

## Unit 3.1.7

### The Physiology of Food Allergies and Intolerances

#### Key Knowledge and Key Skills

##### Key Knowledge 3.1.7

The physiology of food allergies and intolerances, including how allergy and intolerance differ and their respective symptoms, causes and management with a focus on allergies identified by Food Standards Australia New Zealand and lactose, gluten and fermentable oligosaccharides, disaccharides, monosaccharides and polyols (FODMAP) intolerances.

##### Key Skills 3.1.6

Evaluate the nutritional quality of foods and meals.

##### Key Skills 3.1.7

Justify the substitution of ingredients in the management of food allergies and intolerances.

##### Key Skills 3.1.8

Apply the healthy eating recommendations of the Australian Dietary Guidelines and Australian Guide to Healthy Eating to the planning of daily food intake and, through practical activities, create nutritious meals to cater to a diverse range of needs.

#### VCE Food Studies Study Design p. 20 and 21

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## Terms and Definitions

**Common food allergens** refer to foods that are known to trigger an allergic reaction in a larger population group.

**FODMAP** is an acronym for a group of carbohydrates (sugars) that some people find difficult to absorb.

A **food allergy** occurs when the body's immune system reacts to an allergen in food. The body makes antibodies to destroy the food. The food allergen is a protein that is generally harmless to most people.

**Food intolerance** is a chemical reaction caused when the digestive system cannot completely break down food into smaller components due to producing insufficient enzymes.

**Food Standards Australia New Zealand** (FSANZ) is an independent statutory agency responsible for developing Australian and New Zealand food standards.

**Gluten intolerance** occurs when the protein gluten, found in wheat, oats, and rye, causes digestive problems such as abdominal pain, diarrhoea, and flatulence.

The **immune system** is a complex network of cells, tissues, and organs that produce substances to fight infections and other diseases.

**Lactose** is a simple sugar (disaccharide) found in milk and other dairy products.

People who are **lactose intolerant** cannot digest lactose effectively.

**Substitution** refers to replacing an ingredient with another ingredient that can fulfil a similar function in cookery.

# The Physiology of Food Allergies and Intolerances

## Food Allergies and Intolerances

A person with a food allergy or intolerance experiences health issues when eating a particular food. One in 10 infants and two in 100 adults in Australia suffer from food allergies. It is estimated that around 25% of Australians think they have a food intolerance. This estimate may be higher because people do not always report a food intolerance to their doctor.

**Watch** this video about the similarities and differences between food allergies and intolerances:

<https://youtu.be/5eHTToEdDaCo>

## Food Allergies

A food allergy occurs when the immune system reacts to food by making antibodies to destroy the food because it is harmful. The body often responds in the same way when the food is eaten again. The severity of the response usually increases each time a person is exposed to the allergen. Food allergy reactions typically begin appearing immediately after ingesting food containing the allergen. Consuming a small amount of these foods or even touching the food can trigger an allergic reaction.

## Symptoms

Food allergy symptoms include abdominal pain, difficulty breathing, an itchy rash, swelling and a tingling sensation around the mouth, throat and tongue, and vomiting. Anaphylaxis is a severe reaction where a person's blood pressure drops suddenly, and their airways begin to close. They experience difficulty breathing and may die. An adrenaline (epinephrine) injector (e.g., EpiPen®) must be given to someone experiencing anaphylaxis.

## Substitutions

Food Standards Australia New Zealand has identified the following foods as common causes of an allergic reaction: eggs, fish, lupin, milk, peanuts, shellfish, soy, tree nuts, and wheat. Types of tree nuts include almonds, Brazil nuts, cashew, hazelnuts, macadamia, pecan, pine, pistachio, and walnuts.

**Watch** this video to find out more about egg allergies and substitutions that can be used in cooking:

<https://youtu.be/evaG0pbNi4M>

**Watch** this video to find out more about substitutions that can be used in cooking: <https://youtu.be/S4q-2muvj80>

The table below identifies some common food allergens and possible substitutions for these allergens.

Eggs
<p>For use as an aerating ingredient:</p> <ul style="list-style-type: none"> <li>one teaspoon of baking powder, one tablespoon of vinegar, and one tablespoon of water</li> <li>one teaspoon of egg replacer and two tablespoons of water</li> <li>one tablespoon of plain agar powder, dissolved in one tablespoon of water, then whipped, chilled, and whipped again</li> <li>liquid (brine) from a can of chickpeas (three tablespoons of chickpea brine can replace one whole egg or two tablespoons of brine replaces one egg white).</li> </ul> <p>For use as a binding ingredient:</p> <ul style="list-style-type: none"> <li>half cup mashed banana or pureed apple</li> <li>one teaspoon of baking powder, one tablespoon of vinegar, and one tablespoon of water</li> <li>one teaspoon of egg replacer and two tablespoons of water</li> <li>two tablespoons of chia seeds simmered in three tablespoons of water</li> <li>two tablespoons of flaxseed meal simmered in three tablespoons of water</li> <li>two teaspoons of potato or corn starch</li> <li>quarter cup mashed potato or mashed pumpkin</li> <li>quarter cup pureed prunes.</li> </ul>

