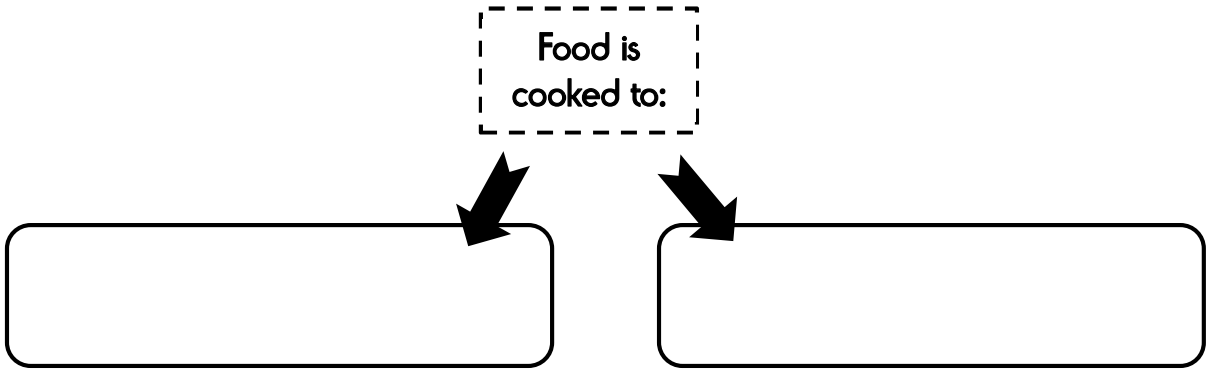
1. Food science: the reasons why food is cooked, heat transfer through cooking methods, how preparation and cooking methods affect the nutritional value and sensory properties of food

1) Complete the diagram below to show two reasons behind cooking food.



2) Identify the processes in which heat is transferred to food, and give an example of where each method is applied.

I can only work when water or oil is here…

I am _____

You use me to steam vegetables or boil eggs!

Examples:

I can work remotely, like a radio!

I am _____

Examples:

I need to be close to give you my warmth!

I am _____

Examples:

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3) Complete the table below to explain how cooking and preparation methods affect food. Use the key phrases provided below (you can use them multiple times). You can also write your own ideas.

prevents vitamin loss	leads to vitamin loss	allows cooking of delicate ingredients
low in calories	high in calories	good for people who want to lose weight
can lead to obesity	leads to enzymic browning	increases oxidation
is quick	is time-consuming	makes peeling easier
slows down oxidation	prevents enzymic browning	softens the proteins
makes the food easier to chew	creates a crunchy top	alters texture
softens texture	can't be used to prepare certain foods	

	Is good because…	**Is bad because…**
Steaming (cooking)		Can't be used to prepare certain foods
Boiling (cooking)		
Shredding (preparation)	Makes the food easier to chew, alters texture	
Deep-frying (cooking)		
Poaching (cooking)		Can't be used to prepare certain foods
Blanching (cooking and preparation)		
Baking (cooking)		
Braising (cooking)		
Marinating (preparation)		

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4) Below you can see various cooking methods.

Cooking methods:

braising	simmering	roasting	grilling	dry-frying	stir-frying	steaming

Choose those which:

i) Lower the amount of fat in foods

.....

.....

ii) Increase the amount of fat in foods

.....

.....

iii) Decrease the nutritional value of foods

.....

.....

iv) Preserve the nutritional value of foods

.....

.....

(You can use each method more than once, and you can also give your own suggestions.)

Exam-style Question



Identify **two** cooking or preparation methods and explain how they help to prevent vitamin loss.

(4 marks)

Extension Task

Take three potatoes and cook them using three different methods, e.g. boiling, frying and baking.

1) Measure the time needed to cook the potatoes.
2) Put them on a paper towel. What do you observe?
3) Assess the appearance, colour, flavour and texture of each of the potatoes.

Make sure the potatoes are the same size.

Use the Extension Task worksheet to help you.

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Extension Task worksheet



	Potato 1	Potato 2	Potato 3
Cooking method			
Cooking time			
Paper towel experiment observations			
Appearance			
Colour			
Flavour			
Texture			
Conclusions			

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1. Food science: the reasons why food is cooked, heat transfer through cooking methods, how preparation and cooking methods affect the nutritional value and sensory properties of food ■

1) Complete the table to explain why people cook food and give examples which justify your answer.

People cook food to…	An example of this is…

2) i) Explain the difference between convection, conduction and radiation.

……

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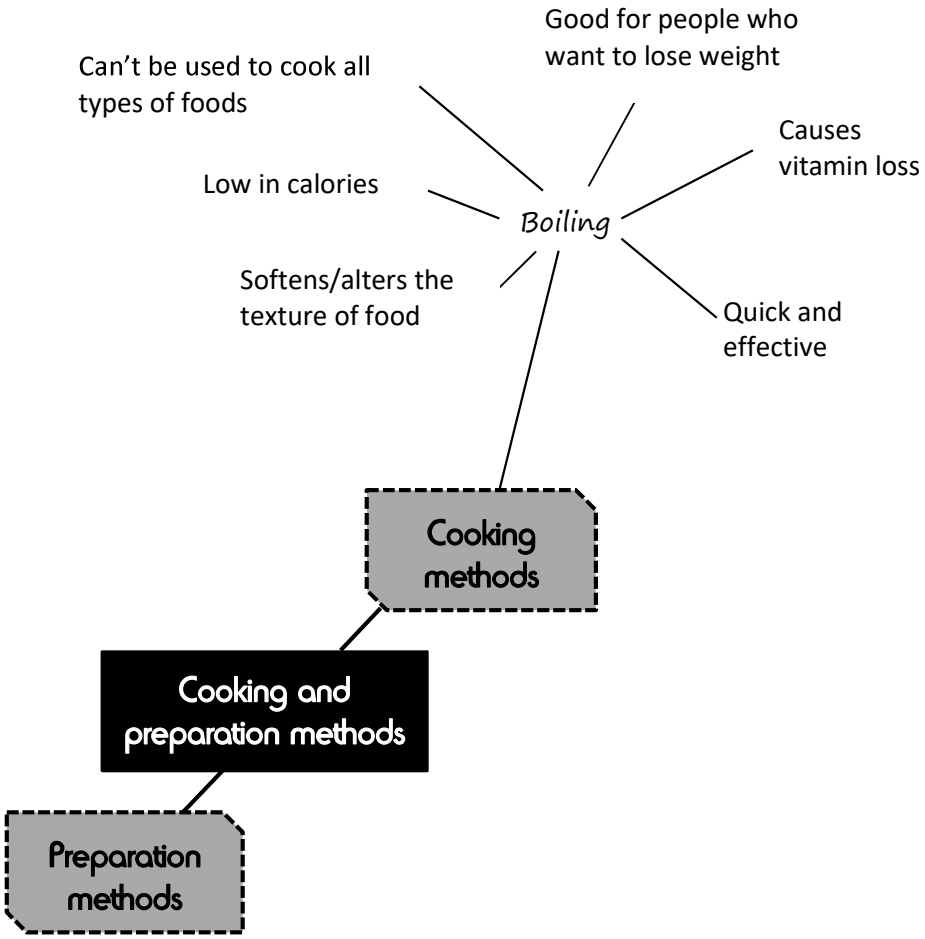
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ii) Identify which processes take place during the following cooking methods. For each process ticked, explain how/when it occurs.

Cooking method	Heat transfer method		Explanation
Baking an apple pie	Convection	☐	
	Conduction	☐	
	Radiation	☐	
Cooking soup	Convection	☐	
	Conduction	☐	
	Radiation	☐	
Frying chicken	Convection	☐	
	Conduction	☐	
	Radiation	☐	
Steaming vegetables	Convection	☐	
	Conduction	☐	
	Radiation	☐	
Grilling steak	Convection	☐	
	Conduction	☐	
	Radiation	☐	

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3) Complete the diagram to explain how cooking and preparation methods affect food.



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4) Explain how different cooking methods alter the nutritional value and fat content of foods.

Simmering: .....

.....

Braising: .....

.....

Roasting: .....

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Grilling: .....

.....

Dry-frying: .....

.....

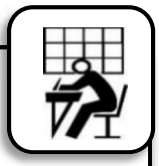
Stir-frying: .....

.....

Shallow-frying: .....

.....

Exam-style Question



Explain scientifically how vitamins can be lost when preparing and cooking food.

(4 marks)

Extension Task

Take five potatoes and prepare them using steaming, boiling, microwaving, shallow-frying and roasting.

- Make notes on how the cooking methods affect their appearance, colour, flavour and texture.
- How could you check the fat content of each of the potatoes?

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2. Food science: working characteristics, functional and chemical properties of carbohydrates, proteins and fats ●

1) Fill in the gaps in the text to explain what happens to proteins during cooking, using the keywords below.

air	gliadin	acid	gluten	plasticity	polypeptides
amino acids	foam	heat	coagulation	glutenin	denature

Proteins are large molecules built from _____. They are bound together in long chains of _____, which then twist and curl up to form specific proteins. If treated with _____ or _____, proteins _____.

_____ is a process in which proteins aggregate and form lumps. Proteins in flour, such as plain flour, contain _____ and _____. When mixed with water, they glue together and form _____. It has long elastic fibres which give the dough _____. If you whisk an egg white, you incorporate _____ into the mixture and _____ is created.

2) i) Identify the main processes which affect carbohydrates during cooking.

Sugars



Name of process:

Starch in bread



Name of process:

Starch in sauce



Name of process:

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ii) Explain the difference between gelatinisation and dextrinisation.

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3) Complete the sentences below to explain how fats act during cooking. Use the keywords below to help.

aeration	cream	water	spread and reshaped	shortening	gluten formation
emulsion	melting point	mayonnaise	batter	shortbread biscuits	ice cream	pastry

i) Fat mixed with flour leads to .....because

.....

This is used to prepare .....

ii) Fat mixed with sugar creates ..... due to the process called

..... This is used to obtain

.....

iii) Fats do not dissolve in .....Instead they create

.....Emulsions are used to prepare

.....

iv) Plasticity of fat means that it can be easily..... and that various fats have different..... This is used to cook

.....

4) Give an example of one dish in which:

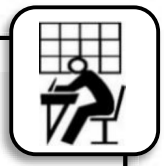
Dextrinisation takes place: .....

Gelatinisation of starch occurs: .....

Sugar caramelises: .....

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Exam-style Question



Crème brûlée is a classic dessert made of milk or cream, eggs and sugar.

