AQA
Realising potential

GCSE FOOD PREPARATION AND NUTRITION

(8585)

Food investigation tasks and commentaries

Four examples of students' work to help you understand how different marks are achieved and how to interpret the marking criteria.

Version 1.0 May 2017

EXAMPLE STUDENT NEA TASKS

Food investigation task

Example folder 1

GCSE Food Preparation and Nutrition

Investigate the ingredients used for bread making

Chosen task: *Investigate the ingredients used for bread making*

Task analysis

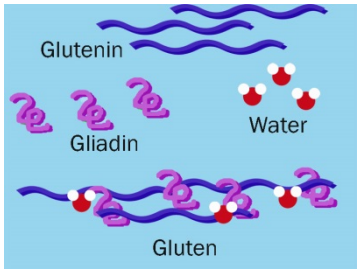
To be able to answer the food investigation task I will carry out background research into the ingredients used to make bread, particularly the types of flour that can be used. I will make use of prior learning related to bread making, particularly the functions of ingredients. There are many different types of bread available around the world including ciabatta, focaccia, soda bread, chapattis, and naan bread. These breads all include different ingredients. When I have completed the research I will carry out practical investigations based on the working and chemical properties of ingredients for bread making.

Prior Learning: Working properties/Function of ingredients in bread.

Strong plain flour	This has high gluten content. Gluten forms the structure of the bread.
Yeast	Produces carbon dioxide gas known as fermentation.
Salt	Stengthen gluten and adds flavour
Liquid	Binds dry ingredients together, works with gluten to stretch the dough. Liquid (water/milk) should be lukewarm to help the yeast to ferment.
Sugar	This speeds up fermentation.

Research:

Flour is used in the making of bread, the protein in the flour, is called gluten. The gluten is used because of its ability to stretch, be elastic, when kneaded; producing the structure of the bread. Gluten also has the ability to hold pockets of gas produced by the yeast. Gluten aids in setting the framework of the bread by coagulating when heated and therefore produces the structure. The gluten is developed and strengthened through the kneading process during bread making.



Wheat flour contains two proteins – glutenin and gliadin – which connect with each other and water to form gluten. Stirring and kneading increases gluten formation. The gluten catches the carbon dioxide produced by the yeast and stretches, resulting in millions of tiny bubbles.

https://pieinthewoods.wordpress.com/2012/11/28/pie-crust/

Different types of flours can be used when making of bread, these flours include; plain flour, strong plain flour, wholemeal flour and granary flour. Each of these flours has a different gluten content which causes both physical and chemical changes to the bread.

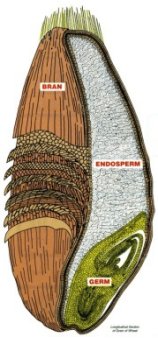
How much protein is in your flour?

flour type	% protein	recommended uses
high-gluten	14 to 15	bagels, pizza crusts, blending with other flours
whole-wheat	14	hearth breads, blending with other flours
bread	12 to 13	traditional breads, bread machine breads, pizza crusts
all-purpose	9 to 12	everyday cooking, quick breads, pastries
self-rising	9 to 11	biscuits, quick breads, cookies
pastry	8 to 9	pie crusts, pastries, cookies, biscuits
cake	5 to 8	cakes, especially those with a high ratio of sugar to flour

The table which I sourced from a website shows the % of protein in flour. Plain flour has some gluten content. Strong plain flour has the highest gluten content, which provides elasticity to the bread dough producing the unique strong stretch when kneading.

Plain flour and strong plain flour has a 70% extraction rate, meaning it contains 70% of the original grain; the bran and germ have both been removed from the grain.

Wholemeal flour contains gluten but has a high fibre content. Both wholemeal and granary flour has bran included in the flour, and grain like texture because of the 100% extraction rate. This extraction rate means that nothing has been removed from the wheat grain.



Bran: The hard brown protective skin of the grain. It surrounds the germ and the endosperm and protects the grain from environmental factors, such as weather, insects, mould and bacteria. The bran includes dietary fibre which is required for the body and B vitamins
Endosperm: The centre of the grain. The endosperm is equal to 83% of the whole grain and contains the greatest share of the grains protein.
Germ: The embryo of the grain. It holds most of the fat and vitamin E of the whole grain. It is usually separated because the fat limits the keeping quality of the flour.

Hypothesis:

My hypothesis which I am going to examine and test is that the most successful flour for bread making is strong plain flour because it has a higher gluten content.

Investigation:

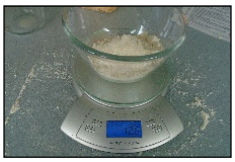
To test my hypothesis I am going to complete three investigations which all focus on a different component of bread making:

- Investigation 1: Experiment with making bread rolls with different types of flour; Wholemeal, Plain, Strong plain and Granary to examine the texture.
- Investigation 2: Gluten balls experiment. Make four dough mixtures with different flours and remove the starch from the dough.

Investigation 1: Testing different flours for bread making

Different bread rolls were made, using the same process and techniques, with four different types of flour; plain flour, strong plain flour, granary flour and wholemeal flour. These different types of flour provide different textures, flavours, aromas, appearances and nutritional compositions.

Sample XYX: Wholemeal flour, salt, sugar, warm water, yeast
Sample ZYX: Strong plain flour, salt, sugar, warm water, yeast
Sample ZYY: Plain flour, salt, sugar, warm water, yeast
Sample ZZX: Granary flour, salt, sugar, warm water, yeast




Photographs provide a visual representation of the bread making process.





Testing panels were used when scoring the different samples. These scores were produced by 4 different tasters who provide a score of up to 5 for each sensory characteristic; the taste, texture, aroma and appearance.

Sample	Appearance				Total	Texture				Total	Taste				Total	Aroma				Total	Final Total
XYX	3	3	3	4	**13**	3	3	3	3	**12**	3	2	3	3	**11**	3	3	2	2	**10**	**46**
ZYX	4	4	5	4	**17**	4	5	4	5	**18**	4	4	4	4	**16**	4	5	4	4	**17**	**68**

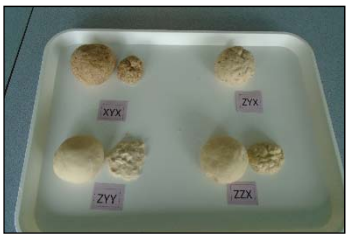
ZYY	4	3	5	5	**17**	4	4	3	3	**14**	4	4	4	3	**15**	4	3	3	4	**14**	**60**
ZZX	3	3	4	3	**13**	4	4	3	3	**14**	3	4	3	3	**13**	4	2	3	3	**12**	**52**

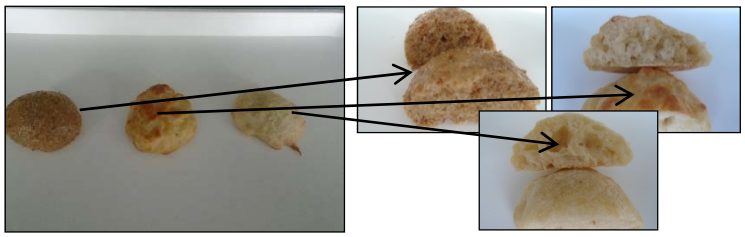
The most successful sample was ZYX, the strong plain flour, which scored 68/80. The tasters found the texture was the best characteristic scoring 18/20 because of its aerated framework. The appearance and aroma both scored 17/20 showing that they were both successful aspects of the samples. Sample ZYY, the plain flour, scored 60/80 by the testing panel. The testing panel found that the appearance was good scoring 17/20. The texture scored 14/20 because the dough was tight. Sample ZZX received a score of 52/80. It received a score of 14/20 for its crisp and aerated texture. The least successful sample was XYX which received a score of 46/80. This sample was not popular with the testing panel because it was dry and dense.