<b>Fish and Shellfish</b>
For use as a protein replacement: <ul style="list-style-type: none"> <li>beef, dried beans, egg, lamb, lentils, pork, poultry, and pulses.</li> </ul> For use as a replacement in the sauces that contain fish or shellfish, such as fish sauce, oyster sauce, and Worcestershire sauce. <ul style="list-style-type: none"> <li>Lime juice and soy sauce can replace sauces that contain fish and shellfish.</li> </ul>
<b>Lupin (lupin is type of legume)</b>
For use as a legume replacement in a range of dishes: <ul style="list-style-type: none"> <li>Cannellini beans, chickpeas and kidney beans can be used to replace whole lupins.</li> </ul> For use as a gluten-free cereal-like product in baking: <ul style="list-style-type: none"> <li>Grains such as wheat can be used to replace lupin in baked goods.</li> </ul>
<b>Milk and Milk Products</b>
For use as dairy in cooking and general consumption: <ul style="list-style-type: none"> <li>almond, coconut milk, oat, and soy plant-based milk</li> <li>almond, cashew nut, coconut, and soy plant-based yoghurt</li> <li>coconut, soy, and vegan plant-based cheese</li> <li>coconut, sorbet, and soy plant-based ice cream</li> <li>avocado and vegetable-based oils and margarine.</li> </ul> Note: Plant-based milk with fortified (added) calcium is recommended. Plant-based milk should contain at least 100 mg of calcium per 100 g. Plant-based milk is not always a suitable milk substitute for young children because it is low in fat and protein.
<b>Peanuts and Tree Nuts</b>
For use as spreads: <ul style="list-style-type: none"> <li>spreads such as hummus and mashed avocado.</li> </ul> For use in savoury dishes: <ul style="list-style-type: none"> <li>lentils, seeds, and water chestnuts.</li> </ul> For use in desserts: <ul style="list-style-type: none"> <li>cornflakes, puffed rice, roasted chickpeas and pepita, sesame, and sunflower seeds.</li> </ul> Note: some people can also be allergic to sesame seeds.
<b>Soy Products</b>
For use as plant-based milk: <ul style="list-style-type: none"> <li>Any plant-based milk listed above can be used instead of soy milk.</li> </ul> For use as a meat alternative: <ul style="list-style-type: none"> <li>Haloumi cheese can be used to replace tofu; however, it does contain cow's milk.</li> </ul> For use as soy sauce: <p>Coconut aminos made from the fermented sap of coconut palm and sea salt can be used as a soy sauce substitute.</p>
<b>Wheat</b>
For use as a flour in baking and as a crumb: <ul style="list-style-type: none"> <li>almond, buckwheat, chickpea, corn, gluten-free, millet, oat, polenta, potato, rice, sorghum, soy, and tapioca flours.</li> </ul> For use in pasta: <p>pasta made from amaranth, barley, buckwheat, millet, sorghum, and quinoa.</p>

## Food Intolerances

Food intolerance is a chemical reaction that occurs in some people after they consume a particular food; it is not an immune response. It occurs when the body produces insufficient amounts of the enzymes needed to digest specific types of food. In other cases, particular gastrointestinal conditions cause reactions in people.

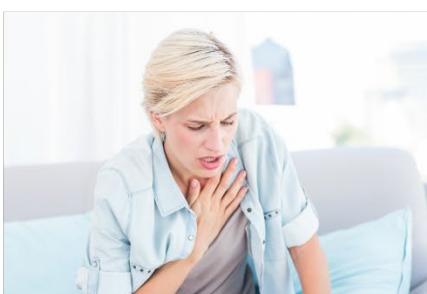
It can take up to 12 or more hours after eating food for food intolerance symptoms to show. The degree of response depends on the amount of food consumed. The reaction is likely to be mild if a small amount of the food was consumed, whereas it would be more significant if larger quantities of the food were eaten.

A range of foods can cause food intolerance, including FODMAP, gluten, and lactose.

### Symptoms

Responses to a food intolerance include asthma, bloating, breathing problems, diarrhoea, headaches and migraines, stomach pain, and sweating.

*The images below represent some of the symptoms of food intolerance.*



### Gluten Intolerance

Gluten intolerance is often referred to as non-coeliac gluten sensitivity or gluten sensitivity. Gluten is a protein found in barley, oats, rye, and wheat. Some people cannot consume gluten because they have coeliac disease; this occurs when gluten damages the villi in the small intestine. Coeliac disease is different from gluten intolerance, although it can cause similar pain.

Recent reports suggest that about one in four people follow a gluten-free diet because they think they are gluten intolerant. However, there is some suggestion that it may not be gluten causing these people discomfort but rather fermentable carbohydrates (FODMAPs) causing their symptoms.

### Symptoms of Gluten Intolerance

Symptoms of gluten intolerance include: bloating, constipation, diarrhea, fatigue, flatulence, headaches, joint pain, nausea, and numbness. Currently, no medical tests can determine if someone has a gluten intolerance.

### Gluten Substitutions

Gluten performs unique functions in cooking, making it challenging to find suitable ingredient substitutions. Gluten creates a strong structure in dough and batter. This strong structure enables dough and batter to hold the air bubbles that form during baking and help the food rise and become airy. This is essential in bread and cake making. Gluten can make other food products stretchy and strong, which are desirable characteristics when making foods such as homemade pasta.

The table below identifies some common foods that contain gluten and possible substitutions.

<b>Grains and Flours</b>
<ul style="list-style-type: none"> <li>• Amaranth, arrowroot, buckwheat, corn and polenta, millet, quinoa, rice, sorghum, soy, tapioca, and teff.</li> <li>• Some food products such as ground almonds and flour made from legumes and potatoes can also be used as a suitable substitute for flour.</li> </ul>
<b>Pasta</b>
<ul style="list-style-type: none"> <li>• Gluten-free pasta can be made from amaranth, barley, buckwheat, legumes and lentils, lupin, millet, quinoa, and sorghum.</li> </ul>
<b>Commercial Food Products</b>
<ul style="list-style-type: none"> <li>• There are numerous gluten-free commercial products available. This information should be displayed under the ingredients list on food labels.</li> </ul>

### Lactose Intolerance

Lactose is the naturally occurring sugar in dairy products; it is a disaccharide. The enzyme lactase breaks down the lactose in dairy foods—the walls of the small intestine release this enzyme during digestion. Lactose intolerance occurs when the small intestine does not make enough of the enzyme (lactase) to fully digest the sugar (lactose) found in dairy products.