Explain scientifically what happens to the proteins in the ingredients when cooking crème brûlée.

(4 marks)

Extension Task

Prepare a béchamel sauce and then explain:

a) How conduction and convection are applied to cook it

b) Why there is the need for agitation (stirring)

Use the Extension Task worksheet to help you.

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Extension Task worksheet



Béchamel sauce ingredients:

.....

.....

.....

Cooking of béchamel sauce step by step:

.....

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.....

Which step of cooking uses conduction?

.....

Which step of cooking uses convection?

.....

What happens to starch in the sauce?

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Why do I have to stir the sauce, and what would happen if I didn't?

.....

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2. **Food science:** working characteristics, functional and chemical properties of carbohydrates, proteins and fats ■

1) Explain what happens to proteins during the cooking and preparation of food, using the keywords below.

plasticity	foam	acid	gliadin	gluten	air
high temperature	polypeptides	coagulation	glutenin	amino acids	denature

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2) Complete the table below to explain how different methods of heat transfer work.

The process	Molecules affected	Conditions needed	Example of food in which it is used
Caramelisation			
Gelatinisation			
Dextrinisation			

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3) Explain how the chemical structure of fats defines their use in cooking.

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4) Explain why:

Bread turns brown when baked: .....

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Eggs set during boiling: .....

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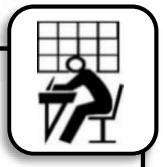
Sauce thickens during simmering: .....

.....

.....

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Exam-style Question



State **one** function of fat in each of the following dishes. Do not use the same function twice.

- Quiche Lorraine
- Mayonnaise

(2 marks)

Extension Task

Research information on food additives at **https://www.food.gov.uk/science/additives** and explain the need for the use of them in production of mayonnaise.

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3. **Food science:** working characteristics, functional and chemical properties of fruit and vegetables, and raising agents ●

1) Fill in the gaps in the text below using the keywords provided.

bananas	damage	enzymes	apples
colour	enzymic browning	nutritional value	potatoes

_____ is a process which takes place when plant cells are being destroyed. The _____ from the cells leak out and cause _____ to the surrounding tissues, which leads to a change of _____ and affects the _____ of the food. Some fruit and vegetables are especially prone to the process. These include _____, _____ and _____.

2) Complete the paragraphs below to indicate how raising agents work. You can use the keywords provided or your own answers.

air	carbon dioxide	chemical	mechanical
biological	whipped cream	bread	pancakes



..... raising agents work because .....

This is used to prepare.....



..... raising agents work because .....

This is used to prepare.....

Yeast

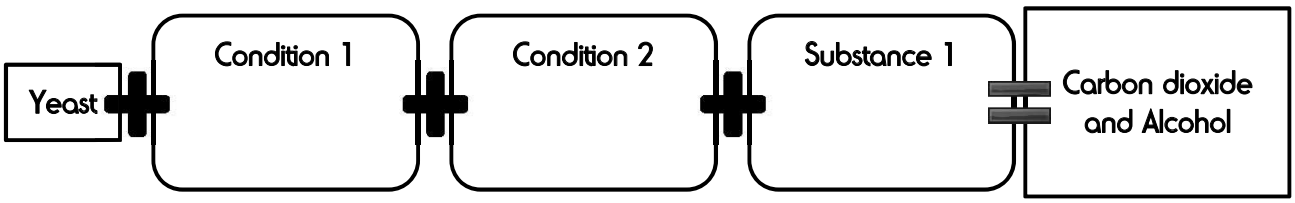


..... raising agents work because .....

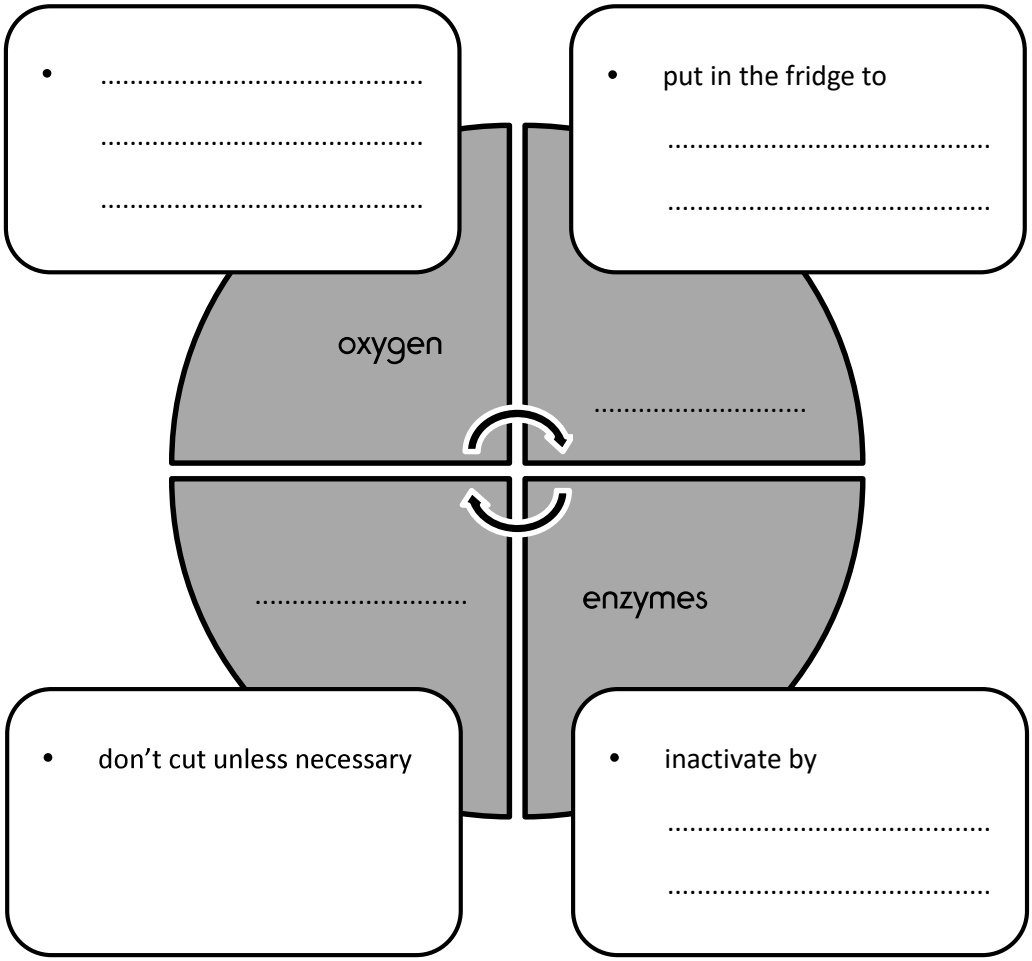
This is used to prepare.....

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3) Complete the equation below to explain the conditions needed for yeast to work properly.



4) i) Complete the diagram below to indicate the main factors that speed up the process of enzymic browning and ways to prevent them.



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ii) Oxidation is a process which affects foods that are exposed to air. Indicate two ways which help to protect food from oxidation.

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5) Fill in the gaps in the text below using the keywords provided.

chemical	soufflé	mechanical	yeast	whisking	facilitate
sodium bicarbonate	lighten	air	carbon dioxide	sieving	flaky pastry

Raising agents are used to _____ the mixture and _____ raising during cooking. Different raising agents are used for various purposes. _____ raising agents include baking powder and _____. Biological raising agents are _____. Both chemical and biological raising agents work by releasing _____ into the mixture, whereas _____ raising methods such as _____ or _____ work by incorporating _____ into the mass. Along with steam, they are used to cook such foods as _____ or _____.

Extension Task

Investigate the influence of diminution, time and temperature on the rate of enzymic browning of apples and potatoes. Use the worksheet on the next page to help you design the experiment. You can take pictures at every stage to help you assess the changes in colour.

Use the Extension Task worksheet to help you.

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Extension Task worksheet



	Freshly cut	After 30 minutes	After 60 minutes
Apple, peeled and cut in halves, room temperature			
Apple, peeled and cut in halves, in the fridge			
Apple, peeled and shredded, room temperature.			
Apple, peeled and shredded, in the fridge			
Potato, peeled and cut in halves, room temperature			
Potato, peeled and cut in halves, in the fridge			
Potato, peeled and shredded, room temperature.			
Potato, peeled and shredded, in the fridge			

How does temperature affect the rate of enzymic browning?

.....

.....

How does time affect the rate of enzymic browning?

.....

.....

How does diminution affect the rate of enzymic browning?

.....

.....

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3. **Food science:** working characteristics, functional and chemical properties of fruit and vegetables and raising agents

1) i) Explain what enzymic browning is.

.....

.....

.....

.....

.....

.....

ii) List three fruits and three vegetables that are especially prone to enzymic browning.

Fruits:

1. .....
2. .....
3. .....

Vegetables:

1. .....
2. .....
3. .....

2) Describe how raising agents work using the keywords below.

air	carbon dioxide	yeast	sodium bicarbonate	self-raising flour	whisk

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3) Explain why sugar is necessary for the proper growth of yeast.

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4) Complete the table below to indicate why enzymic browning takes place and ways of preventing it.

Factors causing and accelerating enzymic browning	Ways of preventing it

5) i) Explain what oxidation is.

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.....

ii) Indicate two ways of preventing oxidation in foods.

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6) Complete the table below to indicate foods in which different raising agents are used.