To conclude strong plain flour has an open structure because the gluten has stretched. Wholemeal flour did rise and had a good structure but to make it more open some strong plain flour needs to be added. Plain flour has little gluten which made a heavy texture. Granary flour had a heavy structure.

Investigation 2: Testing the amount of gluten in bread dough.

Four different types of bread rolls were made and the starch was extracted from the samples. This occurred by washing the bread doughs and squeezing the starch and water from the wet dough. This leaves the gluten which was then heated to coagulate the gluten.





Sample XYX was made from wholemeal flour. This sample produced little gluten it was difficult to remove the starch from the dough. The sample had a light brown colour caused by the natural colour of the bran on the grain.

Sample ZYX was made from granary flour. Similar to wholemeal flour it contains all of the components of the grain, including the germ and the bran. The gluten from the flour was washed away with the unwanted starch. This prevented from any results from being collected.

Sample ZYY was made from strong plain flour and included the most gluten. When the gluten was heated it showed the strong open structure. The high gluten content allows this sample to be highly suitable for bread making.

Sample ZZX was made from plain flour. This sample included less gluten and an open structure was not created.

The sample which is most suitable for the bread making process is sample ZYY (strong plain flour) because of the high gluten content which provides the elastic property. With more time I could have weighed the dough before and after testing to have a more accurate result.

Investigation 3: Testing the fermentation of yeast

I decided to carry out a further investigation on the conditions yeast needs to ferment successfully.

I have tested the gluten content in bread I now wanted to find the best conditions for yeast to release carbon dioxide.
Different samples of yeast were kept in different conditions and the amount of carbon dioxide produced was measured using balloons. The carbon dioxide is produced by the yeast being activated by warmth, food and time. The balloons were compared to see the amount of carbon dioxide was produced.

Sample 1, the yellow balloon, produced the most carbon dioxide. This is because it was kept in the perfect conditions for yeast growth. The yeast in this test tube had access to food the sugar, warmth, the warm water and being left at room temperature, and time. All of these conditions allowed the yeast to produce as much carbon dioxide.
Sample 2, the red balloon, produced no carbon dioxide. The sample had time and warmth however it had no sugar which meant that the yeast had no access to food. This meant that the yeast would not activate and therefore no carbon dioxide was produced.
Sample 3, the blue balloon, produced no carbon dioxide. This sample had access to all of the necessary requirements such as food, time and warmth. However, the yeast was in direct contact to the salt. This meant that yeast was killed before it was activated and fermented. This prevented carbon dioxide from being produced.
Sample 4, the green balloon, had access to food and time however it was kept in refrigerated conditions, 0°C to below 5°C. When the yeast was kept in this refrigerated condition some carbon dioxide was produced but very slowly.
To conclude, the sample which produced the most carbon dioxide and is therefore most appropriate for bread making is sample 1, with the yellow balloon. This is because carbon dioxide is needed to aerate the dough.

Analysis and evaluation:
The most appropriate flour to use for bread making is the strong plain flour, as concluded by investigation 1 and 2. Investigation 1 found that the strong plain flour provided the best sensory characteristics when compared to the other flours; granary, wholemeal and plain flour. Furthermore, investigation 1 found that strong plain flour was the most popular flour with the testing panel. Investigation 2 found that the strong plain flour was the most suitable for bread making because it includes the highest gluten content of all the flours tested. The gluten is needed in the making process of bread because it provides the elasticity and stretch of the dough when it is kneaded. The gluten also sets the framework and structure of the bread when heated because it coagulates. The practical investigation supports the research I found out.
Investigation 3 found that yeast needs all conditions to be correct to allow carbon dioxide to be produced. Carbon dioxide is key in bread making because it allows the bread to produce a rise which aids the texture. Furthermore, investigation 3 showed that ingredients, especially salt, which should not be in contact with the yeast, should be kept separate because of the risk to kill the yeast.
It is evident that my hypothesis was correct. The investigations all show that the most successful flour for bread making is strong plain flour. This is because it was the most popular with the testing panel and it includes the most gluten. I have proved my hypotheses: when making bread it is essential that a flour is used that includes a high gluten content this allows the correct texture to be achieved. It is evident that the type of flour used in the bread making process has an effect on the final product. White flours are arguably better for the structure and texture of the bread whereas the wholemeal flours, such as granary flour and wholemeal flour, provide a better nutritional composition.

Bibliography

Rickus et al (2016) (2016) AQA GCSE Food Preparation and Nutrition, Hodder
Tull, A ; Littlewood G (2016) AQA GCSE Food Preparation and Nutrition, Illuminate
https://pieinthewoods.wordpress.com/2012/11/28/pie-crust/

Food investigation task

Commentary for example folder 1

GCSE Food Preparation and Nutrition

See section 4.3.4 of the specification for guidance on marking the tasks

Investigate the ingredients used for bread making

Marking criteria	Strengths	Development	Marks
Research (6 marks)	• Clear understanding of the task requirements. • Good use of prior learning related to bread making as a starting point of the research. • Several sources used as part of the background research. Information edited well with good use of key subject terminology. The secondary sources have been referenced. • The research is relevant and has been used to formulate the hypothesis. A clear hypothesis has been established. • Two investigations have been planned initially related to flour and gluten – this links to the research and hypothesis.	• Justification related to why these investigations have been planned would add to this section. This could be produced in a table.	**5**
Investigating (15 marks)	• Investigations 1 and 2 show very good knowledge and understanding of how ingredients work and why. Linked closely to the hypothesis. • Good range of testing examples carried out and results recorded and interpreted accurately. Very good use of photographic evidence to record the investigations. • Practical investigations are recorded well with very good use of sensory tables and photographic evidence.	• Little mention of the controls applied to the investigation. • Photographic evidence is clear but annotation related to the function and chemical properties would have improved the content. • Photographic evidence should be authenticated with the student's name or number. • Investigation 3 does not relate specifically to the	**11**