### Symptoms of Lactose Intolerance

Lactose intolerance is often, but not always inherited from our parents. Some people are born with this condition but for others, the symptoms can appear during adolescence or adulthood. The severity of symptoms will depend on the amount of the enzyme lactase the body can produce—the less lactase the body has, the more severe the symptoms. Common symptoms include abdominal pain and cramps, bloating, diarrhoea, flatulence, and nausea.

Medical tests can be conducted to determine if people have lactose intolerance. People who experience symptoms of lactose intolerance are encouraged to seek medical advice.

### Lactose Substitutions

Different types of dairy foods contain different amounts of lactose. Butter and hard cheeses, such as cheddar, parmesan and Swiss, contain very little lactose. Cottage and feta cheese made from goat's or sheep milk contain minimal amounts of lactose.

The food manufacturing industry has developed a range of lactose-free dairy products. The enzyme lactase is added to these dairy products during manufacturing. This enzyme breaks down the lactose present into two sugars, glucose and galactose. Although consumers report that lactose-free milk tastes slightly sweeter, the sugar content is the same as normal milk.

The table below identifies some common foods that contain lactose and possible substitutions.

<b>Milk and Milk Products</b>
<p>For use as dairy in cooking and general consumption:</p> <ul style="list-style-type: none"> <li>• almond, coconut milk, oat, or soy plant-based milk</li> <li>• almond, cashew nut, coconut, or soy plant-based yoghurt</li> <li>• coconut, soy, or vegan plant-based cheese</li> <li>• coconut, sorbet, or soy plant-based ice cream</li> <li>• avocado and vegetable-based oils or margarine.</li> <li>• Note: Plant-based milk with fortified (added) calcium is recommended. Plant-based milk should contain at least 100 mg of calcium per 100 g of milk. Plant-based milk is not always a suitable milk substitute for young children because it is low in fat and protein.</li> </ul>

**Watch** this video to find out about lactose intolerance and the lactose-free foods available:

<https://youtu.be/TUpQpWxMYtk>

**Watch** this video to find out about milk allergy and lactose intolerance: <https://youtu.be/OtotAAsitHU>

## FODMAP Intolerance

FODMAP is an acronym for a group of carbohydrates (oligosaccharides, disaccharides, monosaccharides, and polyols) found in various foods. This group of carbohydrates is often referred to as short-chain carbohydrates. FODMAP-sensitive individuals find it difficult to absorb these short-chain carbohydrates in the small intestine. Instead, these short-chain carbohydrates move into the large intestine, where bacteria use them as an energy source. As a result, significant amounts of flatulence and digestive discomfort are caused.

The acronym, FODMAP, stands for:

F	O	D	M	A	P
Fermentable	Oligosaccharides	Disaccharides	Monosaccharides	And	Polyols

### Symptoms of FODMAP Intolerance

For some people, eating a diet high in FODMAPs can cause symptoms, including bloating, constipation, cramping, diarrhoea, pain in the abdomen, and flatulence.

Evidence suggests that consuming a low FODMAP diet may improve these symptoms. A low FODMAP diet may also assist in relieving the symptoms of irritable bowel syndrome (IBS). IBS is a disorder that affects around one in five Australians. This disorder is not life-threatening; however, it can cause abdominal discomfort, bloating, and a change in bowel habits (constipation or diarrhoea).

Foods that are high in FODMAP are outlined below:

Short-chain carbohydrate		Sugar	Types of food that this short-chain carbohydrate is found in
F	Fermentable		
O	Oligosaccharides	Fructans	<b>Vegetables:</b> asparagus, beetroot, broccoli, brussel sprouts, cabbage, fennel, garlic, leek, onion, okra, shallots, and spring onion <b>Cereal grains:</b> Large amounts of wheat and rye can be found in biscuits, bread, cookies, couscous, and crackers. <b>Fruits:</b> dates, grapefruit, custard apple, persimmon, and watermelon <b>Other foods:</b> chicory, inulin, and pistachio
		Galacto-oligosaccharides or galactans (GOS)	<b>Legumes:</b> baked beans, cashews, chickpeas, kidney beans, lentils, and soybeans
D	Disaccharides	Lactose	<b>Milk:</b> milk and milk products made from cow, goat, and sheep milk, for example, buttermilk, condensed milk, custard, ice cream, kefir, and yoghurt <b>Cheese:</b> soft and unripened cheese, including cottage cheese, cream, mascarpone, and ricotta
M	Monosaccharides	Fructose	<b>Fruit:</b> apples, cherries, mango, pear, ripe bananas, tinned fruit in juice, and watermelon <b>Sweeteners:</b> fructose, high fructose corn syrup, and honey <b>Foods that contain large amounts of fructose:</b> fruit juices, large serves of fruit, dried fruit, and fruit juice concentrate
P	Polyols	Fructose	<b>Fruit:</b> apple, apricot, avocado, blackberry, cherry, lychee, nectarine, peach, pear, plum, prune, and watermelon <b>Vegetables:</b> cauliflower, green capsicum, mushrooms, and sweet corn <b>Sweeteners:</b> isomalt (952), maltitol (965), mannitol (421), sorbitol (420), and xylitol (967)

## FODMAP Substitutions

Listed below are a range of food substitutions that can be consumed on a low FODMAP diet:

Grains	Vegetables	Meat and meat alternatives	Dairy and dairy alternatives	Fruit
Brown rice, buckwheat, maize, millet, oats, polenta, quinoa, and tapioca	Bean sprouts, capsicum, carrot, choy sum, eggplant, kale, tomato, spinach, and zucchini  Herbs and spices: chives, chilli, fenugreek, ginger, lemongrass, mustard seeds, saffron, and turmeric	Tofu, eggs, and most nuts and seeds	Milk alternatives: almond milk, coconut UHT milk, soy milk made from 'hulled' soybeans, and soy milk made from hulled soy beans (small serves)  Lactose-free yoghurt  Hard cheese such as brie and feta  Alternative dairy products fortified with calcium, phosphorus, and vitamin B12 are recommended	Unripe bananas, blueberries, kiwi, limes, mandarins, oranges, papaya, pineapple, rhubarb, and strawberries
<b>Sweeteners</b>				
White, caster, brown, palm, and raw sugar; glucose; pure maple syrup; rice malt syrup; and aspartame				

UHT=ultra heat treatment.

**Watch** these videos to find out more about FODMAP:

<https://www.youtube.com/watch?v=VVtY-VM1Yco>

[https://www.youtube.com/watch?v=Z\\_1Hzl9o5ic](https://www.youtube.com/watch?v=Z_1Hzl9o5ic)

## Managing Food Allergies and Intolerances

The key to avoiding an allergic or intolerant response to a particular food is identifying the types of foods and recipes the food is found in.

### Buying Food

Learning to read and understand the information on food labels is recommended for managing food allergies and intolerance. In February 2021, FSANZ introduced new regulations for the food labelling of common allergens. Simple terminology and easy-to-read information about the allergen in a food product must now be provided in a specific format and location on food labels.

### Dining Out or Buying Takeaway Food

Current legislation does not require non-packaged food to be labelled with allergen information. However, information about common allergens must be displayed with food that contains a common allergen or provided on request. Nowadays, many restaurants, cafes, and takeaway outlets display this information on their menus. People with allergies and intolerances must look for this information.

Asking whether food or a dish contains a food allergen or intolerance is essential if the information is not displayed on the menu. It is best to call a food establishment and advise them that someone visiting the establishment has an allergy or intolerance. Asking food-service staff to inform the chef is also encouraged. This communication is important, even if it is stated that food does not contain an allergen or if it is unlikely the food has an allergen.

Learning about the recipes that may contain a particular food allergen or cause food intolerance is also recommended.

### **When Eating with Others**

People with allergies should always explain to friends and people who invite them to dinner that they have a food allergy or intolerance. They must be very clear about the types of foods that they can and cannot eat and always suggest some alternative food choices they could have instead. This will allow the host to have suitable alternatives or plan a meal that everyone can consume and enjoy together.

People with an allergen or intolerance must not share unlabelled food with friends. Homemade food shared at a picnic or community event could easily contain a ‘hidden ingredient’ that could cause a reaction. For example, popcorn can be relatively harmless; however, cooking it in peanut or macadamia nut oil can be life-threatening for people with nut allergies.

People must also inform workplaces and education providers with up-to-date and accurate allergen documentation.

### **When Out and About**

People with a known allergy should carry adrenaline autoinjectors (EpiPen®). An EpiPen® should be administered if someone has an anaphylaxis reaction. Difficulty breathing, becoming pale or floppy, collapsing, coughing, dizziness, hives, tightness in the throat, swollen face, eyes, lips and tongue, and wheezing can all be signs of an anaphylaxis reaction. These symptoms should subside within minutes of being administered an EpiPen®. If left untreated, the person may die.

### **Managing Allergies and Intolerances Using Apps**

The following apps help people manage their allergies and intolerances:

#### **Monash University FODMAP Diet App**

As a leader in FODMAP research, Monash University has developed an app with one of the most extensive FODMAP food databases available. The app also provides access to low FODMAP recipes and a database of dieticians that can assist people with the condition.

**Click here** to access the FODMAP app: <https://www.monashfodmap.com/ibs-central/i-have-ibs/get-the-app/>

#### **Allergy Pal App**

The Murdoch Children’s Research Institute in Australia has developed an app to help parents manage their children’s allergies. This app allows parents to share a digital action plan with their child’s carers. It also keeps records of their EpiPen®s’ expiry dates.

**Click here** to access the Allergy Pal App: <https://allergyfacts.org.au/resources/apps/allergy-pal>

#### **The Foody App**

The Foody App helps people track their foods and record the severity of their symptoms. This information can be exported in a PDF format to relevant health care providers.

**Click here** to access the Foody App: [https://foody.health/?utm\\_source=allergysave.com&utm\\_medium=blog-post&utm\\_campaign=Allergysave](https://foody.health/?utm_source=allergysave.com&utm_medium=blog-post&utm_campaign=Allergysave)

#### **The Food Switch App**

The Food Switch App allows consumers to scan barcodes and identify gluten-free foods.

**Click here** to access the Food Switch App:

[https://play.google.com/store/apps/details?id=com.foodswitch.android&hl=en\\_AU&gl=US](https://play.google.com/store/apps/details?id=com.foodswitch.android&hl=en_AU&gl=US)

**Watch** this video about a personal story about living with food allergies:

<https://youtu.be/04Dff8Va8s4>

**Watch** this video about how people manage to live with food allergies:

<https://youtu.be/SfDNI11Qqrl>

## Written Activity One

### Case Study Analysis: Melissa

#### Part 1: What triggers irritable bowel syndrome?

Watch the video below: <https://youtu.be/bJLRcHSNUIs>

1. What is IBS? What does it stand for?

2. What can trigger IBS?

3. How is IBS impacting Melissa's life?

4. What do researchers think might be the cause of Melissa's IBS?

5. What is a microbiome? Why is it so important to have a healthy microbiome?

6. What is the relationship between the gut microbiome and the food that people consume?

7. What was Melissa consuming that may have been consuming or what aspects of her lifestyle were impacting her IBS?

**Part 2: How changing your diet can improve your life**

**Watch** the video below: <https://youtu.be/2NNo61xd1pw>

Note: mute the video at 1.10-1.11.