Raising agent	Used to prepare
Mechanical	
Biological	
Chemical	

Extension Task

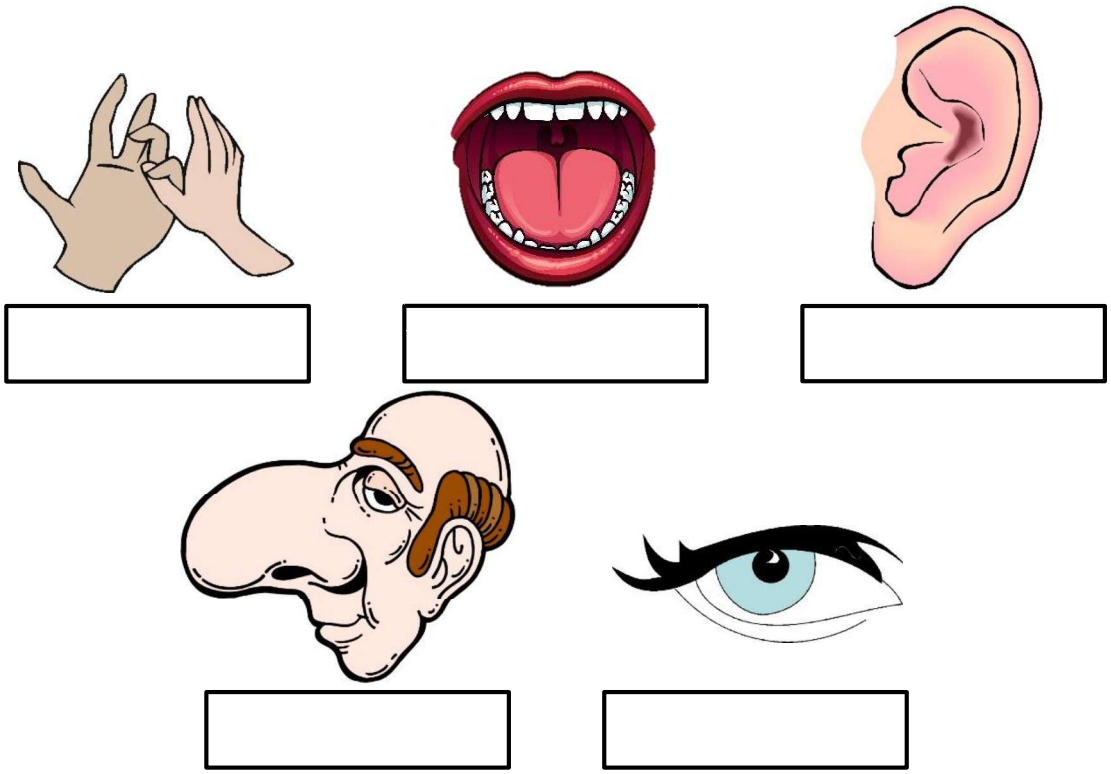
Investigate how various factors affect the rate of enzymic browning and oxidation in three different food products.

- What foods can you use in your experiment?
- What factors can you measure?
- How could you record your findings?

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4. Sensory properties

1) i) Identify the five senses.



ii) Explain why controlled conditions have to be assured for sensory testing. Provide one example of what has to be controlled.

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2) Match the beginning of the statement with the correct ending to discover what specific sensory tests are used for.

Preference tests are conducted	measures many features in one sample
The rating test	can be performed by unskilled testers
Grading tests are carried out	measures the strength of one feature in many samples
The ranking test	to find out whether a product is acceptable for the consumer
The profiling test	helps to find out the best sample
Hedonic ranking	to measure the strength of a specific feature of the given food

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3) Below is a list of various food products. Identify what taste each product provides.

i) **glucose**.....

ii) **sodium chloride**.....

iii) **vinegar**.....

iv) **coffee**.....

v) **mushrooms**.....

4) Using the keywords below, describe the changes that happen when food is cooked. Give examples to support your answer.

texture	appearance	colour	taste	sound	aroma

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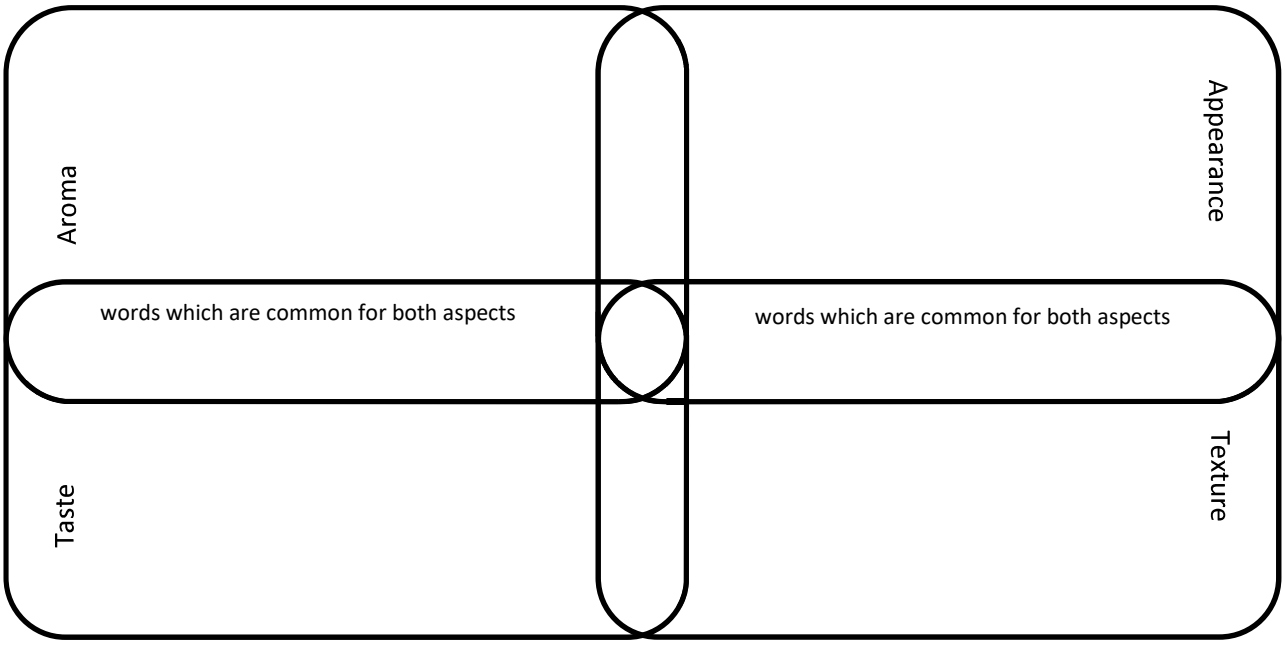
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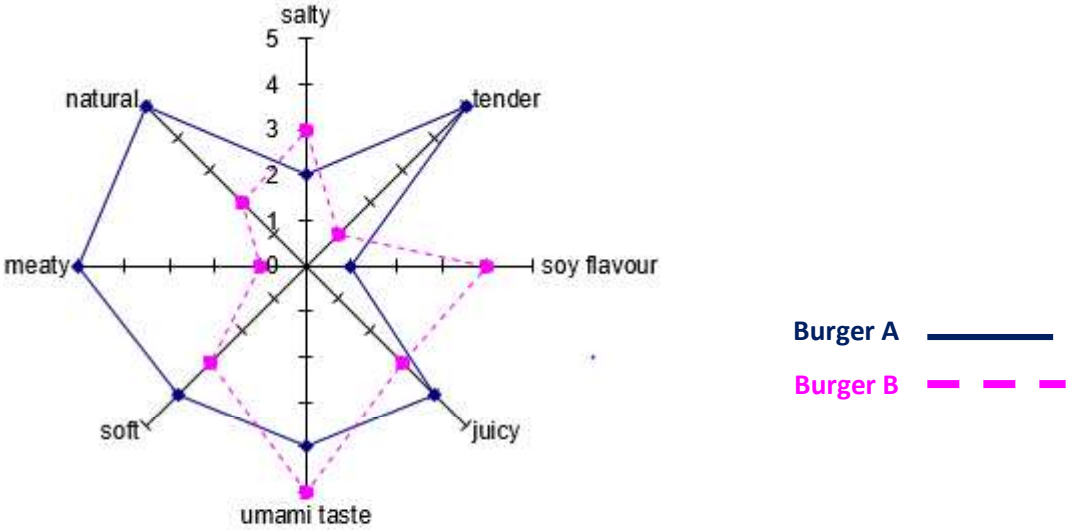
5) Complete the diagram below to identify three terms used to describe the different characteristics of food identified during a taste test. Note that some words can be used to describe two or more different aspects of food (e.g. 'zesty' can describe both the aroma and the taste).



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Exam-style Question

1) The diagram below shows the sensory profile of two types of soy burger.



a) State which burger obtained a better result.

(1 mark)

b) Identify **one** sensory aspect of the dish that needs improving, and describe how it could be improved.

(2 marks)

Extension Task

Prepare five samples of tomato soup containing different amounts of salt. Set up a taste panel for your family or friends and ask them to assess the samples using various sensory tests.

- What tests can you use?
- What features, other than saltiness, can you test?

Use the Extension Task worksheet to help you.

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Extension Task worksheet



Sensory evaluation 1

Method:.....

Feature tested: .....

Results:

.....

.....

.....

.....

.....

Sensory evaluation 2

Method:.....

Feature tested: .....

Results:

.....

.....

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.....

.....

Sensory evaluation 3

Method:.....

Feature tested:.....

Results:

.....

.....

.....

.....

.....

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4. Sensory properties

1) i) Identify the five senses.

1. .....
2. .....
3. .....
4. .....
5. .....

ii) Explain how to set up a taste panel.

.....

.....

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2) Decide whether the statements below are true or false, and then correct any marked as false.

- Preference tests are conducted to detect differences between two samples. TRUE or FALSE?

.....

- A rating test is an example of a preference test. TRUE or FALSE?

.....

- In the rating test, a profile star is drawn to identify the features of a food sample. TRUE or FALSE?

