject-specific language shows more informed understanding of the subject content.

#### Basic level response

Conduction - Heat is conducted from one molecule to another. (1 mark)

Radiation - Heat travels in waves or rays that heat up the foods. (1 mark)

Convection - Heat travels round liquids and air by convection currents. (1 mark)

#### Examiner feedback (3 marks)

One mark for each example as the student has understood the basic principles of how the heat is transferred.

## Cooking of food and heat transfer

### High level response

Conduction – Heat transferring through a solid object into food. Heat is conducted through a metal pan and through joints of meat as it roasts. Wood and plastics are poor conductors and metals are good conductors. (2 marks)

Radiation – Heat is transferred by infra-red waves which heat up whatever they come into contact with. Toasting bread and grilling bacon are examples of radiation. (2 marks)

Convection – Heat transferring through a liquid or air into the food, by convection currents. Hot air rises and cold air sinks, but in fan ovens the temperature is constant throughout. Boiling food in a pan and baking food in an oven are both examples of convection. (2 marks)

### Examiner feedback (6 marks)

Two marks for each of the above examples as the student has fully understood how the heat is transferred and is able to give practical examples to show the full extent of his/her understanding.

### Responses part (c)

The following responses were provided by students. The level and detail increases throughout.

#### Basic level response

Food is cooked for lots of reasons. Cooking makes it taste better for example cooked meat tastes better than raw meat. Cooking makes food look better for example cooked chicken has a brown skin and looks more attractive than raw chicken. Food is also safer to eat when it has been cooked as harmful bacteria have been killed. (3 marks)

#### Examiner feedback (3 marks)

The student has understood the question and has given the most obvious reasons why foods are cooked. Each reason has an example, which is good. To gain more marks, a wider range of examples should be given.

#### Medium level response

There are a number of reasons why we cook food. Cooking brings out the flavour of the food, for example, cakes and cooked meat. Some foods need to be cooked in order to kill the harmful bacteria, for example, chicken to destroy salmonella bacteria. Cooking can make food easier to eat, for example, raw potato is unpleasant but once it is boiled or baked, it is softer, has a better flavour and is easier to digest. Cooking, for example grilling, tenderises meat such as steak. Cooking foods also helps to give people more variety in their diets, for example eggs can be boiled, fried, poached or scrambled. (6 marks)

#### Examiner feedback (6 marks)

The student has listed several examples of why we cook food. There is a range of reasons and there are examples to accompany each reason. This is a good response and shows thorough understanding of the concepts.

### High level response

There are a variety of reasons why we cook food. These include destroying the food poisoning bacteria, for example, salmonella, contained in high-risk foods such as fish, poultry and meat. Other foods contain natural toxins that could be harmful if the food is eaten raw. An example is raw red kidney beans, which need to be boiled for 15 minutes. Canned kidney beans have already been cooked, thereby destroying the harmful bacteria. Cooking can also improve the shelf-life of the food, for example, ultra-heat treated milk and jams.

Cooking develops the flavours in foods in a number of ways. It concentrates and intensifies the flavour of foods by causing water to evaporate, for example, when roasting vegetables or caramelising sugar. Cooking also causes chemical reactions to take place in food mixtures, for example, when cooking cakes.

Another reason for cooking food is to improve the texture and appearance of food. For example, the cooking process gelatinises starches to thicken and soften food when cooking potatoes, rice or sauces. Cooking also softens vegetables to make them easier to eat, for example, carrots and swede. Meat is tenderised by cooking for example braising or roasting. A crisp texture is developed on the outside of certain foods when they are cooked, for example, when making chips or fish with a breadcrumb coating such as fish cakes and goujons.

Cooking foods can also be cooked in a variety of different ways to give people variety in their diets, for example, potatoes can be roasted, made into mashed potato, chips, boiled or baked, all of which give very different results. (9 marks)

### Examiner feedback (9 marks)

This is a very good answer. Most of the reasons why foods are cooked are included. Each reason has at least one example to show the extent of his/her understanding. Some good use of specialist terminology, such as 'gelatinisation'.

### Mark scheme

**For 13–18 marks:** The student has a **thorough** knowledge and understanding of heat transference methods and the reasons for cooking food. Several detailed explanations are given related to the reasons for cooking food and clear examples have been stated.

**For 7–12 marks:** The student has a **good** knowledge and understanding of heat transference methods and the reasons for cooking food. Some explanations are given related to the reasons for cooking food and examples have been stated.

**For 0–6 marks:** The student has a **basic** knowledge and understanding of heat transference methods and the reasons for cooking food. Limited explanations are given related to the reasons for cooking food with one or two examples stated.

