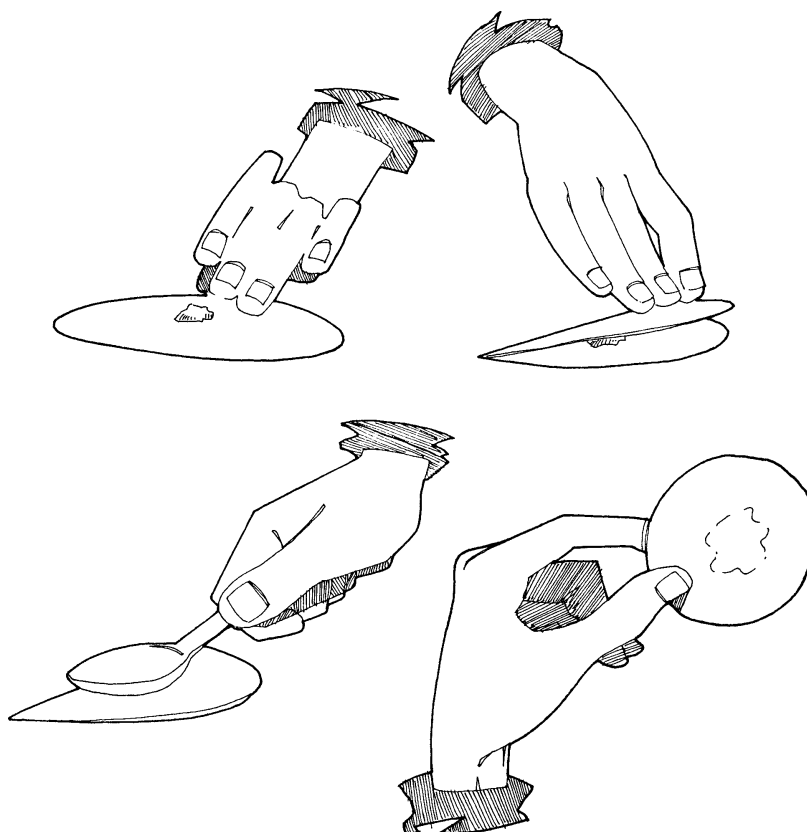


You will be given the following food samples to investigate:

- potato
- apple
- minced beef
- hard cheese
- bread
- tea
- milk
- chocolate.

Part 1: To find out which of these foods contain *fat*

- 1 Place a sample of the food in the middle of a piece of filter paper.
- 2 Fold the filter paper in half with the food inside and press the food hard with the back of a clean teaspoon.
- 3 Leave to dry in a warm place.
- 4 Look at the dry filter papers against the light.
- 5 A greasy spot indicates the presence of fat.



L Learning

How to carry out simple food tests for a range of nutrients.

Safety note You should carry these out in a science area, *not* a food preparation area.

Student's book

Food tests, pages 138–140

Timing

2 hours, unless students share results

Equipment and materials

- workbook
- pen, pencil
- food samples
- test tubes
- test tube rack
- Bunsen burner
- tripod
- gauze
- heatproof mat
- 250 ml beaker
- glass stirring rod
- safety goggles
- paper plates
- knives