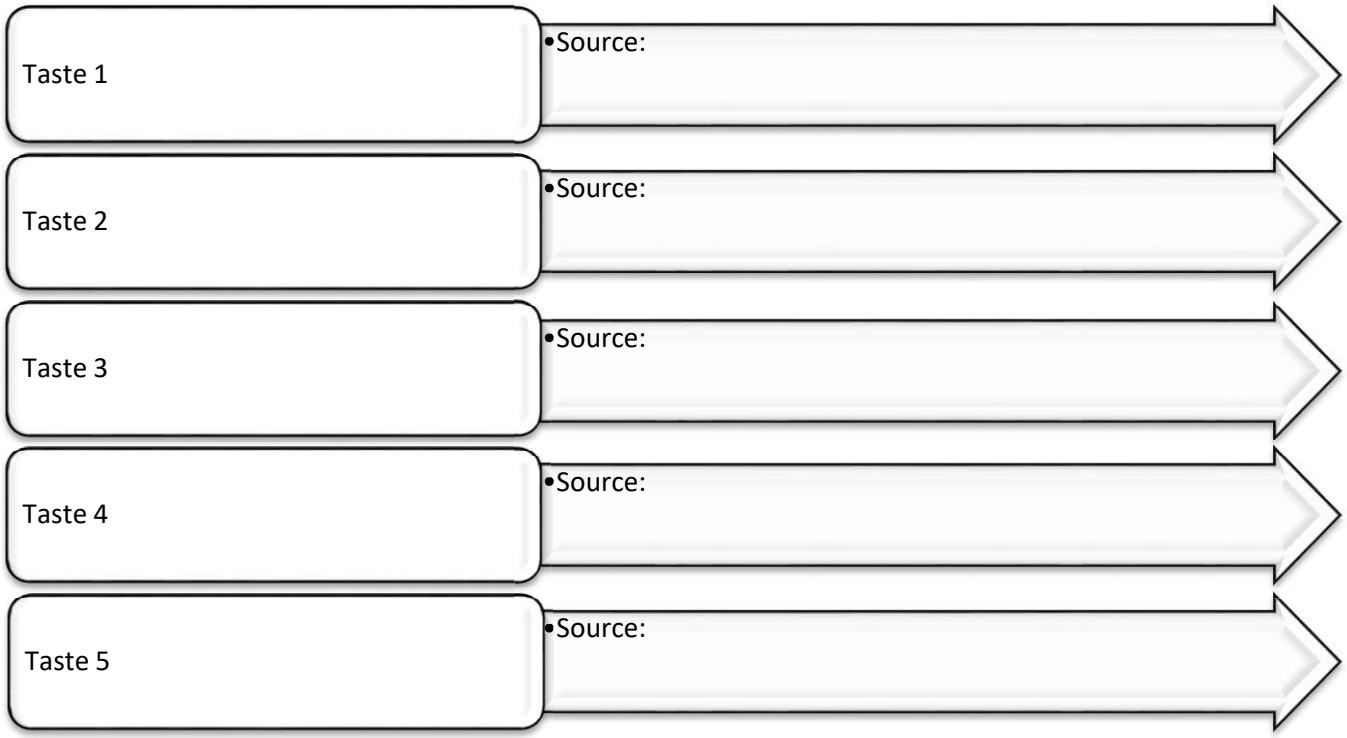
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- In the grading test a hedonic scale is used to assess the sample. TRUE or FALSE?

.....

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3) List the five tastes and provide a food source of each taste.



4) Describe the sensory changes that happen when food is cooked, providing an example of each.

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5) What words would you use to describe these foods? Annotate the images to list at least five words to describe their various sensory characteristics.



carbonated soda



chocolate with filling



corn nachos



fresh oranges

Exam-style Question

The chart below shows the taste test results for a sample of strawberry ice cream.

	Tester A	Tester B	Tester C
sweetness	3	2	2
creaminess	4	4	2
size of fruit chunks	5	5	1
fruitiness	4	5	4

a) Name the type of test which was used to assess the ice cream.

(1 mark)

b) Identify the scale that was used to carry out the test.

(1 mark)

c) Identify **two** conditions that have to be controlled during a tasting panel, and describe why each condition has to be controlled.

(4 marks)

Extension Task

Prepare five samples of a dish of your choice differing in the amount of salt/sugar or another ingredient. Set up a taste panel for your family or friends and ask them to assess the samples using various sensory tests.

Change the taste and aroma by replacing salt with herbs and spices, and conduct the evaluation again. Write an article on how salt can be replaced in meals and what the health benefits of doing this are.

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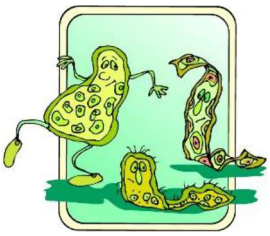
5. Food safety: conditions and control of microorganisms' growth, signs of food spoilage, helpful properties of microorganisms in food production

1) Complete the table below to indicate which microorganisms are good and which are harmful. You can use either the keywords provided or your own answers to structure your answer.

yogurt	bread	cheese	wine	beer	blue cheese
fermentation	alcohol	carbon dioxide	flavour	food spoilage	fruit
juice	milk	banana	grapes	tomatoes	

	Good	Harmful
Bacteria	Is good because…	Is bad because…
	Used to produce…	Occurs in…
Yeast	Is good because…	Is bad because…
	Used to produce…	Occurs in…
Mould	Is good because…	Is bad because…
	Used to produce…	Occurs in…

2) Complete the diagram below to indicate conditions for microorganisms' growth and high-risk foods.



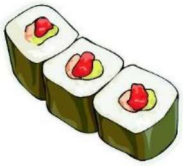
Microorganisms require the following conditions to grow:



- Time
-
-
-



Examples of high-risk foods include:



-
-
-
-
-

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3) Enzymes are biological catalysts usually made from protein.

i) Explain why the use of vinegar or lemon juice helps to prevent enzymic action.

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ii) Explain why blanching vegetables helps to prevent enzymic action.

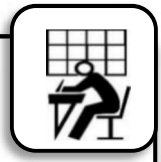
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4) There are different signs of food spoilage depending on the factors causing it. Match the factor to the food spoilage signs it can cause.

Enzymes	green or white furry coating formed on the surface
Mould	sour flavour, foam on top, air bubbles in the food
Yeast	browning of food, ripening of bananas

Exam-style Question



1) Microorganisms can cause food spoilage.
Suggest **two** ways in which the growth of microorganisms can be controlled.

(2 marks)

Extension Task

Natural decay is often caused by loss of water from plant and animal cells. Carry out an experiment to investigate how natural decay works. Take an apple, a plum and an orange and observe the physical and chemical changes in them over time. Remember not to eat them at the end of the experiment – they won't taste very good and they may make you ill.

Use the Extension Task worksheet to help you.

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Extension Task worksheet



Step 1:
Take an apple, a plum and an orange. Wash them. Measure their diameters and weigh them. Take a photograph of each piece of fruit. Then, place them in a dark, dry place, e.g. in a kitchen cupboard.

Step 2:
After one week, measure and weigh the pieces of fruit again. Take photographs and put away the fruit for another week.

Step 3:
After another week, measure and weigh the pieces of fruit again. Take a final set of photographs and record your findings in the table below.

		Apple	**Plum**	**Orange**
Size	Fresh			
	After 1 week			
	After 2 weeks			
Weight	Fresh			
	After 1 week			
	After 2 weeks			
Appearance	Fresh			
	After 1 week			
	After 2 weeks			
Texture	Fresh			
	After 1 week			
	After 2 weeks			

Attach the photographs you have taken to this worksheet to support your findings.
Conclusions – how natural decay affects fruit:

.....

.....

.....

.....

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5. **Food safety:** conditions and control of microorganisms' growth, signs of food spoilage, helpful properties of microorganisms in food production

1) Describe the ways in which microorganisms may be beneficial, using the keywords below.

yeast	bacteria	mould	bread	cheese
yoghurt	beer	species	pathogenic	

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2) i) Complete the table below to indicate the risk factors that allow bacteria to grow and give examples of foods that may be affected by bacteria.

Factors needed for microorganisms' growth	High-risk foods
	Foods that are reheated repeatedly
High protein content	

ii) List three pathogens that occur in food and cause food poisoning.

1. .....

2. .....

3. .....

3) i) Explain what enzymes are, using the keyword: 'catalyst'.

.....

.....

ii) Give two ways of controlling enzymic action in foods.

1. .....

.....

2. .....

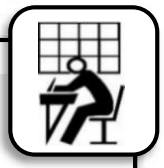
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4) Complete the table below to explain how microorganisms cause food spoilage and foods affected by it.

Microorganism	Sign of spoilage caused by given microorganism	Example of food affected
Enzymes		
Mould		
Yeast		

Exam-style Question



1) Microorganisms are used in the production of multiple food products.
Explain scientifically how bacteria work in the production of yoghurt.

(4 marks)

Extension Task

Carry out an experiment to investigate how natural decay affects food. During preparation, consider the following questions:

- What food products can you assess?
- What features/characteristics will you observe?
- How are you going to measure these features?
- How are you going to record your findings?

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6. Food safety: buying and storing food

1) Complete the table to explain why proper storage conditions are important in preventing food spoilage and poisoning.

Storage conditions	Is important because…
Keeping food covered	
Choosing the correct temperature	
Keeping the storage dry and mould-free	
Choosing the correct light	

2) Place the products listed in the boxes below in the correct areas in the fridge to avoid cross-contamination, storing food at the wrong temperature and spoilage of food.

milk, yogurt and dairy	eggs	cold cuts	fruit and vegetables	juice	ice cream
soup	cottage cheese	oil	frozen peas	ketchup	raw meat

Top shelf:

Middle shelf:

Bottom shelf:

Drawers:

Freezer:



Door:

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3) i) Match the storage conditions with the correct temperatures.

Freezing	100 °C
Chilling	-18 °C
Cooking and reheating food	0–5 °C
Boiling water	75 °C

ii) What is the range of 'danger zone temperatures'?

.....

iii) Ambient storage means that food is stored at _____ temperature. This is usually at the temperature between _____. This falls in the range of _____.

4) Food labelling is helpful when buying and storing food.

i) Give one example of a statement which you might find on a food label to identify the storage conditions required for that food.

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ii) Using the keywords provided, explain the difference between a 'use by' and a 'best before' date.

Quality	Safety	Fish	Dairy	Dry	Long-lasting	Fresh

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5) Visual checks help a person to quickly and effectively assess the quality and freshness of food products. Tick the points you would notice if the food was fresh.

Fish	☐ bright red gills	☐ pink gills covered with mucus
	☐ flaking off scales	☐ scales firmly attached to the body
Fruit	☐ wrinkled, dry skin	☐ firm, undamaged skin
	☐ clean and unbruised	☐ multiple brown stains
Meat	☐ bright colour	☐ dull colour
	☐ white, firm fat	☐ yellow, soft fat

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Exam-style Question



1) Milk is one of the staple foods in the UK. Identify the date mark used on:
   a) a bottle of fresh milk
   b) a carton of UHT milk

(2 marks)

Extension Task

For many people it is important to buy food from reputable suppliers. Create a poster to indicate what makes a supplier reputable. You can consider factors such as:

- food hygiene ratings
- storage conditions
- customer approach
- general hygiene conditions

You can also include some negative factors – things we should avoid when looking for a reputable supplier.

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6. **Food safety:** buying and storing food

1) i) List five conditions that have to be met to ensure proper food storage conditions.

1. .....
2. .....
3. .....
4. .....
5. .....

ii) Explain how the conditions you identified in part i) help to avoid cross-contamination and spoilage of foods.

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2) Give an example of food that can be stored:

On the top shelf of the fridge .....

On the bottom shelf of the fridge .....

In the fridge door .....

In the freezer .....

3) i) Indicate the correct temperatures for:

Freezing .....

Chilling .....

Cooking and reheating food .....

Boiling water .....

ii) Explain the term 'danger zone' in relation to food safety. What is the temperature range of the danger zone?