8. What changes did Melissa make to her diet?

9. How have these changes impacted Melissa's mental and physical health?

10. What type of information do case studies like Melissa's give researchers?

## Written Activity Two

### Case Studie Analysis: Sarah, Alix, and Becky

- Divide the class into small groups of around 3 or 4.  
(the same case study can be distributed to different groups)
- Each group is to complete one case study analysis and report their findings to the class, or each group can complete each case study.

## Case Study Analysis: Sarah's Allergies

**Watch** the video at this link and answer the questions: <https://www.youtube.com/watch?v=04Dff8Va8s4>

Answer the following questions:

1. What allergies does Sarah have?

2. What symptoms does Sarah have when she has an allergic reaction?

3. Why do these foods cause her body to react in this way?

4. What does Sarah do to minimise the risk of an allergic reaction?

5. What has Sarah had to do in the past to minimise her risk of an allergic reaction?

6. Why did Sarah experience a life-threatening anaphylactic reaction when eating in a restaurant?

7. What advice does Sarah give to others with regard to managing allergies?

## Case Study Analysis: Alix's Food Intolerance

**Watch** the video at this link and answer the questions: <https://www.youtube.com/watch?v=4-fiJCfGm10>

Answer the following questions:

1. What symptoms did Alix experience?

2. What was the cause of Alix's mysterious illness?

3. What foods should Alix avoid eating?

4. Why do these foods cause Alix to react in this way?

5. What could Alix consume instead of the foods listed below?

Milk	
Yoghurt	
Cheese	
Ice cream	
Cream	

6. What advice do you think Alix would give to people who have a food intolerance?

## Case Study Analysis: Becky's Low FODMAP Diet

**Watch** the video at this link and answer the questions: <https://www.youtube.com/watch?v=NlKF33wGdk>

Answer the following questions:

1. What symptoms might people who benefit from a low FODMAP diet experience?

2. Why do FODMAP sensitive people experience these problems?

3. What foods should people who are FODMAP sensitive avoid eating?

4. Do they need to avoid all of these foods? Why? Why not?

5. What kind of foods can a person on a low FODMAP diet consume?

6. What advice do you think Becky would give to people who are on a low FODMAP diet?

# Practical Activity One

## Allergy and Intolerant Free Party

For this task, you will work in groups of four to make:

- 1 batch of noodles without any modifications.
- 1 batch of noodles modified to meet the needs of two allergens and one intolerance.

and

- 1 batch of cupcakes without any modifications.
- 1 batch of cupcakes modified to meet the needs of one allergen and one intolerance.

### Design Brief

You have been asked to make some noodles and cupcakes to serve at a teenager's 13<sup>th</sup> birthday party. You have been given a basic recipe that you must use. You must modify the recipes to suit the intolerance and allergens you select below.

1. **Select** two of the following allergens:

<input type="checkbox"/> eggs	<input type="checkbox"/> milk	<input type="checkbox"/> soy
<input type="checkbox"/> fish	<input type="checkbox"/> peanuts	<input type="checkbox"/> tree nuts
<input type="checkbox"/> lupin	<input type="checkbox"/> shellfish	<input type="checkbox"/> wheat

2. **Select** one of the following intolerances:

- FODMAP
- gluten
- wheat (if you have not selected it previously)

3. **Modify** the recipes provided to ensure they do not contain the food allergen and intolerant you have selected.

4. **Fill in** the food order for your recipe and submit it to your teacher.

5. **Make** the recipe in class.

6. **Conduct** a sensory analysis using a focus group (teenagers around 13 years of age).

A focus group consists of 6-12 people who are similar to the person the product is made for.

Make sure you check with the people in your focus group to determine if they have a food allergy and/or intolerance.

**Food Order**

<b>Name</b>			
<b>Recipe</b>		<i>A printed copy or website link of your recipe must be submitted with the food order.</i>	
<b>Preparation Time:</b>		<b>Cooking Time:</b>	
<b>Quantity</b>	<b>Refrigerated Items (only one meat)</b>	<b>Quantity</b>	<b>Pantry Items</b>
<b>Quantity</b>	<b>Fruit and Vegetables</b>	<b>Quantity</b>	<b>Frozen Items</b>
<b>Additional Equipment:</b>			
Equipment not located at your workbench must be listed here			