For Part 1: Testing for fat

- filter papers
- teaspoon

For Part 2: Testing for starch

- iodine solution – *poisonous*, so wash your hands after use

For Part 3: Testing for glucose

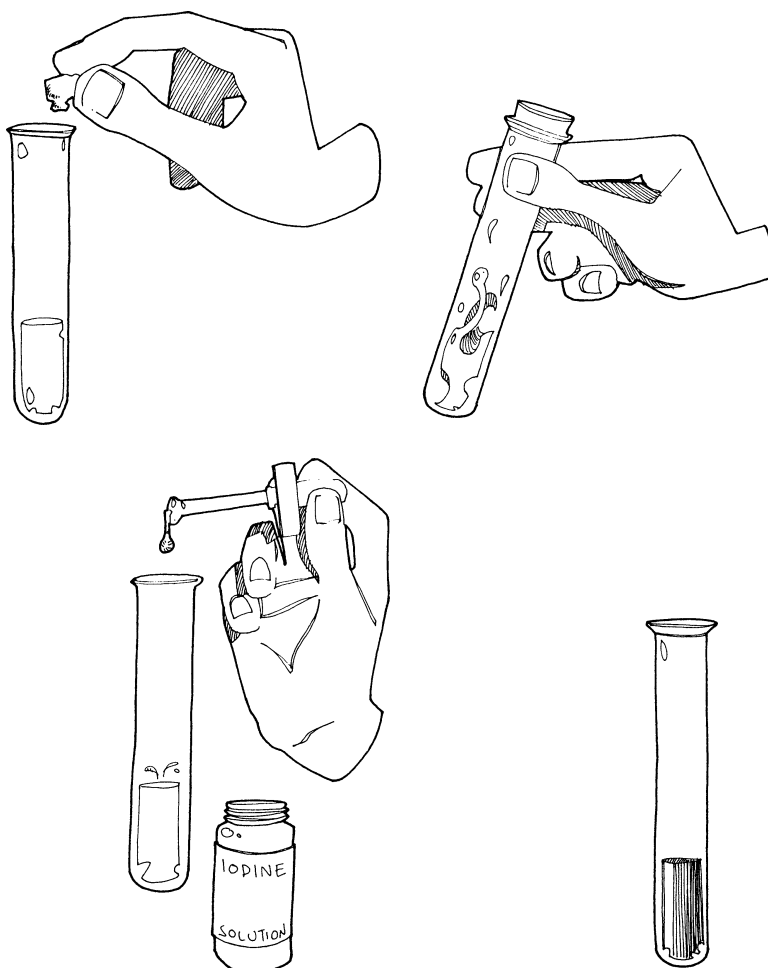
- Clinistix – do not touch the reagent end – *harmful*

For Part 4: Testing for reducing sugars

- Benedict's reagent – *poisonous*, so wash your hands after use

Part 2: To find out which of these foods contain *starch*

- 1 Add a small sample the food to a test tube, one quarter filled with water.
- 2 Shake gently for about 20 seconds.
- 3 Add two drops of iodine solution.
- 4 A dark blue-black colour indicates the presence of starch.

**For Part 5: Testing for protein**

- 1 per cent copper sulphate solution – *poisonous*, so wash your hands after use
- 2M sodium hydroxide solution – *caustic*, so do not splash it on clothes or skin and rinse accidental spills with plenty of water

For Part 6: Testing for vitamin C

- DCPIP papers

t Type of task

New

Other subjects

Science

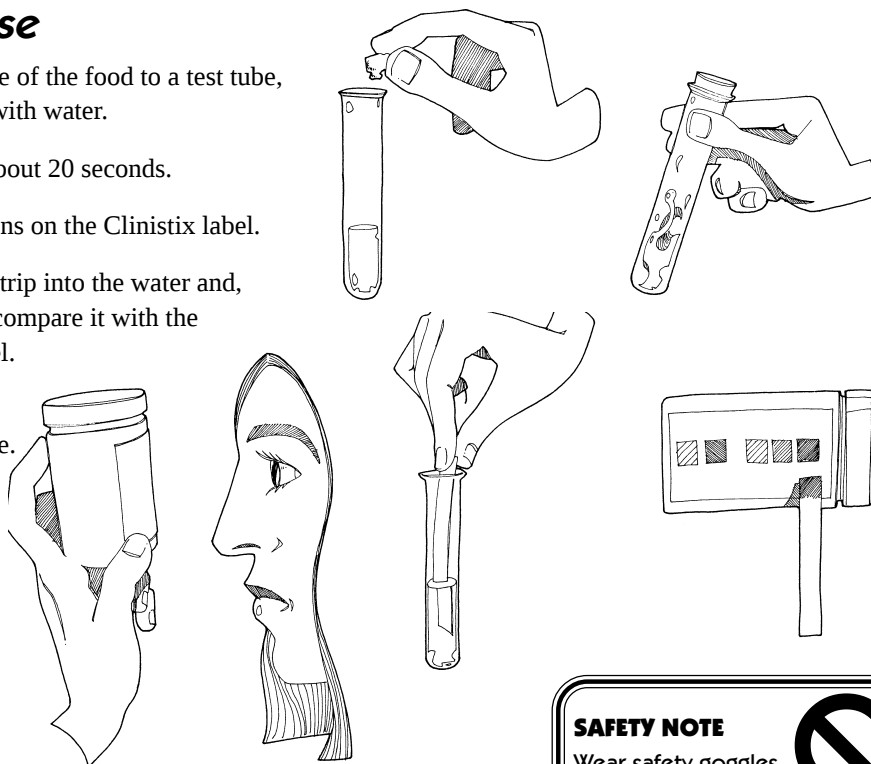
SAFETY NOTE

Wear safety goggles.