	• Investigations are clear and practical results well recorded.	hypothesis. • For a wider range of investigations, the following are examples: kneading times of bread dough with flours/comparison of equipment/amount of water to make the perfect bread dough/stretching tests of raw dough etc.	
Analysis and evaluation (9 marks)	• Accurate and very good analysis of the results with clear justification related back to the research findings. • Good use of specialist terminology throughout the report. • The hypothesis proven by the investigation work. • Report is communicated in a structured and coherent manner. • Excellent understanding of the working properties of ingredients.	• There are many strengths to the analysis and evaluation, but little reflection of how the results will be applied when preparing and cooking food – this prevents further marks from been awarded.	**7**
Total	The project was complete within 10 hours and is within the 1500-2000 word count.		**23**

Food investigation task

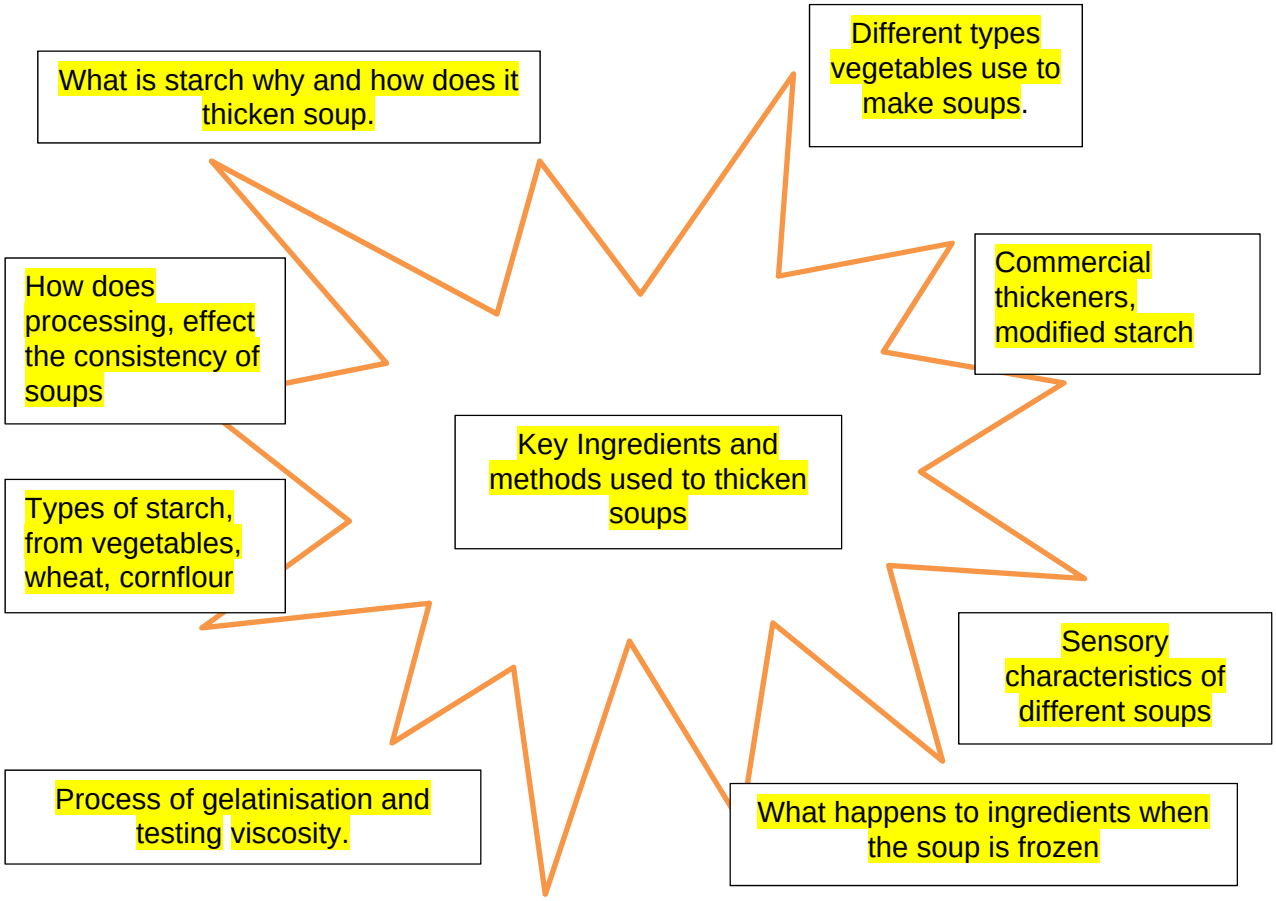
Example folder 2

GCSE Food Preparation and Nutrition

Investigate the ingredients used to thicken sauces and/or soups

Task: Investigate the ingredients used to thicken sauces and or soups.

Section A: Analysis of task: Key areas for research.



Section A: Research into different ingredients used to thicken soups:

Main factors to consider are:

The consistency and mouth feel of the soup is a main factor, using starch from cereal based products e.g corn flour and plain flour can create a thick and gluey consistency. The use of root vegetables which contain starch in the tubers can leave the soup grainy and pulses e.g lentils and beans are also a recommended way of thickening soup. Starch is a type of carbohydrate, and is used to thicken products, the process is gelatinisation.

The stages of thickening with starch

1. When a liquid and starch are heated together to 60 degrees the liquid enters the starch granules.	
2. The starch granules swell.	
3. At 80 degrees they burst. The starch thickens forming a gel. Process known as **gelatinisation**.	
4. At 100 degrees gelatinisation is complete. 5. On cooling the gel sets and the sauce becomes thicker	

The following factors can affect the way gelatinisation works in soups, the amount of liquid used, the type of starch, the temperature at which the soup is heated too, if the soup contains a high amount of acid as in tomato soup and the amount of stirring done during the making this is very important if cereal starch is used as it can form lumps if not stirred continuously.

The table below demonstrates the advantages and disadvantages of using some of these different ingredients to thicken soups

Type of starch	advantages	disadvantages
Corn flour	A very good thickener gives different consistencies.	Needs to be mixed to a paste with cold water or will go lumpy, if it is boiled
Plain flour	If it used a roux it can form a smooth soup	It needs to cook for a long time or it will taste of uncooked flour
Starch vegetables	These are a natural way to thicken, using potato, yams, sweet potato, etcLeft over mashed potato makes a good thickener for soup. The soup should have a more glossy appearance	Can make the soup grainy and stringy if vegetables are not cooked properly

Rice/pasta/oats	These can produce a lot of body to the soup, it can be very filling.	If too much is used it can be very gloopy or sticky, it is not a good idea to puree these ingredients
Cream	Gives a very creamy texture and good flavour	Needs to be done very carefully as it can curdle or separate if heated too much
Pulses	Lentils and beans are good ways to thicken soup and add extra nutrients	They can make a very thick texture and can be grainy they usually need to be blended
Blending	A good and quick way to thicken soups it gives a even and smooth finish, a hand blender is best.	Need to be careful that all the lumps are gone
Modified starch	A very quick way to thicken stops the soup from splitting good for freezing	Not often available at home

Linking research and investigation planning:

The research has shown me that several different starch ingredients can be used to thicken soups The starch in the different carbohydrate products can give different end results. I will plan three investigations which will test the sensory characteristics and thickness/viscosity of the soup.