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iii) Explain what 'ambient storage' is. What is the temperature range of ambient storage?

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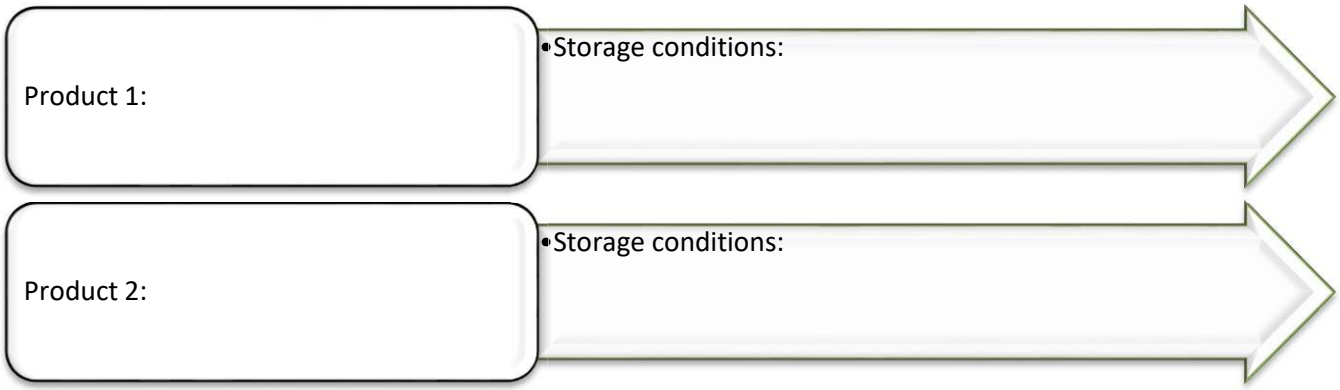
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4) Food labelling is helpful when buying and storing food.

i) Give two examples of food products which may be labelled with their storage conditions. State what these conditions are.



ii) Explain the difference between 'use by' and 'best before' date marks.

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5) Visual checks help a person to quickly and effectively assess the quality and freshness of food products. Describe the points to look for when buying the following foods.

Fish.....

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Milk and/or dairy .....

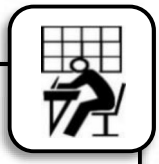
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Fruit.....

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Exam-style Question



1) Fresh fish is a high-risk food. Give **three** rules you would follow when storing fresh fish.

(3 marks)

Extension Task

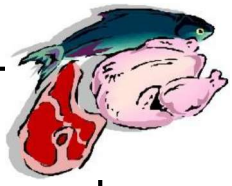
Inspect the packages of three different foods. Indicate the mandatory and non-mandatory pieces of information included on the packaging. Then, try to explain why producers choose to include the non-mandatory information on food labels.

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7. Food safety: preparing, cooking and serving food

1) i) Indicate the main sources of bacterial contamination. Use the pictures as hints.

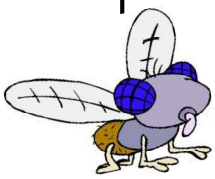






Bacterial contamination





ii) Provide an example of how to prevent food contamination and food poisoning.

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2) i) Identify high-risk kitchen activities which require you to wash your hands afterwards.













ii) Explain the role of hygiene in preventing food poisoning and cross-contamination. Use the keywords below.

hands	clean	risk	bacteria	outdoor
work surface	raw	utensils	cooked	

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3) Colour-coding kitchen utensils helps to prevent cross-contamination of foods. Match the colours of the chopping boards and utensils with the foods they should be used to prepare.

BLUE	salads and fruit
RED	raw fish
YELLOW	vegetables
BROWN	raw meat
GREEN	dairy
WHITE	cooked meat

4) Correct cooking time and temperature are important in preventing food poisoning. Explain how the correct cooking time helps to prevent food poisoning.

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5) Fill in the gaps to explain the need for appropriate temperature control during defrosting and reheating of food, using the keywords below.

increases (x2)	never	moisture	shorten	warmth
bacteria	defrosted	75 °C	poisoning	

In most cases, frozen food should be _____ before cooking. This is necessary to _____ the time of cooking and kill all the _____ inside of the food. Once defrosted, food should _____ be frozen again because it _____ the risk of bacterial growth.

Reheating food is a major cause of food _____. This is because the microorganisms had all the conditions needed for growth – _____, _____ and food. For that reason, reheating should be done thoroughly at temperatures above _____. Repeatedly reheating foods _____ the risk of food poisoning.

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6) Explain how the use of a food probe helps prevent food poisoning.

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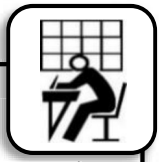
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Exam-style Question



Explain why defrosted food should not be frozen again.

(2 marks)

Extension Task

Prepare fishcakes while trying to avoid contamination of other foods with fish.

Create a diary in which you will note, step-by-step, what you are doing and how this will help you avoid cross-contamination of foods.

Use the Extension Task worksheet to help you.

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Extension Task worksheet



Ingredients in fishcakes:

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High-risk ingredients in fishcakes:

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The making of fishcakes – step-by-step instructions	What do I do to avoid cross-contamination?
e.g. trimming and filleting of the fish	Use of disposable gloves, disinfect the knife before and after use so that pieces of fish won't contaminate other foods when I use the knife again

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7. **Food safety:** preparing, cooking and serving food

1) i) Indicate the main sources of bacterial contamination of foods.

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ii) Explain how food contamination and food poisoning can be prevented

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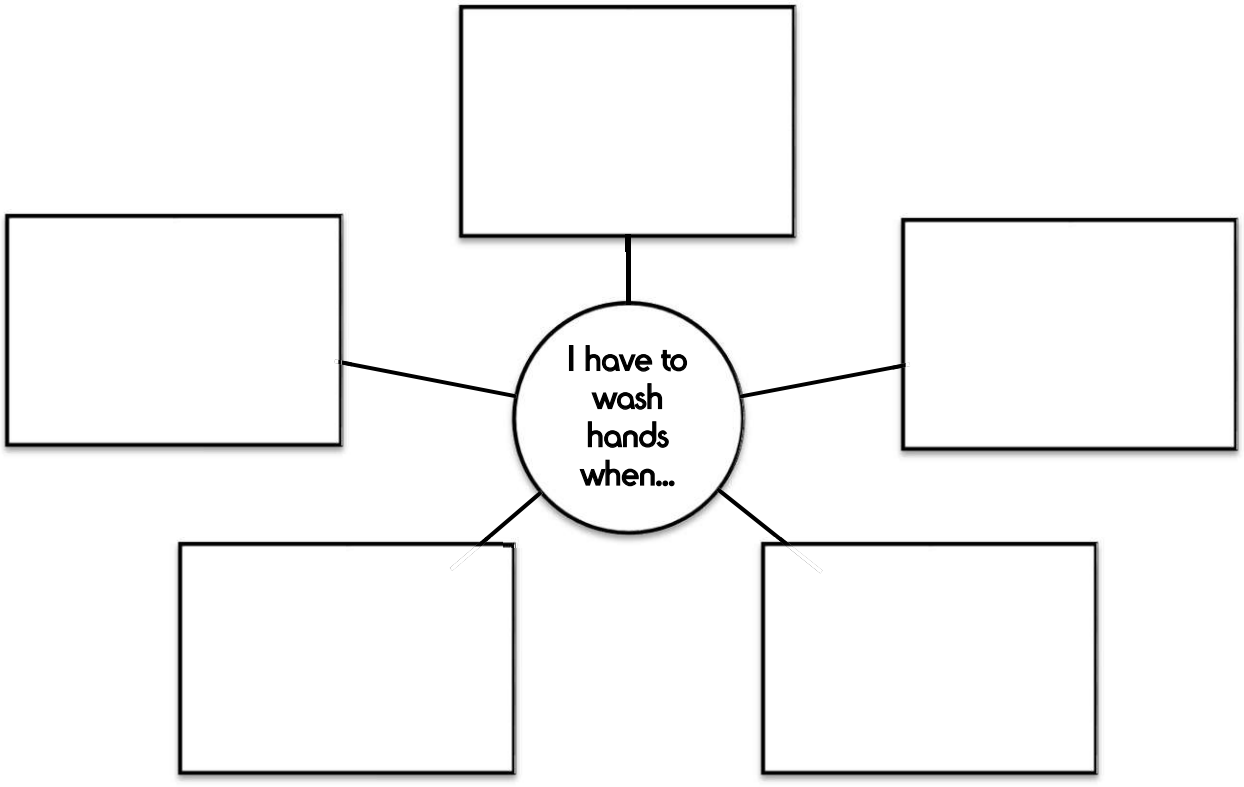
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2) i) Identify high-risk kitchen activities which require you to wash your hands afterwards.



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ii) Explain the role of hygiene in preventing food poisoning and cross-contamination.

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3) Colour-coding kitchen utensils helps to prevent cross-contamination of foods. Indicate which colours are designated for:

Salads and fruit .....

Raw fish .....

Vegetables .....

Raw meat .....

Dairy .....

Cooked meat .....

4) Explain how correct cooking time helps to prevent food poisoning.

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5) Explain how appropriate temperature control during defrosting and reheating helps to prevent food poisoning.

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6) i) Explain step by step how a food temperature probe should be used.

Step 1

Step 2

Step 3

Step 4

Step 5

ii) Explain why the probe should not touch the pan.

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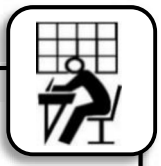
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Exam-style Question



Give **three** food safety and hygiene procedures that should be followed in a salad bar to avoid cross-contamination and food poisoning.

(3 marks)

Extension Task

Create a clipboard review to remind you about all of the food safety principles.

Remember to include:

- High-risk foods
- Methods of preventing cross-contamination and food poisoning
- Correct temperatures for freezing, cooking and reheating foods

You can also create a step-by-step guide on how to avoid cross-contamination during cooking.

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Answers

1. Food science: the reasons why food is cooked, heat transfer through cooking methods, how preparation and cooking methods affect the nutritional value and sensory properties of food

1) ●■ Higher ability to provide similar answer to lower-ability worksheet

People cook food to…	An example of this is…
Make food safe to eat	Heat kills pathogenic bacteria (such as *Salmonella* and *Campylobacter*), and inactivates harmful enzymes (e.g. during blanching)and toxins (such as solanine in potatoes) so that the cooked food is safer to eat than the raw food
Make food more digestible/palatable	During cooking the chemicals in food undergo changes that make them easier to break down in the human digestive tract, e.g. protein is denatured, starches are degraded and broken into shorter chains, dietary fibre is dissolved During cooking, the sensory characteristics of food are changed, making the food more palatable, e.g. bread rises and becomes soft with a crispy surface, sugar caramelises, custard sets.