## Cooking of food and heat transfer

### Points to consider:

- **Conduction:** this means transferring heat through a solid object into food
- **Convection:** this means transferring heat through a liquid or air into food
- **Radiation:** this means transferring heat by infra-red waves which heat up what they come into contact with food

### Reasons for cooking food:

- **To make food safe to eat**
  - Some foods must be thoroughly cooked to destroy the food poisoning bacteria they could contain.
  - Some foods contain natural toxins (poisons) which would be harmful if the food was eaten raw. Cooking destroys the toxins and makes the food safe to eat.
- **To develop flavours in the food**
  - Cooking develops flavour by causing chemical reactions to take place in the food
  - Cooking concentrates and intensifies flavour by causing water to evaporate
- **To improve the texture and appearance of food, and make it easier to eat, swallow and digest**
  - Cooking causes starch granules to swell, gelatinise and thicken or soften a food
  - Cooking softens the structure of the cells in vegetables to make them less bulky and easier to eat
  - Cooking tenderises meat. This means the cooking process softens the meat so that it is easy to chew and digest
  - Cooking turns raw doughs into risen, light-textured and crusty bread and bun products
  - Cooking melts fat and gives foods a smooth 'mouth-feel'
  - Cooking develops a crisp texture on the outside of some
- **To improve the shelf life of food**
  - Cooking destroys harmful micro-organisms such as bacteria and moulds, which preserves the food (makes the food last longer)
- **To give people a variety of foods in their diet**
  - Foods can be cooked in different ways to give variety, for example, potatoes

## Cooking of food and heat transfer

## Chapter 3: Practice question 2

- a) Which method of heat transfer is used when grilling food? (1 mark)
- b) Give one example of what happens to the following ingredients during the baking process.

<b>Protein</b>	
<b>Sugars</b>	
<b>Yeast</b>	

(2 marks)

- c) Give **two** reasons why food is cooked. (2 marks)
- d) Suggest a food that could be cooked by each of the following methods.

<b>Poaching</b>	
<b>Baking</b>	
<b>Steaming</b>	

(2 marks)

- e) Suggest ways to prepare and cook vegetables to reduce the loss of water-soluble vitamins. (6 marks)

## Cooking of food and heat transfer

## Chapter 3: Mark scheme for practice question 2

## Question

- a) Which method of heat transfer is used when grilling food? (1 mark)
- b) Give one example of what happens to the following ingredients during the baking process.

Protein	
Sugars	
Yeast	

(2 marks)

- c) Give **two** reasons why food is cooked. (2 marks)
- d) Suggest a food that could be cooked by each of the following methods.

Poaching	
Baking	
Steaming	

(2 marks)

- e) Suggest ways to prepare and cook vegetables to reduce the loss of water-soluble vitamins. (6 marks)

## Mark scheme

**For 5–6 marks:** The student shows a **very good** understanding of how the nutrients can be retained. Almost all of the points below have been included and examples from both aspects of the question have been included. The student is able to explain why the actions taken work.

**For 3–4 marks:** The student shows a **good** understanding of how the nutrients can be retained. The student is able to explain how to retain the nutrients and may give some examples of why these actions work.

**For 0–2 marks:** The student gives a **basic** response that may only cover one aspect of the question – preparation or cooking. The student has some understanding of how to retain the vitamins.

**Cooking of food and heat transfer****Points to include in the answer**

- a) Radiation
- b) Correct answers include:
- protein – denatures, coagulates
  - sugars – caramelize, melt and form syrup that softens the gluten
  - yeast – killed by the heat.

Only one example needed for each ingredient.

- c) Correct answers include:
- to give people variety
  - to improve the shelf-life of the food
  - to improve the texture and the appearance of the food
  - to concentrate and intensify the flavour of the food
  - to make the food safe to eat by destroying the food poisoning bacteria.

One mark for each correct answer

- d) Correct answers include:
- poaching – fish, eggs, fruit (for example, pears)
  - baking – cakes, breads, potatoes, biscuits, scones, pizzas, cookies, pastries
  - steaming – green vegetables, fish, chicken, sponge puddings, rice, dim sum, dumplings.
- e) Correct answers include:

**Preparation**

- Use a sharp knife when cutting, or tear the fruit or vegetable, as enzymes are released when the food is cut and these destroy the vitamin C.
- Use the fruit or vegetables when they are fresh as they contain more nutrients. Damage and bruising causes enzymes to be released, which destroy vitamin C.
- Prepare the food just before you intend to cook it as exposure to light and oxygen destroys vitamin B1 and vitamin C.
- Peel the skin thinly or do not peel at all as most of the nutrients are just under the skin.
- Do not soak, but wash under running water so that the water soluble vitamins do not leach out.

**Cooking**

- Use the minimum amount of water.
- Put the fruit or vegetables into water that is already boiling so that the water soluble vitamins are not lost in the water during the heating-up time.
- Boil quickly for a short period of time until the fruit or vegetables are cooked to reduce the loss of the heat-sensitive vitamins B and C.
- Use the cooking water in soups and gravies.