Hypothesis
Starch vegetables thicken soups and produce the best sensory characteristics (taste, texture and appearance)

Section B: Planned investigations
To test my hypothesis, I am going to do the following two investigations; each one will test a different way of thickening the soup. I will conduct a fair test and have a control.
1: test how different ingredients thicken tomato soup: control (no thickener) corn flour, plain flour, oats, lentils and cream: (control = tomatoes, onion, celery, stock)
2: test how different starchy vegetables thicken vegetable soups: control (base soup ingredients) yam/sweet potato/potato/celeriac/butternut squash. (control = onion, carrot, celery leek and stock.)

These pictures show the range of starches which I could use for my investigations. I have decided not to use them all. In particular the modified starch and beans. I could use these if I was to extend the investigation further.

Investigation 1

A control batch of tomato soup was made and blended using a hand blender, it was then thickened using the following ingredients:

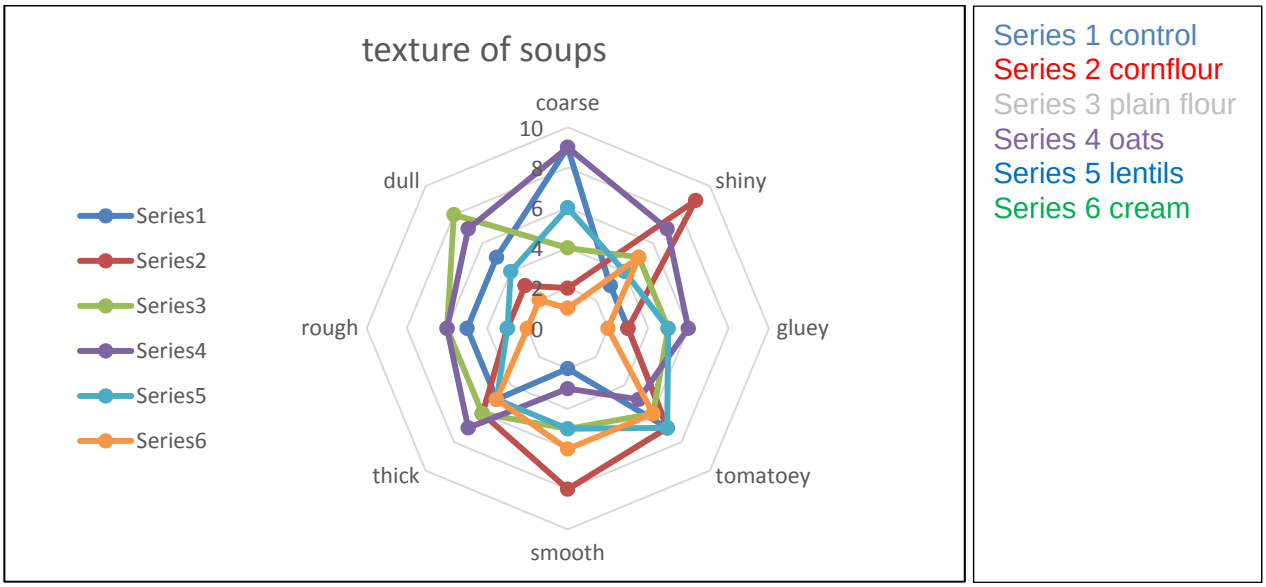
Control	Blended hand blender	Total result:
Sample 1	Cornflour and blended	50
Sample 2	Plain flour and blended	29
Sample 3	Oats and blended	8
Sample 4	Lentils and blended	42
Sample 5	Double cream and blended	46

to test the sensory characteristics of the different thickening ingredients a group of testers were asked to rate the samples for taste, texture, and appearance.

sample	taste					texture					appearance				
Control	2	1	3	2	1	3	2	1	2	3	1	2	1	2	1
Sample 1	4	3	3	4	3	4	5	2	4	3	4	3	2	3	3
Sample 2	1	2	1	1	2	1	2	2	2	2	2	2	3	3	3
Sample 3	1	1	0	0	0	1	1	0	0	1	1	1	1	0	0
Sample 4	3	4	3	3	2	2	3	3	3	2	3	2	3	3	3
Sample 5	4	3	3	3	2	3	3	4	3	4	3	3	2	3	3

The scores from the 5 tasters were added up and sample 2 the soup thickened with corn flour was the most popular scoring 50/75, the reasons for this were that the cornflour made a very smooth and shiny soup which was very tasty and tomatoey.

coarse	9	2	4	9	6	1
shiny	3	9	5	7	4	5
gluey	3	3	5	6	5	2
tomatoey	7	7	6	5	7	6
smooth	2	8	5	3	5	6
thick	5	6	6	7	5	5
rough	5	3	6	6	3	2
dull	5	3	8	7	4	2



The textures of the soups were very interesting and once again the cornflour thickened soup was preferable to the tasters, as the appearance was shiny, texture smooth, flavour very good, it reminded them of 'tinned soup'

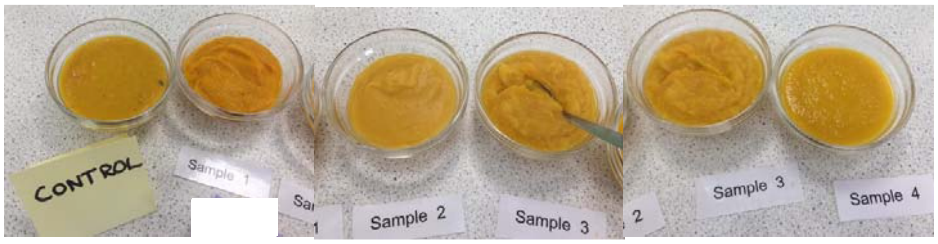
Conclusion:
As a result of this investigation cornflour appears to be the most popular starch to thicken the tomato soup. Although cream was very popular some felt it was too rich. Cornflour has tiny starch

particles and therefore make the soup shiny and more appealing. It is also easy to create the best thickness by choosing the right amount of starch to blend with water, the viscosity chart shows this.

Investigation 2 test how different starchy vegetables thicken vegetable soups: control (base soup ingredients) yam/sweet potato/potato/celeriac/butternut squash.