2) ●

I can only work when water or oil is here – I am **convection**. Used to steam vegetables, boil eggs, etc.

I can work remotely, like a radio – I am **radiation**. You use me to cook **roasted dishes**, **grilled dishes**, and **baked dishes**

I need to be close to give you my warmth – I am **conduction**. You use me to **boil water or milk**, **make a stew**, etc.

Other relevant responses possible.

2) ■

i)
- Radiation is a process in which heat is transferred to food through **heat waves** and, therefore, can happen **remotely**.
- Convection is a process in which heat is transferred to food **through water or oil particles** which vibrate very fast and then transfer the energy to food. This is an **indirect** process.
- Conduction is a process in which heat is transferred **directly from pan to food**, due to vibrating particles of the pan. The food and the pan have to be in **direct** contact with each other to enable the process.

Or any other relevant answer including keywords (bold).

ii)

Cooking method	Heat transfer method	Explanation
Baking an apple pie	Radiation Convection Conduction	Sending heat waves from the oven to the baking tin Transferring heat from water particles in the food to other particles in it Transferring heat directly from the hot pot to the food inside
Cooking soup	Convection Conduction	Transferring heat from water to foods floating in it Transferring heat from the hob to the pot
Frying chicken	Radiation Convection Conduction	Sending heat waves from the oven to the pot Transferring heat from water and oil particles in food to other particles in it Transferring heat from the pot to the food inside
Steaming vegetables	Convection Conduction	Transferring heat from vapour to the food Transferring heat from the hob to the pot, and from the pot to the water inside
Grilling steak	Radiation Conduction	Sending heat waves to the food Transferring heat from the hot grill directly to the steak laying on it

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3) ●■ Higher ability to provide similar answer to lower-ability worksheet

	Is good because…	Is bad because…
Steaming (cooking)	Prevents vitamin loss, allows cooking of delicate ingredients, low in calories, good for people who want to lose weight, is quick, makes the food easier to chew, alters texture	Can't be used to prepare certain foods
Boiling (cooking)	Low in calories, good for people who want to lose weight, is quick, softens the proteins, makes the food easier to chew, alter texture, softens texture	Leads to vitamin loss, can't be used to prepare certain foods
Shredding (preparation)	Makes the food easier to chew, alters texture	Leads to vitamin loss, leads to enzymic browning, increases oxidation, can't be used to prepare certain foods, is time-consuming
Deep-frying (cooking)	Creates a crunchy surface / outer layer, is quick	Leads to vitamin loss, high in calories, can lead to obesity
Poaching (cooking)	Prevents vitamin loss, allows cooking of delicate ingredients, low in calories, good for people who want to lose weight	Can't be used to prepare certain foods
Blanching (cooking and preparation)	Slows down oxidation, prevents enzymic browning, makes peeling easier, prevents vitamin loss	Doesn't change the texture
Baking (cooking)	Makes the food easier to chew, alters texture	Is time-consuming, can't be used to prepare certain foods, leads to vitamin loss
Braising (cooking)	Seals the surface of food and keeps it moist, softens the food and makes it easier to chew, develops flavour and aroma	Is time-consuming, leads to vitamin loss
Marinating (preparation)	Softens the proteins, prevents vitamin loss	Is time-consuming

Other correct responses are possible.

4) ●

i) Simmering, grilling, dry-frying, stir-frying, steaming
ii) Braising, roasting
iii) Braising, simmering, roasting, grilling
iv) Dry-frying, stir-frying, steaming

4) ■

- Simmering increases amount of fat, causes vitamin loss
- Braising increases amount of fat, causes vitamin loss
- Roasting increases amount of fat, causes vitamin loss
- Grilling decreases amount of fat, vitamin loss occurs
- Dry-frying decreases amount of fat, vitamin loss occurs
- Stir-frying decreases amount of fat, preserves vitamin value
- Shallow-frying increases amount of fat, vitamin loss occurs

Exam-style question

1) ●

Any two from:

- Cut larger pieces of food rather than smaller ones – this limits the surface area that has contact with external factors such as oxygen, and, therefore, limits the ratio of oxidation and enzymic browning
- Use minimal water for cooking – the vitamins will have no solvent to dissolve in
- Cook only for as long as necessary / reduce the cooking time – this limits the time in which vitamins are affected by heat
- Add oil, cream or other dressing to salads – this helps to protect the ingredients from air/oxygen
- Cover foods – to protect them from oxygen, light and other external factors affecting their nutritional value
- Steam vegetables instead of boiling. simmering or poaching – prevents vitamins from dissolving in water
- Add vegetables to boiling water rather than cold water – this shortens cooking time
- Do not drain water, or reuse water to prepare soups, sauces or gravy – the water from cooking vegetables is rich in vitamins and minerals, so it is worth reusing it to add nutritional value to other dishes
- Do not reheat foods – this avoids additional heat treatment, which would cause further vitamin degradation
- Do not deep-fry foods – the very high temperature will reduce the amount of vitamins in the food
- Add acid, such as lemon juice or vinegar, to fruit/vegetables – this helps to prevent enzymic browning

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- Use stainless steel or ceramic knives – copper or iron ones will speed up the processes of oxidation and enzymic browning
- Serve food immediately – storing food in a warm environment for a prolonged period of time lowers its vitamin content
- Other correct responses may be accepted.

2) ■ 1 mark for each relevant point, up to a maximum of 4 marks
What happens:
- vegetables/fruits are peeled/cut/shredded/grated
  - the plant cells in fruits/vegetables are damaged and the cell contents have contact with air
  - the enzymes in plant cells react with oxygen from air, and enzymic browning takes place
  - the enzymes cause the fruits/vegetables to become brown, and they also damage the surrounding plant tissue
  - as the fruits/vegetables are cooked in water, the vitamins are rinsed out from them into the liquid
  - as the fruits/vegetables are cooked, the vitamins in them are broken down due to high temperature and high pressure used
  - if the fruit/vegetables are cooked/prepared using iron/copper utensils and saucepans, the enzymic browning process speeds up and even more nutritional value is lost
- Other correct responses may be accepted

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2. Food science: working characteristics, functional and chemical properties of carbohydrates, proteins and fats

1) ●■ Higher ability to provide similar answer to lower-ability worksheet

Proteins are large molecules built from **amino acids.** They are bound together in long chains of **polypeptides**, which then twist and curl up to form specific proteins. If treated with **acid** or **heat**, proteins **denature**.

Coagulation is a process in which proteins aggregate and form lumps. Proteins in flour, such as plain flour, contain **gliadin** and **glutenin**. When mixed with water, they glue together and form **gluten**. It has long elastic fibres which give the dough **plasticity** .If you whisk an egg white, you incorporate **air** into the mixture and **foam** is created.

2) ●

i)
- Sugars: caramelisation
- Starch in bread: dextrinisation
- Starch in sauce: gelatinisation

ii) Gelatinisation takes place when starch is heated in the **presence of water**. The granules of starch swell and break, thickening the mixture. Dextrinisation takes place when starch is heated in **dry conditions**. Starch chains break down into shorter ones, changing the look and flavour of the mixture.

Other correct responses possible, with the use of keywords (bold).

2) ■

The process	Molecules affected	Conditions needed	Example of food in which it happens
Caramelisation	sugars	High temperature	Toffee, fudge, caramel sauce
Gelatinisation	starch	High temperature and water	Sauce, cooked rice
Dextrinisation	starch	High temperature	Bread and other baked goods

3) ●

i) Fat mixed with flour leads to **shortening** because it prevents gluten fibres from forming and lengthening. This is used to prepare **shortbread biscuits**, shortcrust **pastry**, etc.

ii) Fat mixed with sugar creates **cream** due to the process called **aeration**. This is used to obtain **creams**, **ice creams**, **sponge cake**, etc.

iii) Fats do not dissolve in **water**. Instead, they create an **emulsion**. Emulsions are used to prepare **mayonnaise**, hollandaise sauce, etc.

iv) Plasticity of fat means that it can be easily **spread and reshaped** and that various fats have different **melting points**. This is used to cook various types of **pastry**, such as puff pastry, flaky pastry, shortcrust, etc.

3) ■ Students may indicate that:
- Fats are built of a **hydrophilic** glycerol 'head' and a **hydrophobic** fatty acid 'tail' and this makes the fat molecules **immiscible**. Due to this they will not **dissolve** in water and, instead, will form **emulsions** – usually with the use of an emulsifier to prevent the mixture from separating.
- Fats which have single bonds only in the fatty acid chain are saturated and stay solid at room temperature. Examples of this are lard and butter. Lard is better used in shortcrust pastry as it contains no water and the pastry will be more crumbly. Butter contains little water so the shortcrust will be a little bit less crumbly than when made with lard only as some gluten will develop in it.
- Fats which have one double bond only (monounsaturated) are better for cooking at high temperatures as they are less prone to turning into trans fats than polyunsaturated fats.
- Polyunsaturated fats from raw oils, such as extra virgin olive oil, are best used cold, e.g. in salad dressings, as high temperatures may cause them to turn into harmful trans fats.
- The length of the fatty acid chains is also important as it defines their melting temperature and culinary use.

Other correct responses are possible.

4) ●
- Dextrinisation: baking bread
- Gelatinisation: thickening sauce with starch, cooking rice or potatoes
- Caramelisation of sugar: crème brûlée, making toffee or fudge

Other correct responses possible.

4) ■
- Bread turns brown when baked due to the caramelisation of sugars, dextrinisation of starch and Maillard's reaction
- Eggs set during boiling due to protein denaturation and coagulation
- Sauce thickens due to the gelatinisation of starch and the evaporation of water

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Exam-style question

1) ● 4 marks from:
   - Proteins from milk and eggs undergo denaturation and coagulation due to high heat treatment.
   - Protein denaturation and coagulation causes the mixture to thicken and set.
   - Denaturation damages the structure of protein and the protein uncoils.
   - Coagulation leads the protein molecules to aggregate and trap water, so the mixture of eggs and milk can set.

1) ■ 1 mark for each correct, max. 2 marks.
   The functions cannot be repeated.