Part 3: To find out which of these foods contain *glucose*

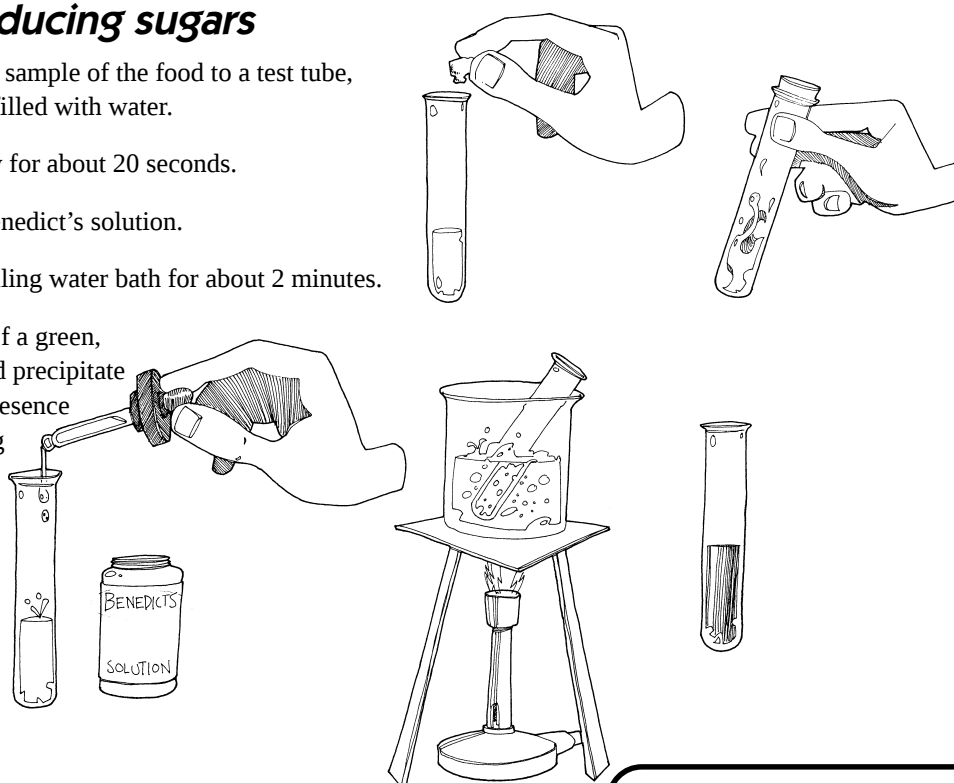
- 1 Add a small sample of the food to a test tube, one quarter filled with water.
- 2 Shake gently for about 20 seconds.
- 3 Read the instructions on the Clinistix label.
- 4 Dip one Clinistix strip into the water and, after ten seconds, compare it with the colours on the label.
- 5 A purple colour is positive for glucose.

**SAFETY NOTE**

Wear safety goggles.

**Part 4: To find out which of these foods contain *reducing sugars***

- 1 Add a small sample of the food to a test tube, one quarter filled with water.
- 2 Shake gently for about 20 seconds.
- 3 Add 5 ml Benedict's solution.
- 4 Heat in a boiling water bath for about 2 minutes.
- 5 Production of a green, yellow or red precipitate shows the presence of a reducing sugar.