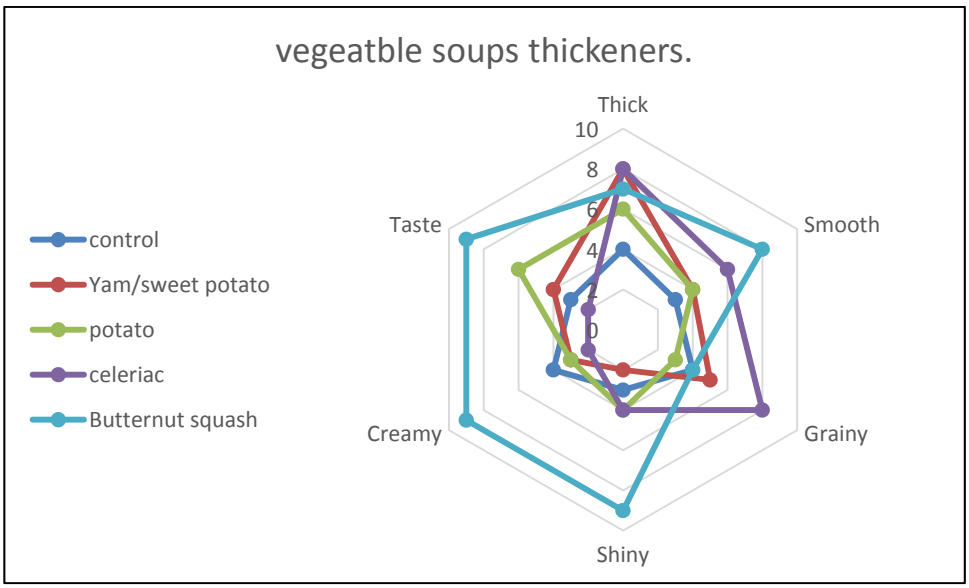
This investigation looked at different types of root and tuber vegetables to thicken the soup. In my research it showed that these were to best. I am hoping to show this in my investigation.

Control	Blended
Sample 1	Yam /sweet potato
Sample2	Potato
Sample3	Celeriac
Sample4	Butternut squash



the tasting panel judged the vegetables soups using the following sensory descriptors:

Sensory descriptors	control	Yam/sweet potato Sample 1	Potato Sample 2	Celeriac Sample 3	Butternut squash Sample 4
Thick	4	8	6	8	7
Smooth	3	4	4	6	8
Grainy	4	5	3	8	4
Shiny	3	2	4	4	9
Creamy	4	3	3	2	9
Taste	3	4	6	2	9



Section C: Analysis and evaluation

The results of this investigation were much closer as the testers really liked the flavour of all the soups except the celeriac which they though was a strange taste. The butternut squash has a very rich colour and lovely creamy taste, this was the favourite. The colours of the soups were also very different and this was very interesting. It would be good in another investigation to combine some vegetables especially potato and butternut squash as this would probably give a very good soup. Some were very thick and this was interesting as I used the same amount 100g of each different vegetable.

Analysis and Evaluation:

The results of the two investigations show that using butternut squash or a combination of starch vegetables is the best way to thicken soups. Although I didn't thicken the tomato soup with the starch vegetables I think the result would be the same. The starch in the cornflour gave a good result but it did not produce a good flavour and I think this is why the starch vegetables are better and prove the hypothesis. Also the vegetables are more natural he testers were very clear.

Bibliography:

- Tull & Littlewood: AQA GCSE Food Preparation and Nutrition: Illuminate: 2016
- Rickus, Saunder, Mackey:AQA GCSE Food Preparation and Nutrition: Hodder: 2016
- British Nutrition Foundation: Home**:** *https://www.nutrition.org.uk/*
  Mayhew: The Soup Bible: Barnes & Noble 1999

How To Thicken Soups: Tips And Techniques - Allrecipes Dish*dish.allrecipes.com/thickening-soups/*

Food investigation task

Commentary for example folder 2

GCSE Food Preparation and Nutrition

See section 4.3.4 of the specification for guidance on marking the tasks

Investigate the ingredients used to thicken sauces and/or soups

Marking criteria	Strengths	Development	Marks
Research (6 marks)	• Clear analysis of the investigation, which considers how ingredients work and why. • Areas of research are considered to inform the process which are concisely presented. • Each piece of research is briefly analysed and linked to the planned investigations, some consideration of the working characteristics of the gelatinisation process considered. • Two investigations planned, hypothesis is focused and linked to research.	• No specific link to prior knowledge identified. • More scientific explanation of gelatinisation could be included. • Explanations linking research to planned investigations could be more detailed. • The research could be analysed in greater detail. • The sources of information should be recorded.	**4**
Investigating (15 marks)	• Investigations are well considered and show good knowledge and understanding of how the ingredients work and why. • Testing has been undertaken to inform the results. • Recording of the investigations is clear and illustrates a good variety of methods. • Controls considered. • Photographic evidence clear and relevant. • The student has worked independently and planned their own investigation. Good knowledge of ingredients in the	• Some reference to the working characteristics of the ingredients, a deeper understanding and consideration could have improved marks. • Investigation 3 is not undertaken. • A wider range of investigations could have been undertaken including the use of equipment, eg blending, further investigation into the thickening of soups using pulses, rice, pasta, looking specifically at potatoes and using them in different ways to thicken the soup, eg grated, mashed, dried, etc.	**7**

	investigation lessons but not always recorded in depth.		
Analysis and evaluation (9 marks)	• Each section is analysed against the sensory descriptors and simple viscosity testing. • Interpretation is relevant and linked back to the research, eg size of cornflour grain in gelatinisation using cornflour. • The hypothesis is proven and justified by the investigation work. • A well-structured report, it is clear and some technical language used appropriately.	• Little consideration re how to use the information further in relation to cooking and preparation of foods. • Simple analysis not developed in depth.	**4**
Total	The project was complete within 10 hours and is within the 1500-2000 word count (1577).		**15**

Food investigation task

Example folder 3

GCSE Food Preparation and Nutrition

Investigate the best type of flour for making bread

To investigate the best type of flour for making bread.

Section A: Task analysis:

I am going to investigate bread and some of the ingredients used to make it. Bread is an important food and is eaten by people all around the world eg nan in India, baguette in France, soda bread in Ireland and pitta bread in Greece. Bread is known as a staple food.

Research:

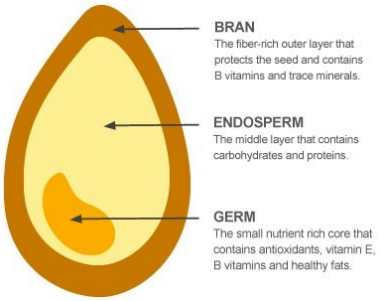
Bread is an important food as it contains lots of carbohydrate, which is needed for energy. It also has vitamin B, some protein and calcium. To make the bread healthier, wholemeal flour can be used. This contains the outer coating of the wheat grain which is a good source of fibre, needed to keep your digestive system working.

Bread is made from flour, yeast, salt, fat and water. The type of flour used is important. Strong plain flour (also known as bread flour) is needed as this has a lot of gluten in it. This is needed to make the dough stay risen. Gluten is a protein in the flour and when it is mixed with water it gives a stretchy texture to the dough. The yeast gives off carbon dioxide which is held in the dough mixture. This gives the bread a light texture.

When cooked at a high texture, the gluten sets and forms the shape of the bread.

Some people cannot eat food containing glutten. This means they cannot eat what flour. They have to use gluten free flour eg rice flour or coconutt flour, in their baked products.

Flour is made by milling wheat grains. Different types of flour can be made by siving and taking away some parts of the wheat grain. For example, wholemeal flour has all of the grain with nothing taken out. White flour only uses about 70% of the wheat grain – it does not contain the outer coating of the wheat grain, which is the part that contains the fibre.



Flour is used in a range of products eg cakes, biscuits, sauces.