<b>Noodles</b>	
<b>Ingredients:</b>	<b>Sauce Ingredients:</b>
<input checked="" type="checkbox"/> ½ onion <input checked="" type="checkbox"/> 1 carrot <input checked="" type="checkbox"/> 3 shiitake mushrooms <input checked="" type="checkbox"/> 2 spring onions <input checked="" type="checkbox"/> 4 cabbage leaves <input checked="" type="checkbox"/> 150g pork belly, sliced <input checked="" type="checkbox"/> 2 tablespoons macadamia nut oil <input checked="" type="checkbox"/> Freshly ground black pepper <input checked="" type="checkbox"/> 1 to 2 packets of ready-to-eat noodles <input checked="" type="checkbox"/> 1 sheet dried seaweed, shredded	<input checked="" type="checkbox"/> 4 tablespoons Worcestershire Sauce <input checked="" type="checkbox"/> 4 teaspoons oyster sauce <input checked="" type="checkbox"/> 2 teaspoons soy sauce <input checked="" type="checkbox"/> 2 teaspoons sugar
<b>To make and prepare the sauce:</b>	
<ol style="list-style-type: none"> <li>1. <b>Collect</b> and <b>measure</b> ingredients.</li> <li>2. <b>Whisk</b> together all the ingredients.</li> <li>3. <b>Taste</b> and <b>adjust</b> to your preferences.</li> </ol>	
<b>To make the stir-fry:</b>	
<ol style="list-style-type: none"> <li>1. <b>Collect, measure, prepare</b> and <b>cut</b> ingredients as required.</li> <li>2. <b>Slice</b> the onion, <b>cut</b> the carrot into julienne strips, and <b>slice</b> the shiitake mushrooms.</li> <li>3. <b>Chop</b> the green onions into 5 cm pieces, cut the cabbage into bite-sized pieces, and cut the meat into 2.5 cm pieces.</li> <li>4. In a non-stick frypan or wok, <b>heat</b> the oil on medium-high heat. <b>Cook</b> the meat until it's no longer pink.</li> <li>5. <b>Add</b> the onions and carrots. <b>Cook</b> for 1-2 minutes.</li> <li>6. <b>Add</b> the cabbage and <b>cook</b> until it's almost tender.</li> <li>7. <b>Add</b> the spring onions and shiitake mushrooms. <b>Cook</b> for 1 minute.  <b>Season</b> with freshly ground black pepper to taste             </li> <li>8. Transfer the noodles to a sieve and run hot water over the noodles. Loosen the noodles with your hands.  <b>Add</b> the noodles to the frypan or wok and lower the heat to medium.</li> <li>9. <b>Add</b> the sauce and mix it all together. <b>Add</b> more sauce if needed.</li> <li>10. Transfer the stir-fry to small containers.</li> <li>11. <b>Garnish</b> with the dried green seaweed.</li> <li>12. <b>Serve</b> immediately.</li> </ol>	

## Cupcakes

### Cupcake Ingredients:

<input checked="" type="checkbox"/> 65g butter	<input checked="" type="checkbox"/> $\frac{1}{4}$ cup milk
<input checked="" type="checkbox"/> 1 teaspoon vanilla essence	<input checked="" type="checkbox"/> $\frac{3}{4}$ cup self-raising flour
<input checked="" type="checkbox"/> 60g caster sugar	<input checked="" type="checkbox"/> Approximately 12 paper patty cases
<input checked="" type="checkbox"/> 1 egg	

### Cupcake Method:

1. **Collect** and **measure** ingredients.
2. **Preheat** the oven to 180°C.
3. **Line** 2 x 12-hole cupcake pan trays with paper cases.
4. **Combine** all ingredients in a medium bowl of an electric mixer, and **beat** on low speed until all ingredients are combined.
5. **Beat** on a medium speed for 1-2 minutes.
6. **Divide** into paper cases.
7. **Bake** for about 20 minutes.
8. **Turn** onto a wire rack to cool.
9. **Ice** with glacé icing.

### Icing Ingredients:

<input checked="" type="checkbox"/> 1 cup icing sugar	<input checked="" type="checkbox"/> 2 teaspoons hot water. Add more if needed
<input checked="" type="checkbox"/> 20g soft butter	<input checked="" type="checkbox"/> colouring and/or flavouring

### Method:

1. **Collect** and **measure** ingredients.
2. **Sift** icing sugar so that there are no lumps.
3. **Add** hot water and butter to the icing sugar.
4. **Combine** ingredients thoroughly.
5. **Add** colour and flavour as desired.
6. **Add** more water if needed, a little at a time.

### Focus Group Sensory Analysis

1. **Invite** a group of Year 7 or 8 students to taste the noodles and cupcakes you have made.

Two different types of sensory tests have been provided.

Test one is a simpler version that requires little explanation to participants.

Test Two is a more complicated version that requires further explanation to participants.

2. **Survey** the participants using one of the sensory tests.

3. **Calculate** the results of the test and present them in a graphical format.

Visit this link to find out how to create a graph in excel: [https://youtu.be/Au1\\_mpiU1qA](https://youtu.be/Au1_mpiU1qA)

4. **Answer** the following questions:

a. What were the most popular noodle and cupcake?

b. Why do you think this was the most popular?

c. Did these results surprise you?

**Sensory Taste Test – Option 1**

Place a tick in the box that best represents how you feel about the taste of each type of noodles.

Noodles	Dislike a lot	Dislike	Undecided	Like	Like a lot
					
Sample A					
Sample B					

Place a tick in the box that best represents how you feel about the taste of each type of cupcake.

Cupcakes	Dislike a lot	Dislike	Undecided	Like	Like a lot
					
Sample A					
Sample B					

Place a tick in the box that best represents how you feel about the taste of each type of noodles.

Noodles	Dislike a lot	Dislike	Undecided	Like	Like a lot
					
Sample A					
Sample B					

Place a tick in the box that best represents how you feel about the taste of each type of cupcake.

Cupcakes	Dislike a lot	Dislike	Undecided	Like	Like a lot
					
Sample A					
Sample B					

Place a tick in the box that best represents how you feel about the taste of each type of noodles.

Noodles	Dislike a lot	Dislike	Undecided	Like	Like a lot
					
Sample A					
Sample B					

Place a tick in the box that best represents how you feel about the taste of each type of cupcake.

Cupcakes	Dislike a lot	Dislike	Undecided	Like	Like a lot
					
Sample A					
Sample B					

**Sensory Taste Test – Option 2**

Place a tick in the box that best represents how you feel about the sensory properties of the noodles.