   Quiche Lorraine
   - to shorten the pastry and make it more crumbly
   - to improve **the taste, colour and aroma** of the pastry (e.g. more buttery if butter is used, more savoury if lard is used)
   - to i**mprove the nutritional value** (as fat provides vitamins A and D)

   Mayonnaise
   - to provide volume and body to the sauce (oil is the main ingredient)
   - to improve the nutritional value (oil is a source of unsaturated fatty acids and vitamins E and K)
   - to allow emulsification to happen and enable the sauce to become creamy

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3. Food science: working characteristics, functional and chemical properties of fruit and vegetables, and raising agents

1) ●■ Higher ability to provide similar answer to lower-ability worksheet
   - **Enzymic browning** is a process which takes place when plant cells are being destroyed. The **enzymes** from the cells leak out and cause **damage** to the surrounding tissues, which leads to a change of **colour** and affects the **nutritional value** of the food. Some fruit and vegetables are especially prone to the process. These include **bananas**, **apples** and **potatoes**.
   - Fruits susceptible to enzymic browning include apples, pears, bananas, avocados and plums
   - Vegetables susceptible to enzymic browning include potatoes, lettuce, mushrooms and aubergines

2) ●■ Higher ability to provide similar answer to lower-ability worksheet
   i) Mechanical raising agents work because they allow the incorporation of air into the mass which makes it lighter and easier to grow in volume. This is used to prepare sponge cake, whipped cream, batter, creams, ice creams and soufflé.
   ii) Chemical raising agents work because in contact with water sodium bicarbonate creates carbon dioxide, which then creates bubbles that are trapped in the mixture and make it possible to grow in volume. This is used to prepare certain cakes, pancakes, etc.
   iii) Biological raising agents work because in the presence of warmth, water and sugar they create carbon dioxide, which then escapes the mixture leaving bubbles inside. This is used to prepare bread and certain cakes such as panettone.

   Other correct answers possible.

3) ● Yeast + warmth + water (moisture) + sugar = carbon dioxide and alcohol

3) ■ Yeast are single – cell fungi which use sugar as feed. When provided with water, warmth and sugar, they transform the latter into carbon dioxide and alcohol. Without sugar (feed) they are not able to grow.

4) ●■ Higher ability to provide similar answer to lower-ability worksheet
   i) Oxygen: cover the food to protect from air, use lemon juice or dressing to shield from air
   Temperature: put in the fridge to slow down the process
   Enzymes: inactivate by blanching
   Diminution (especially with iron or copper tools): don't cut unless necessary
   ii) ● Oxidation can be prevented by:
      - covering the food
      - using lemon juice

5) ● Raising agents are used to **lighten** the mixture and **facilitate** raising during cooking. Different raising agents are used for various purposes. **Chemical** raising agents include baking powder and **sodium bicarbonate**. Biological raising agents are **yeast**. Both chemical and biological raising agents work by releasing **carbon dioxide** into the mixture, whereas **mechanical** raising methods such as **sieving** or **whisking** work by incorporating **air** into the mass. Along with steam, they are used to cook such foods as **flaky pastry** or **soufflé**.

5) ■ i) Oxidation is a process in which oxygen affects molecules in food (oxidises them). Oxidation leads to the loss of nutritional value, and the development of a bad smell and flavour in food.
   ii) Oxidation can be prevented by:
      - covering the food
      - using lemon/lime juice or vinegar

6) ■

Raising agent	Used to prepare
Mechanical	Flaky pastry (folding), batter (beating), whipped cream (whisking and whipping), sponge cake (sieving, beating), shortbread (rubbing in)
Biological	Bread, panettone
Chemical	Pancakes, pudding, sponge, etc.

Other correct answers possible.

4. Sensory properties

1) ●■ Higher ability to provide similar answer to lower-ability worksheet
   i) Touch, taste, hearing, smell, sight
   ii) ● Controlled conditions are necessary **to obtain reliable results**. For example, it is necessary to ensure that all the food samples are the same size, and that the testers are isolated from each other to avoid distraction or being influenced. Or any other relevant answer.

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ii) ■ The taste panel has to be set in controlled conditions in order to obtain reliable results. The testers should be isolated from each other to avoid distraction, and all other distractions (including smells) have to be removed. The lighting has to be adjusted, and the food samples have to be identical in size. If a carrier is used, it has to be neutral in flavour. Water should be provided to cleanse the palate between samples. Testers should receive sheets of paper on which they can record their findings.

Or any other relevant answer.

2) ●

- Preference tests are conducted to find out whether a product is acceptable for the consumer.
- Grading tests are carried out to measure the strength of a specific feature of the given food.
- The ranking test measures the strength of one feature in many samples.
- The profiling test measures many features in one sample.
- The rating test can be performed by unskilled testers.
- Hedonic ranking helps to find out the best sample.

2) ■

- False: Preference tests are conducted **to check if the product is acceptable for the consumer**. Differences between samples are assessed in discrimination tests.
- False: A rating test is an example of **a grading test**. Preference tests include paired preference and hedonic tests.
- False: **In the profiling test a profile star** is drawn to identify the features of a food sample. In the rating test samples are assessed on a scale from 1 to 9 and presented in a table.
- False: **In the hedonic test** a hedonic scale is used to assess the sample. The grading test ranks the samples in an order of preference.

3) ●■ Higher ability to provide similar answer to lower-ability worksheet, by providing any sources of the identified tastes

i) glucose – **sweet**
ii) sodium chloride – **salty**
iii) vinegar – **acidic**
iv) coffee – **bitter**
v) mushrooms – **umami**

4) ●■ Higher ability to provide similar answer to lower-ability worksheet
Student describes how cooking affects the following characteristics of food, providing examples of each.

- **Texture** – chips become crispy, broccoli becomes soft, green peas become mushy, eggs set (harden)
- **Appearance** – breads and cakes rise, vegetables change colour (e.g. red cabbage becomes pink, blue or green, depending on other factors), onion looks shiny and brown
- **Colour** – sugar caramelises and becomes golden/brown/black, red onion becomes pink/purple, green peas become yellow-ish, bread becomes brown, etc.
- **Taste** – onion becomes sweeter and less pungent, added spices and herbs affect the final flavour, Maillard reaction adds the distinctive taste (and aroma) of bread, coffee or cocoa
- **Sound** – foods can become crispy or crunchy (e.g. chips, bread)
- **Aroma** – is more pronounced, onions and garlic smell sweeter and less pungent
- Other suitable answers may be accepted.

5) ● Some descriptive words could include:

- **Aroma:** floral, scented, pungent, rotten, acrid, bland, tart, rancid, citrus, spicy, weak
- **Taste:** sweet, bitter, savoury, salty, tangy, sour, rich, sharp, bland, tart, rancid, citrus, spicy, weak
- **Appearance:** stringy, heavy, flat, fizzy, wet, crystalline, firm, flaky, crisp, lumpy, smooth, mushy, sticky
- **Texture:** bubbly, tacky, close, brittle, rubbery, open, soft, firm, flaky, crisp, lumpy, smooth, mushy, sticky
- Other suitable answers may be accepted.

5) ■ (exemplary answers)

- glass of soda – fizzy, brown, liquid, cold, refreshing, aromatic, sweet, sour
- nachos – crispy, crunchy, hard, fresh, oily, salty, yellow, bland
- chocolate – sweet, bitter, soft, melt in the mouth, aromatic, chocolatey, dark
- oranges – sweet, sour, juicy, soft, aromatic, zesty, citrus, tangy, fresh
- Other suitable answers can be accepted.

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Exam-style question

1) ● a) Burger A – because it achieved a better result in most of the categories tested
   b) Student identifies one sensory aspect that could be improved (1 mark) and suggests one change (1 mark).

   Any one from:
   - Saltiness – use less salt / reduce the saltiness of the burger
   - Tenderness – tenderise the burger, e.g. by mincing or blending the soy
   - Soy flavour – limit the soy flavour, e.g. by using spices and herbs
   - Meaty flavour – improve the meaty flavour, e.g. by adding herbs and spices
   - Natural flavour – improve the natural flavour, e.g. by using natural food additives instead of artificial additives
   - Or any other suitable answer.

1) ■ a) Rating test (1 mark)
   b) Five-point scale (1 mark)
   c) The controlled conditions during the test could include: (1 mark for each condition and 1 mark for correct description, max. 4 marks)
   - **Handing the testers a marking scheme and conducting a training session** to explain how to use it – to make sure all testers know how to assess the samples and are using the same criteria
   - **Preparing same-sized samples of food** – to avoid bias
   - **Using the same type of crockery or carrier** – the colour or size of the plate may affect the tester's judgement, as can the taste of the carrier, so each tester has to use the same type of crockery / carriers to ensure that the results are comparable
   - **Seating tasters in separate boxes** – to prevent them from comparing their feelings, facial expressions, etc., and to keep them focused on the task
   - **Adjusting the lighting so that the appearance of the food doesn't affect the rating** – to avoid bias
   - **Controlling the temperature of the food samples** so that each tester receives them at the same temperature – the flavour changes with temperature so all samples need to be served at the same temperature and physical state to ensure that the results are comparable
   - **Providing each tester with a cup of clean water** to rinse out their mouth after tasting – in case they wanted to try the sample twice, rinsing their mouth will help to prevent bias (and dulling of the taste buds)

   Other correct responses possible.

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5. Food safety: conditions and control of microorganisms' growth, signs of food spoilage, helpful properties of microorganisms in food production

1) ● (Student can provide their own examples)

	Good	Harmful
Bacteria	Is good because… It can ferment and transform lactose into acid	Is bad because… It can cause food spoilage, leading to its fermentation and producing toxins
	Used to produce… Yoghurt and cheese, pickles, sauerkraut	Occurs in… Wine, beer, meat preserves
Yeast	Is good because… It produces carbon dioxide and helps bread grow	Is bad because… It can cause food spoilage and fermentation
	Used to produce… Bread, cakes, wine, beer	Occurs in… Wine, beer, fruit and fruit preserves
Mould	Is good because… It helps foods mature and develops flavour	Is bad because… It causes food spoilage
	Used to produce… Cheese, soy sauce	Occurs in… Bread, fruit and vegetables

1) ■ Non-**pathogenic species** of microorganisms are used in food and the production of medicines. **Bacteria** are used to produce **yogurt** and **cheese**, **yeast** is used in the production of alcoholic beverages such as beer, and **baked goods** such as **bread**. Mould is used in the production of blue **cheese**.