Hypothesis:

The hypothesis I am going to test in my investigations is that strong plain flour is the best flour to make bread.

Section B: Investigations:

I am going to do 2 experiments. In the first one I am going to make bread rolls using different types of flour. In the second one I am going to make glutten balls to see which type flour has the most gluten.

Experiment 1:

Testing different flours to make bread rolls.

I made bread rolls using strong plain, self raising, wholemeal self- raising and gluten free flour. The bread rolls give different textures and flavours to the bread.

Sample: Strong plain flour, salt, dried yeast, warm water

Sample: Self raising flour, salt, dried yeast, warm water

Sample: Wholemeal self - raising flour, dried yeast, warm water

Sample: Gluten free flour, dried yeast, warm water.

I used tasting panels to test the bread rolls to see which they liked the most. I asked them to give a score out of 10 for apperance, texture and flavour.

Here are the results:

	Appearance	Texture	Flavour
Strong plain flour	8+9+8+7+8 = 40	8+9+9+8+9 = 43	9+9+8+9+9 = 44
Self raising flour	8+7+8+7+8 = 38	7+7+6+7+7 = 34	7+7+6+8+7 = 35
Wholemeal self -raising	8+7+8+6+7 = 36	7+6+6+5+6 = 36	7+7+8+7+8 =37
Gluten free self raising	5+6+6+7+6 = 35	7+7+6+7+6 = 33	7+7+8+7+7 = 29

First – strong plain flour with a total of 127/150
Second – wholemeal self-raising flour with a total of 109/150
Third – self raising with a total of 107/150
Fourth - gluten free with a total of 97/150

Conclusion:

The bread made with strong plain flour was the most popular. This is because this flour contains the most gluten. It gives the bread a good even structure and a good texture.

The wholemeal self raising flour had a different taste to the others and was a much darker colour. The texture was much heavier than the bread made with the strong plain flour.

The bread made with self raising flour had not risen very much. It did rise when the bread was proving, but sank when it was in the oven.

The gluten free flour gave a reasonable result, but the dough was difficult to work with.

Experiment 2:Testing the amount of gluten in different flours

I used 150g of each type of flour – strong plain, wholemeal self raising, , self raising and gluten free – and mixed this with water to make a paste.

I held the dough under the water and washed the starch from the dough mixture. I then put the mixture that was left (which looked like chewing gum) on a baking tray. I then baked the mixtures until the dough ball went golden brown.

The results:

Sample ZYY – strong plain. This gave a good result. There was a lot of gluten in the flour and when this mixture was baked it had an open texture. This dough had a clear structure.

Sample XYX – wholemeal SR. This mixture had some gluten and made a small ball. The mixture that was left was not as light as the strong plain flour.

Sample YYX – Self raising. This mixture contained very little gluten and the mixture was heavy compared to the strong plain flour.

Sample YYX – gluten free SR. This mixture did not contain any gluten and so it did not make a ball. All of the starch was washed out of this mixture

Section C: Analysis and evaluation:

From the experiments I have done, I have found out that strong plain flour is the best flour to use when making bread.

When I made bread rolls, the strong plain flour gave the best results. When my tasting panel tasted it, they thought this gave the best result for appearance, texture and flavour.

The experiment I did with the gluten balls showed that strong plain flour contained the most gluten out of all the flours I tested and showed it had a light structure.

Gluten (a protein in wheat flour) is made when water is mixed with the flour to make a dough. The gluten makes the dough elastic and means it can stretch. When making the bread, the dough is neaded. This is important as it develops the gluten in the flour and this helps to make the dough stay risen.

When the bread is cooked, the gluten sets and the bread dough stays risen which gives the bread a light texture.

The wholemeal self-rising flour contains some gluten. The bread made with this flour did rise but not as much as the strong plain flour. The gluten ball experiment did show that this flour contained a small amount of gluten. This flour could be used for making cakes, scones and biscuits rather than bread.

Self raising flour contains a very small amount of gluten. The bread rolls made with this flour did not rise as much as the ones with the strong plain flour. They did rise when the bread was proving but then went flatter when they were baked as the gluten had over stretched and this made the gluten weaker which affected the end result. This flour could be used to make cakes and scones rather than bread.

The gluten free flour did not give very good results for either the bread rolls or the gluten ball experiment. The bread rolls did rise a little bit, but not as much as the ones made with the other flours. There was no gluten left when the starch had been removed from the flour.

The experiments I have done prove my hypothesis that strong plain flour is the best to make bread. This gives the best result. The results showed that white flour gave a lighter texture than the wholemeal flour, but from my research I have found that wholemeal flour is healthier as it is higher in fibre. Gluten free flour was more difficult to work with when making the bread and did not give the best result, but some people need to use this flour if they have coeliac disease.

Bibliography:

AQA GCSE Food and Nutrition by Anita Tull and Garry Littlewood.
CGP GCSE Food Preparation and Nutrition For AQA Revision Guide.

Food investigation task

Commentary for example folder 3

GCSE Food Preparation and Nutrition

See section 4.3.4 of the specification for guidance on marking the tasks

Investigate the best type of flour for making bread

Marking criteria	Strengths	Development	Marks
Research (6 marks)	• Some understanding of the task requirements. • Some use of prior learning related to bread making as a starting point of the research. • Limited number of sources used as part of the background research. • Research is relevant used to formulate a simple hypothesis. • Two investigations have been planned initially related to flour and gluten – this links to the research and hypothesis.	• Limited explanation of the working characteristics and chemical and functional properties of the bread. • Justification related to why these investigations have been planned would add to this section.	**2**
Investigating (15 marks)	• Two investigations completed. • Both experiments are relevant to bread making and the hypothesis. • A range of testing examples has been carried out and recorded in a simple but concise format. • Good use of photographic evidence to record the investigations – although some confusion with the labels of investigation 1. • Investigations are clear and the practical results are recorded in a simple but understandable format.	• Little mention of the controls applied to the investigation. • Photographic evidence is clear but annotation relation to the function and chemical properties would have added to the content. • Two investigations completed. For a wider range of investigations, the following are examples: kneading times of bread dough with flours/comparison of equipment/amount of water to make the perfect bread etc.	**6**

Analysis and evaluation (9 marks)	• Accurate but simple analysis of the results with some justification related back to the research findings. The review of findings allows the project to be marked at the bottom of the second band. • Limited use of specialist terminology throughout the report. • The hypothesis has been proven by the investigation work. • The report is communicated in a simple but coherent manner. • Limited understanding of the working properties of ingredients demonstrated throughout.	• Simple analysis and evaluation but limited reflection of how the results will be applied when preparing and cooking food – this prevents further marks from been awarded. • More explanation related to the working properties and scientific understanding of ingredients.	**5**
Total	The project was complete within 10 hours and is just under the 1500-2000 word count (1402). Some spelling and grammatical errors throughout the project.		**13**

Food investigation task

Example folder 4

GCSE Food Preparation and Nutrition

Investigate the use of raising agents in baked products

Section A: Research.