Noodles		Dislike a lot	Dislike	Undecided	Like	Like a lot
						
Appearance	Sample A					
	Sample B					
Texture	Sample A					
	Sample B					
Smell	Sample A					
	Sample B					
Taste	Sample A					
	Sample B					

Place a tick in the box that best represents how you feel about the sensory properties of the cupcakes.

Cupcake		Dislike a lot	Dislike	Undecided	Like	Like a lot
						
Appearance	Sample A					
	Sample B					
Texture	Sample A					
	Sample B					
Smell	Sample A					
	Sample B					
Taste	Sample A					
	Sample B					

## Summary Activity

**What is the main idea about the key knowledge & key skills?**

**Explain what a food allergy is.**

**Identify the foods that cause an allergy and list some substitutes for these ingredients.**

**Explain what a food intolerance is.**

**Identify the foods that cause a intolerance and list some substitutes for these ingredients.**

**Explain what FODMAP is and what it stands for.**

**Identify the kinds of foods someone on a low FODMAP diet might eliminate from their diet.**

**List some substitutes for these ingredients.**

**Identify the similarities and differences between food allergies and food intolerances.**

**Refer to the following in your response:**

- The type of reaction that occurs and reasons why the reactions occur
- The most likely foods that cause reactions
- The way the reaction/ condition is managed

Differences	Similarities	Differences
Allergies	Allergies and Intolerances	Intolerances

**Identify how to manage allergies and intolerances:**

In practical Food Studies classes at school:

When cooking at home:

When buying food at places like a supermarket:

When dining out at a restaurant or buying takeaway food:

When visiting a friend's home:

## Exam Preparation

### Section A - Multiple Choice Questions (5 marks)

#### Question 1

Identify the most appropriate preventative practice for a person with lactose intolerance:

- a. Use pasta made from rice instead of wheat.
- b. Use lactose-free milk instead of cow's milk.
- c. Use low-fat cheese.
- d. Carry an EpiPen at all times.

#### Question 2

What is food intolerance?

- a. A form of coeliac disease.
- b. An immune response to a food.
- c. A chemical reaction to a food.
- d. A life-threatening response that occurs when someone consumes peanuts.

#### Question 3

FODMAP is an abbreviation for:

- a. fermented oligosaccharides, disaccharides, monosaccharides and accharide polyols.
- b. fermentable oligosaccharides, disaccharides, monosaccharides and polyols.
- c. oligosaccharides, disaccharides, monosaccharides and polyols.
- d. A food intolerance.

#### Question 4

A symptom of a food allergy is:

- a. Bloating.
- b. Stomach Pain.
- c. Swelling of the tongue or mouth.
- e. Diarrhoea.

#### Question 5

Gluten can be found in:

- a. Sauces and stock powder.
- b. Soy flour.
- c. Gluten-free sausages.
- d. Rice.

## Section B – Short Answer Responses (15 marks)

### Question 1 (4 marks)

Explain the term food allergy and food intolerance.

### Question 2 (6 marks)

a. Outline what may happen if a person experiences a food intolerance reaction. 2 marks

b. Outline what may happen if a person experiences a severe allergic reaction. 2 marks

c. Identify one food that someone may have an allergic reaction to and one food that someone may be intolerant to. 2 marks

**Question 3 (5 marks)**

A food manufacturer is considering releasing a new low FODMAP product range.

Their family-sized spaghetti bolognese is currently the most popular food product they sell. Shown below is the list of ingredients that are found on the package of spaghetti bolognese.

**INGREDIENTS LIST:** Beef Sauce (60%), Cooked Spaghetti (37.5%), Ricotta Cheese (2.5%) (Milk).

**Beef Sauce contains:** No Added Hormone Australian Beef (33%), Diced Tomato (32%) [Tomato, Acidity Regulator (330), Mineral Salt (509)], Water, Tomato Paste, Onion, Carrot, Canola Oil, Corn flour, Crushed Garlic, Natural Beef Flavour, Salt, Thyme, Oregano  
**Cooked Spaghetti contains:** Spaghetti [Durum Wheat, Durum Wheat Semolina], Canola Oil.

a. Examine the list and identify one ingredient that is linked to FODMAP. 1 mark

b. Outline two ways in which the food manufacturer could alter the ingredients in the spaghetti bolognese to make it suitable for someone who has a FODMAP intolerance. 2 marks

c. The key to avoiding an allergic or intolerant response to a particular food is identifying the types of foods and recipes the food is found in.

Explain what someone who follows a low FODMAP diet can do to manage their condition when they are eating food outside of the home. 2 marks

## Exam Preparation

### Section A - Multiple Choice Questions (5 marks)

#### Question 1

Identify the most appropriate preventative practice for a person with lactose intolerance:

- Use pasta made from rice instead of wheat.
- Use lactose-free milk instead of cow's milk.
- Use low-fat cheese.
- Carry an EpiPen at all times.

The answer is not A. Pasta made from rice is suitable for someone with gluten intolerance. Lactose is found in dairy foods. It is unlikely that lactose would be in pasta.

**The answer is B. Cow's milk contains lactose. Someone with lactose intolerance can consume lactose-free milk.**

The answer is not C. Low-fat milk is low in fat only.

The answer is not D. An EpiPen will not provide any relief for someone experiencing food intolerance symptoms.

#### Question 2

What is food intolerance?

- A form of coeliac disease.
- An immune response to a food.
- A chemical reaction to a food.
- A life-threatening response that occurs when someone consumes peanuts.

The answer is not A. Coeliac disease is neither an allergy nor an intolerance.