2) ● To grow, microorganisms require: warmth, moisture, protein, time
Examples of high-risk foods include: raw meats, raw eggs, raw fish, foods that are reheated, foods that have been defrosted and frozen again (other correct responses possible)

2) ■ i)

Factors needed for microorganisms' growth	High-risk foods
Warmth	Foods that are reheated; foods that have been defrosted and frozen again; foods that were incorrectly cooked and stored
Time	Foods that are reheated repeatedly
High protein content	Raw chicken, eggs, fish
Moisture	Foods rich in water such as raw chicken, fish and eggs, milk, ice creams

ii) *Salmonella*, *Clostridium perfringens*, *Staphylococcus aureus*, *Listeria*, *Campylobacter*, *E. coli*, *Bacillus cereus* or any other.

3) ● i) Vinegar and lemon juice contain acid. Proteins (such as enzymes) denature in an acidic environment.
ii) Blanching means that the vegetable is put into boiling water. High temperatures denature and inactivate proteins (such as enzymes).

3) ■ i) Enzymes are biological catalysts usually made from protein. (Other correct responses possible.)
ii) Enzymic action can be controlled by the addition of acid or by applying high temperature to foods, because proteins denature and inactivate in acidic and/or hot environments.

4) ●
- Enzymes – browning of food, ripening of bananas
- Mould – green or white furry coating formed on the surface
- Yeast – sour flavour, foam on top, air bubbles in the food

4) ■

Microorganism	Sign of spoilage caused by given microorganism	Example of food affected
Enzymes	Browning, ripening	Bananas, apples, potatoes
Mould	Growth of green, white or black 'furry' coat on the surface	Bread, cheese
Yeast	Sour flavour, foam on top, bubbles	Fruit juices, tomatoes

Other correct responses possible.

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Exam-style question

1) ●

Any two from:

- use food by its use by date
- carry out **stock rotation** (so that older foods are eaten first)
- store food at low temperatures, e.g. in a fridge or cooler, or in a freezer
- cook food thoroughly until the core temperature reaches at least 75 °C
- store foods in dry places (such as in cupboards)
- store foods in a controlled atmosphere (this helps to control the amount of oxygen in the air)
- dry or freeze dry foods if you want to keep them for a very long time.

Other suitable answers may be accepted.

1) ■ 1 mark for each correct statement, max. 4 marks

What happens:

- Starter bacteria are added to milk which is a source of lactose (sugar).
- During fermentation, bacteria break up the lactose and produce lactic acid.
- Lactic acid changes the pH of the milk, changing its taste from sweet to sour.
- Acidic pH causes denaturation of the proteins in milk.
- Denaturation causes the milk to thicken.

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6. Food safety: buying and storing food

1) ●

	Is important because…
Keeping food covered	It shields the food from oxygen, air, light and vermin (such as mice and insects) or pets
Choosing correct temperature	Prevents microorganism growth
Keeping the storage dry and mould – free	Prevents growth of bacteria, yeast and mould
Choose correct light	Light that is too strong will cause vitamin loss, but some light is needed to spot any possible food spoilage (when food should be removed as soon as possible to avoid contamination of other foods)

1) ■ i) Any five from:
- Keep food covered
- Ensure dry conditions
- Keep the storage clean
- Keep the storage mould-free
- Choose correct temperature
- Protect from light and choose correct lighting
- Keep the food off the floor

ii)
- Maintaining dry and clean storage helps avoid growth of microorganisms such as yeast.
- Choosing the correct temperature prevents bacteria growth.
- Protecting food from light helps maintain its nutritional value.
- Correct lightning helps you to spot any possible spoilage.
- Keeping food off the floor helps protect it from insects and vermin such as mice and rats.

2) ●■ Higher ability to provide similar answer to lower-ability worksheet
- Top shelf: milk, yogurt and dairy; cottage cheese
- Middle shelf: cold cuts, soup
- Bottom shelf: raw meat
- Drawers: fruit and vegetables
- Door: eggs, juice, oil, ketchup
- Freezer: ice cream, frozen peas

Other correct responses are possible.

3) ●■ Higher ability to provide similar answer to lower-ability worksheet

i)
- Freezing: -18 °C
- Chilling: 0 to 5 °C
- Cooking and reheating: 75 °C
- Boiling water: 100 °C

ii) The range of danger zone temperatures is from **5 °C to 63 °C**. It is temperature in which most microorganisms grow the fastest and the risk of food spoilage is therefore increased.

iii) Ambient storage means that food is stored at **room** temperature. This is usually at the temperature between **18 °C and 22 °C**. This falls in the range of **danger zone temperatures**.

4) i) ●Examples could include: 'refrigerate after opening', 'store in a cool, dry place', 'once opened, reseal the bag to retain freshness'

i) ■Examples could include:
- on a carton of UHT milk – 'refrigerate after opening and consume within 48 hours'
- on a bag of peanuts – 'once opened, reseal the bag to retain freshness'
- on a box of biscuits – 'store in a cool, dry place'
- on a bottle of oil – 'keep away from direct sunlight and sources of heat'
- Other examples can be accepted.

ii) ●■ Higher ability to provide similar answer to lower-ability worksheet
- **Use by** date is used for **fresh** foods such as **dairy and fish**. It helps ensure food **safety** and, therefore, foods should not be eaten after that date.
- **Best before** is used for **dry and long-lasting** foods such as pasta, and applies to food **quality**. The food after that date may be eaten, but its nutritional value or quality may be affected.

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5) ● • **fish:** bright red gills, scales firmly attached to the body
• **fruit:** firm, undamaged skin; clean and unbruised
• **meat:** bright colour; white, firm fat

5) ■ • **fish:** clear, bright eyes, eyes not sunken, bright red gills, scales firmly attached to the skin, the flesh is firm and shiny, tail is stiff
• **milk and/or dairy:** the lid of the container is not bulging, the milk is not curdled or split, cheese is not covered with mould
• **fruit:** not wrinkled, firm, no brown or black stains, undamaged, not mouldy or bruised

Exam-style question

1) ● a) use by
b) best before

1) ■ Any three from:
- store in a fridge (below 5 °C)
- store in a closed/lidded box or container
- store on the lowest shelf of the fridge
- prevent contact with other foods, e.g. by wrapping it in foil, putting it into a separate box or putting it on a separate shelf
- store fresh fish for no longer than 48 hours
- if storing for a longer time, freeze (store under -18 °C)
- or any other suitable answer

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1) ●■ Higher ability to provide similar answer to lower-ability worksheet
   i) Sources of bacterial cross-contamination include:
      - Contact with other contaminated foods
      - Contact with contaminated surfaces and equipment
      - Dirty hands of the people cooking/preparing the food
      - Pests (insects) having contact with the food
      - Waste food and rubbish
   ii) Cross-contamination and food poisoning can be prevented by:
      - Dealing with foods separately
      - Using specific, dedicated equipment
      - Maintaining personal and work hygiene
      - Protecting kitchen and storage from pests

2) ●■ Higher ability to provide similar answer to lower-ability worksheet
   i) High-risk activities include:
      - handling high-risk foods such as raw eggs
      - using the toilet
      - handling raw meat
      - eating
      - touching the face or hair
      - cleaning or putting rubbish into the bin

      Higher-ability students may provide other relevant responses.
   ii) **Bacteria** can be found everywhere – from **hands**, through clothing, to work surfaces and tools. **Cleaning hands** before and after handling high-**risk** foods such as **raw** meat or eggs helps prevent food poisoning and cross-contamination. Other hygiene rules include changing clothes when starting the day or coming inside from the **outdoors**, using separate **utensils** for **raw** and **cooked** products and keeping the **work surfaces** clean.

3) ●■ Higher ability to provide similar answer to lower-ability worksheet
   - Blue – raw fish
   - Red – raw meat
   - Yellow – cooked meat
   - Brown – vegetables
   - Green – salads and fruit
   - White – dairy

4) ●■ Higher ability to provide similar answer to lower-ability worksheet
   Correct cooking time helps to kill bacteria and other microorganisms, which cannot reproduce/multiply in temperatures above 65 °C. Cooking helps to prevent food poisoning by killing pathogenic bacteria and other microorganisms, and by deactivating toxins and enzymes with the use of high heat.

5) ●■ Higher ability to provide similar answer to lower-ability worksheet
   - In most cases, frozen food should be **defrosted** before cooking. This is necessary to **shorten** the time of cooking and kill all the **bacteria** inside of the food. Once defrosted, food should **never** be frozen again because it **increases** the risk of bacterial growth.
   - Reheating food is a major cause of food **poisoning**. This is because the microorganisms had all the conditions needed for growth – **warmth**, **moisture** and food. For that reason, reheating should be done thoroughly at temperatures above **75**°C. Repeatedly reheating foods **increases** the risk of food poisoning.

6) ● A food probe helps measure the **temperature inside** of the food. If the temperature is **high** enough, it is more **likely** that all the **bacteria** will be **killed** and, therefore, food poisoning is unlikely to occur.

6) ■ i) The use of a temperature probe:
      1) Clean/**disinfect** the probe to avoid cross-contamination
      2) Insert the probe into the **thickest** part of the food
      3) **Leave** the probe in place until the temperature **stabilises**
      4) Remove the probe making sure it does **not touch** the pan
      5) Read the result and **disinfect** the probe again

   ii) The pan is always **hotter** than the inside of a meal and touching the pen with the probe would produce **fake** results, leading to incorrect conclusions about the readiness of the food, which can result in **food poisoning** if an uncooked food is served.

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Exam-style question

1) ● 1 mark for a basic description, 2 marks for a detailed explanation, max. 2 marks

Indicative content:

- Temperature – **freezing** (-18 °C) stops bacteria from **multiplying**.
- Defrosting brings food to the **ambient / danger zone** temperature, in which bacteria can begin to multiply.
- Repeated freezing will stop the **bacterial growth**, but will **increase** the **risk of food poisoning** in the future.

Other relevant answers may be accepted.

1) ■ Any three from:

- Procedures specific to a salad bar:
  - ensure proper storage conditions (temperature below 5 °C) is important
  - older salad should not be mixed with the newer produce
  - each salad should have its own serving spoon
  - bowls and cutlery have to be cleaned properly
  - a list of ingredients should be provided for every salad
  - date marks should be provided, e.g. to indicate when a given salad was made
- General food safety procedures:
  - change clothes / wear an apron
  - tying back hair or covering it with a hairnet
  - use gloves if necessary
  - wash hands before and after high-risk activities (such as using the toilet, cleaning or dealing with a bin)
  - separate raw foods from cooked foods
  - clean utensils and disinfect work surfaces, especially after dealing with high-risk foods

Other relevant responses may be accepted.

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