Raising agents are used in many different baked products such as scones, cakes, and pastries. For this investigation I will focus on the **chemical** and **mechanical** raising agents used in cake making. To plan the investigation I need to carry out some background research on the working characteristics, functional and chemical properties of raising agents used in baked products. I would also examine the use of a gluten free flour/raising agent in the cake making process.

What are raising agents?

Raising agents are used to make mixtures rise. Raising agents work by introducing gas into a mixture. When a mixture is heated, which contains a raising agent, the gas expands and makes the mixture rise. Some gas escapes and some is trapped in the mixture as it cools and sets. Many baked items depend on raising agents for their soft and open texture.
The gas bubbles in raising agents are air, carbon dioxide and steam.

- ***Air***: a mixture of gases and trapped in a mixture as it is creamed, rubbed in, beaten, whisked or rolled and folded. Air can also be added when flour is sieved.
- ***Carbon dioxide,*** is given off by yeast in bread making, bicarbonate of soda which is added to cakes and baking powder. Baking powder is added to self-raising flour,
- ***Steam,*** which is water in a gaseous state.

Mechanical raising agents

The physical actions of creaming, kneading, sieving, and whisking will incorporate tiny air bubbles which expand when heat is added. The addition of flour gives structure for the air bubbles to work. This structure is fixed in the oven by heat.

Sieving	Sieving flour traps air between the flour particles
Creaming	Fat and sugar traps air bubbles. The fat becomes pale in colour and the mixture creamy. When heated, the mixture sets and stops the bubbles escaping.
Whisking	Eggs or egg whites when whisked will trap a large volume of air creating a foam. The mixture must be cooke to set and stabilise the foam. The foam is formed due to unravelling and stretching of the protein.
Rubbing in	Rubbing the fat into the flour incorporates some air.
Folding and lamination	Layers of air are trapped between the layers of pastry. During baking, the air expands between the layers and lifts the pastry.

Chemical raising agents:

Baking powder is made from the alkali, bicarbonate of soda and the acid, cream of tartar. As liquid is added to the baking powder, carbon dioxide gas bubbles are given off which push up the cake.

Sodium bicarbonate is a raising agent used in soda bread and gingerbread. It is an alkali. When sodium bicarbonate comes in contact with an acid and liquid is added, carbon dioxide is produced. If too much is used a 'soapy' aftertaste remains. Sodium bicarbonate is much stronger than baking powder.
https://get-baking.com/raising_agents.html

Cream of tartar is an acid and it is mixed with bicarbonate of soda to provide the acid ingredient for baking powder.

Science of chemical raising agents:
When carbon dioxide is released by either bicarbonate of soda and/or baking powder, it first dissolves in the liquid. When this becomes saturated, the carbon dioxide produced turns into the air bubbles which expand. Towards the end of baking the bubbles set.

- If bicarbonate of soda is used on its own in a cake, they would rise well, but the taste of the washing soda that is produced in the reaction would be very unpleasant. This is the reaction:

  Bicarbonate of soda + heat ⟶ washing soda + carbon dioxide gas + water

  Alkali + heat ⟶ Alkali (soapy taste)

- To prevent this, the bicarbonate of soda is mixed with an **acid** called 'cream of tartar' to make **baking powder.**

  Bicarbonate of soda + cream of tartar + heat ⟶ sodium potassium tartrate + carbon dioxide gas + water

  Alkali + Acid + heat ⟶ Neutral (no taste)

Tull (2016), Food Preparation and Nutrition, Illuminate

Analysis/Planning the investigation
I will test that baking powder is the best raising agent to use is cakes resulting in the best texture and taste. I will investigate the most suitable flour/combination of raising agents. I will investigate which making method is best comparing creaming: traditional and all-in-one by hand with whisking with a mixer.

Hypothesis:
To achieve the best results when cake making:
i. self-raising flour should be used as this has the correct ratio of raising agent
ii. the traditional creaming method provides the best results.
iii. gluten free flour with a raising agent does not provide the correct structure for cakes.

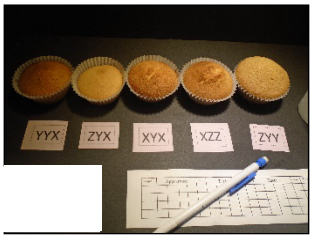
Section B: Investigation:
To test my hypothesis, I am going to complete the following:
- Investigation 1: Investigate different flours / raising agent combinations.
- Investigation 2: Observe the production of carbon dioxide gas from chemical raising agents.
- Investigation 3: To compare different cake methods and find out which method produces the perfect cake.
- Investigation 4: To test how to make perfect cakes using self-raising gluten free flour

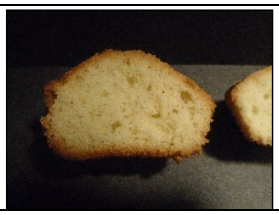
Controls for all investigations
- Digital scales used for accurate weighing measuring.
- Cakes mixed for the equal times, unless otherwise stated
- Cakes cooked at 180°C for 20 minutes, the same shelf and oven.

35g of mixture placed in each paper case.

Investigation 1: Testing different flours and raising agents for making small cakes.
Five samples of cakes each with a different variable. All included: 50g caster sugar, 50g soft spread, 1 egg

Setting up the investigation

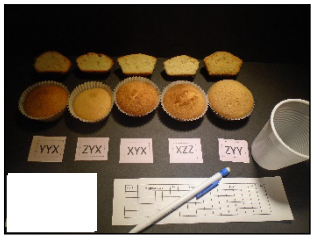


Sample	Ingredients	
YYX	50g Self-raising flour,	
ZYX	50g Plain flour	
XYX	50g Gluten free flour,	
XZZ	50g Plain flour, ½ tsp baking powder	
ZYY	50g Plain flour, ½ tsp bicarbonate of soda	

Results

Sample	Appearance				Total	Texture				Total	Taste				Total	Final Total
YYX	5	4	5	4	**18**	5	5	4	4	**18**	4	5	4	5	**18**	**54**
ZYZ	2	2	3	2	**9**	2	2	3	2	**9**	4	3	4	3	**14**	**32**
XYX	4	4	3	3	**14**	3	2	3	3	**11**	3	3	4	3	**13**	**38**
XZZ	4	4	3	4	**15**	4	5	5	5	**19**	4	3	3	4	**14**	**48**
ZYY	2	2	3	3	**10**	2	3	2	3	**10**	1	0	1	1	**3**	**23**

The sample with the highest score for all sensory characteristics was YYX the self-raising flour. There was an aerated structure and a dome shape . The texture was very good scoring 18/20. The sample XZZ was a close second. This included baking powder and provided a very good texture. The appearance only scored 15/20 as the surface cracked. This could indicate that too much baking powder was added resulting in uneven surface.



The plain flour cake only scored 32/60. The texture was dense and the cake did not rise due to the lack of raising agent. The gluten free flour worked quite well but did lack aeration and the texture was not quite right this could be investigated further. Sample ZYY has an unpleasant taste scoring only 3/20. It tasted soapy this backs up my research. The colour was also poor with a yellow tone. To conclude self-raising flour had an open structure because the baking powder released carbon dioxide and allowed the cake to rise. There was the correct ratio of raising agent to flour.