The answer is not B. An immune response occurs when the body defends itself against a substance that it thinks is foreign or harmful. This is an allergic reaction.

**The answer is C. Food intolerance is a chemical reaction that usually occurs when the body responds to a chemical (substance) ingested.**

The answer is not D. A food intolerance causes discomfort, but it is not life-threatening.

#### Question 3

FODMAP is an abbreviation for:

- fermented oligosaccharides, disaccharides, monosaccharides and accharide polyols.
- fermentable oligosaccharides, disaccharides, monosaccharides and polyols.**
- oligosaccharides, disaccharides, monosaccharides and polyols.
- A food intolerance.

The answer is not A. The correct term is fermentable, not fermented.

**The answer is B. This is the correct abbreviation.**

The answer is not C. This answer is missing 'fermentable' at the start.

The answer is not D. FODMAP is a specific type of food intolerance.

**Question 4**

A symptom of a food allergy is:

- a. Bloating.
- b. Stomach Pain.
- c. **Swelling of the tongue or mouth.**
- e. Diarrhoea.

The answer is not A, B, or D. These are all symptoms of food intolerance.

**The answer is C. Swelling of the tongue and mouth are symptoms of a food allergy.**

**Question 5**

Gluten can be found in:

- a. Sauces and stock powder.
- b. Soy flour.
- c. Gluten-free sausages.
- d. Rice.

The answer is not B, C, or D. Gluten is not present in soy flour, gluten-free food items, or rice.

**The answer is A. Stocks and sauces are often thickened with flour that may contain gluten.**

## Section B – Short Answer Responses (15 marks)

### Question 1 (4 marks)

Explain the term food allergy and food intolerance.

For 2 marks, the student needed to explain the term 'food allergy.'

For 2 marks, the student needed to explain the term 'food intolerance.'

Food intolerance is a chemical reaction that occurs in some people after they consume a particular food. It occurs when the body produces insufficient amounts of the enzymes needed to digest specific types of food. In contrast, an allergen occurs when the immune system reacts to food by making antibodies to destroy the food because it is harmful.

### Question 2 (6 marks)

a. Outline what may happen if a person experiences a food intolerance reaction. 2 marks

For two marks, the student needed to explain what happens when someone has a food intolerance reaction.

Responses to a food intolerance include asthma, bloating, breathing problems, diarrhoea, headaches and migraines, stomach pain, and sweating.

b. Outline what may happen if a person experiences a severe allergic reaction. 2 marks

For two marks, the student needed to refer to anaphylaxis as a severe reaction where someone could die. In addition, they could have also mentioned one of the following:

- A person's blood pressure drops suddenly;
- Airways begin to close; and
- Experiencing difficulty breathing.

Anaphylaxis is a severe reaction where a person's blood pressure drops suddenly, and their airways begin to close. They experience difficulty breathing and may die.

c. Identify one food that someone may have an allergic reaction to and one food that someone may be intolerant to. 2 marks

For one mark, the student could list any of the following types of allergens:

- Eggs, fish, lupin, milk, peanuts, shellfish, soy, tree nuts, and wheat.

For one mark, the student could list any of the following types of foods that people are intolerant to:

- People can have an intolerance to gluten that is found in bread or pasta. People can have an intolerance to gluten that is found in bread or pasta.
- People could have lactose intolerance and will need to avoid dairy foods.

**Question 3 (5 marks)**

A food manufacturer is considering releasing a new low FODMAP product range.

Their family-sized spaghetti bolognese is currently the most popular food product they sell. Shown below is the list of ingredients that are found on the package of spaghetti bolognese.

**INGREDIENTS LIST:** Beef Sauce (60%), Cooked Spaghetti (37.5%), Ricotta Cheese (2.5%) (Milk).

**Beef Sauce contains:** No Added Hormone Australian Beef (33%), Diced Tomato (32%) [Tomato, Acidity Regulator (330), Mineral Salt (509)], Water, Tomato Paste, Onion, Carrot, Canola Oil, Corn flour, Crushed Garlic, Natural Beef Flavour, Salt, Thyme, Oregano  
**Cooked Spaghetti contains:** Spaghetti [Durum Wheat, Durum Wheat Semolina], Canola Oil.

a. Examine the list and identify one ingredient that is linked to FODMAP. 1 mark

Any of the following ingredients were acceptable responses:

Onion, spaghetti, ricotta cheese, or garlic

b. Outline two ways in which the food manufacturer could alter the ingredients in the spaghetti bolognese to make it suitable for someone who has a FODMAP intolerance. 2 marks

For 2 marks, the student needed to suggest two different ingredients that could be used in the spaghetti bolognese.

Any of the following ingredients were acceptable responses:

Herbs and spices like chili could be used instead of onion and garlic.

Hard cheese like feta could be used instead of ricotta cheese.

Pasta made from buckwheat or rice could be used instead of spaghetti pasta made from wheat.

c. The key to avoiding an allergic or intolerant response to a particular food is identifying the types of foods and recipes the food is found in.

Explain what someone who follows a low FODMAP diet can do to manage their condition when they are eating food outside of the home. 2 marks

For 2 marks, the student needed to explain other measures a person who follows a low FODMAP diet can do to manage their condition.

Any of the following ingredients were acceptable responses:

They could explain to friends and people who invite them to dinner that they follow a low FODMAP diet and discuss some food substitutions with them.

When eating food at a restaurant or fast food shop, they should ask whether a dish contains a known ingredient that causes a FODMAP reaction. They can even call ahead and ask the establishment.

Many places nowadays identify on their menus whether something is suitable for a low FODMAP diet. They could go to restaurants and fast food shops that provide this information.