Investigation 2: Observing the production of carbon dioxide gas from chemical raising agents.

The test tubes contained a raising agent and 20ml of warm water. The aim of the investigation was to find out which raising agent released the most carbon dioxide.
YYX: Baking powder (alkali and acid)
ZYX: Bicarbonate of soda (alkali)
XYX: Cream of tartar (acid)

Results. YYZ (baking powder) released carbon dioxide and the balloon inflated. ZYX there was some reaction when the water was added but this happened over a very short period and there was only slight inflation. XYX no reaction.

Conclusion

When hot moisture is added to bicarbonate of soda, carbon dioxide gas is released. This results in small fizzy bubbles. They don't last very long, so this method is not that useful in cooking unless you can use the bubbles immediately. When hot water is added to the baking powder a chemical reaction is achieved, producing carbon dioxide gas. When making a cake, the CO2 released from the baking powder is trapped in tiny air pockets in the cake batter. When heat is applied, the carbon dioxide gas expands and makes the mix rise. To conclude, if you need a chemical raising agent you can use either baking powder or bicarbonate of soda with cream of tartar (acid and alkali)

Investigation 3: To compare different cake methods and find out which method produces the perfect cake.

Four samples were made each with different variables as seen in the table. The cakes included:
50g Self raising flour,
50g Caster sugar,
50g Soft spread,
1 Egg

YYX	XYX	XZZ	ZYY
Traditional creaming method (Hand)	All in one method (Hand)	All in one method (Whisk 30 seconds)	All in one method (Whisk 60 seconds)

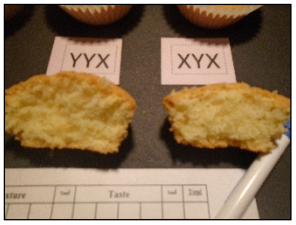
Results

Sample	Appearance				Total	Texture				Total	Taste				Total	Final Total
YYX	5	5	4	5	**19**	5	5	4	5	**19**	5	5	4	4	**18**	**56**
XYX	5	5	5	5	**20**	5	4	5	5	**19**	4	4	5	5	**18**	**57**
XZZ	4	4	5	5	**18**	4	4	4	4	**16**	5	5	4	4	**18**	**52**
ZYY	3	3	2	2	**10**	3	4	4	3	**14**	4	4	4	4	**16**	**20**

I predicted that whisking the mixture would provide the best results as more air would be incorporated. The results show the top scoring cakes YYX (56) and XYX (57). The panel considered that the creaming and all in one methods provided cakes with a more even texture. When using the electric whisk, the cakes mixture was paler . ZYY which was whisked for longer has a very uneven rise scoring only 10 for appearance. ZYY was probably over whisked. The texture was heavy. Both YYX and XYE had a perfect dome shape with an aerated structure. To conclude there is no advantage by creaming fat and sugar and then gradually adding the eggs and flour. The all in one method has very good results and was quicker.

Investigation 4: Testing whether the addition of xanthan gum improves the texture of cakes.

All the cakes included: 50g Self Raising Gluten Free Flour, 50g caster sugar, 50g soft spread, 1 egg plus different proportions of xanthan gum.

ZYY 2g xanthan gum	**ZYX** 4g xanthan gum	**YYX** 6g xanthan gum	**XYX** Control – no xanthan gum
			

Results

Sample	Texture				Total
YYX	5	5	4	5	**19**
XYX	4	5	4	5	**18**
XZZ	4	4	4	4	**16**
ZYY	3	3	3	3	**12**

The addition of xanthan gum in low proportions resulted in a better texture. It's a useful ingredient for baking with gluten-free mixes as it improves the texture and shelf life of your baked products. It works like gluten by binding ingredients during the baking process to give a conventional texture. When added to gluten-free flour mixes, it replaces the gluten 'stretch factor'.

Analysis and evaluation

From these investigations I can prove and disprove my hypothesis. Sellf raising flour should be used in cake making as this has the correct ratio of raising agent added which results in a cake having a uniform and even structure. The addition of other raising agents can affect the taste and texture of the cake. It is difficult achieving the correct proportion of raising agent to plain flour. There is little different between the creaming method and all in one method. The all in one method gave excellent results. However, it was easy to over whisk the cakes and therefore creaming by hand provided the best results. Gluten free flour resulted in an acceptable cake, however the texture was not perfect, however, the addition of xanthan gum improved this significantly. When preparing and cooking food in future I will:

- Only use bicarbonate of soda with some strong flavoured ingredients such as ginger or chocolate.
- When using gluten free flour in baked goods add xanthan gum to improve texture.

Bibliography

Rickus et al (2016) (2016) AQA GCSE Food Preparation and Nutrition, Hodder
Ridgwell, J (2017) Food Science You Can Eat
Tull, A ; Littlewood G (2016) AQA GCSE Food Preparation and Nutrition, Illuminate
https://get-baking.com/raising_agents.html
Word count (1999) not included title page and bibliography

Food investigation task

Commentary for example folder 4

GCSE Food Preparation and Nutrition

See section 4.3.4 of the specification for guidance on marking the tasks

Investigate the use of raising agents in baked products

Marking criteria	Strengths	Development	Marks
Research (6 marks)	• Clear understanding of the task, the student has focused on mechanical and chemical raising from the outset. • Secondary research is relevant, detailed and concisely recorded. Good evidence of different sources that have been referenced. • Research is analysed throughout and used to formulate the hypothesis. • Four investigations have been planned that link to most of the research findings and the hypothesis.	• Justification is evident in the task but would be helpful to record this separately. • The gluten free flour investigation is relevant but does go slightly off on a tangent.	**5**
Investigating (15 marks)	• All four investigations demonstrate a very good knowledge and understanding of how ingredients work and why. They link very closely to the hypothesis. • Good range of testing/investigations have been carried out and results accurately recorded and interpreted – a strength of the report. • Excellent use of photographic evidence, which is authenticated, to record the investigations. Good links to scientific principles. • Practical investigations are recorded well with very good use of sensory tables and photographic evidence.	• Controls for each investigation could be referenced. • Results and conclusion could include further scientific links related to working properties of ingredients.	**13**

	General controls listed. • The investigations are clear and practical results meticulously recorded.		
Analysis and evaluation (9 marks)	• Accurate and very good analysis of the results throughout the investigation. • Good use of specialist terminology throughout the report. • The hypothesis has been proven/disproved by the investigation work. • The report is communicated in a structured and coherent manner. • Excellent understanding of the working properties. • Justified conclusion evident.	• Many strengths to the analysis and evaluation but more reflection of how the results will be applied when preparing and cooking food. • It appears the word limit has been tight and investigation four could have been replaced with a more detailed final conclusion.	**7**
Total	The project was complete within 10 hours and is within the 1500-2000 word count (data within tables and bibliography not included).		**25**

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