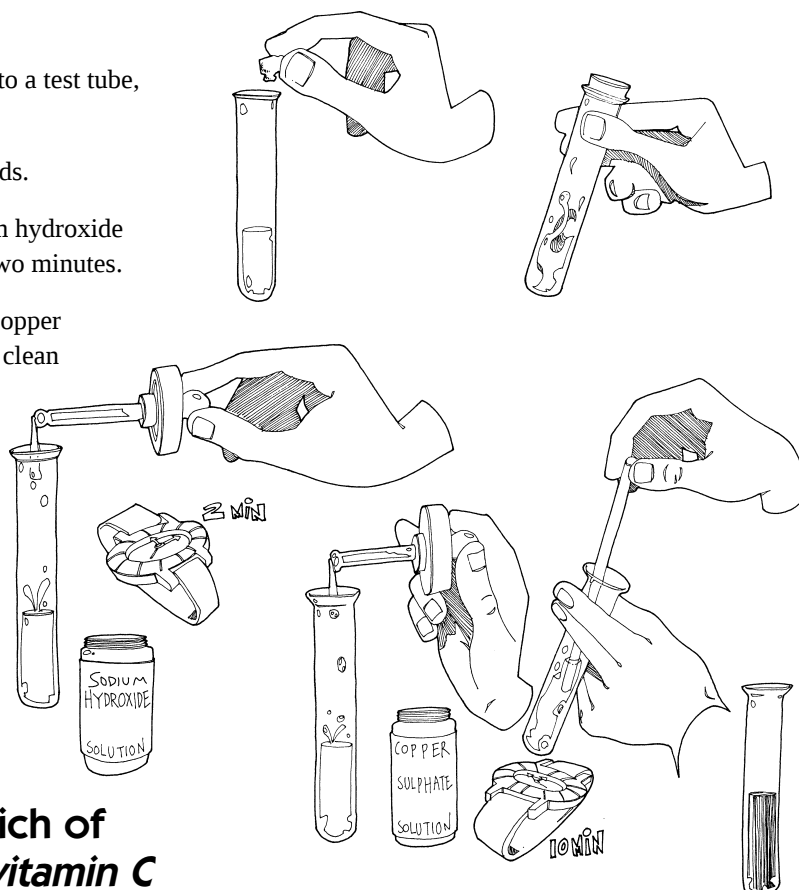


Part 5: To find out which of these foods contain *protein*

- 1 Add a small sample of the food to a test tube, one quarter filled with water.
- 2 Shake gently for about 20 seconds.
- 3 Add eight to ten drops of sodium hydroxide solution and leave to stand for two minutes.
- 4 Now add two to three drops of copper sulphate solution and stir with a clean glass rod. Leave to stand for ten minutes.
- 5 A violet colour indicates the presence of protein.

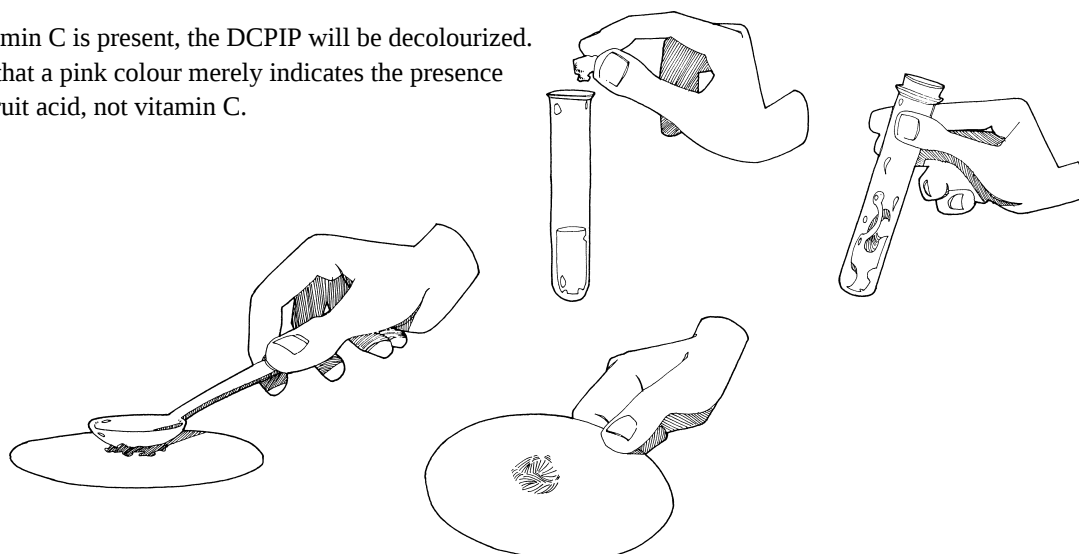
SAFETY NOTE

Wear safety goggles.



Part 6: To find out which of these foods contain *vitamin C*

- 1 Press a small sample of the food onto a piece of DCPIP paper with the back of a teaspoon.
- 2 If vitamin C is present, the DCPIP will be decolourized. Note that a pink colour merely indicates the presence of a fruit acid, not vitamin C.



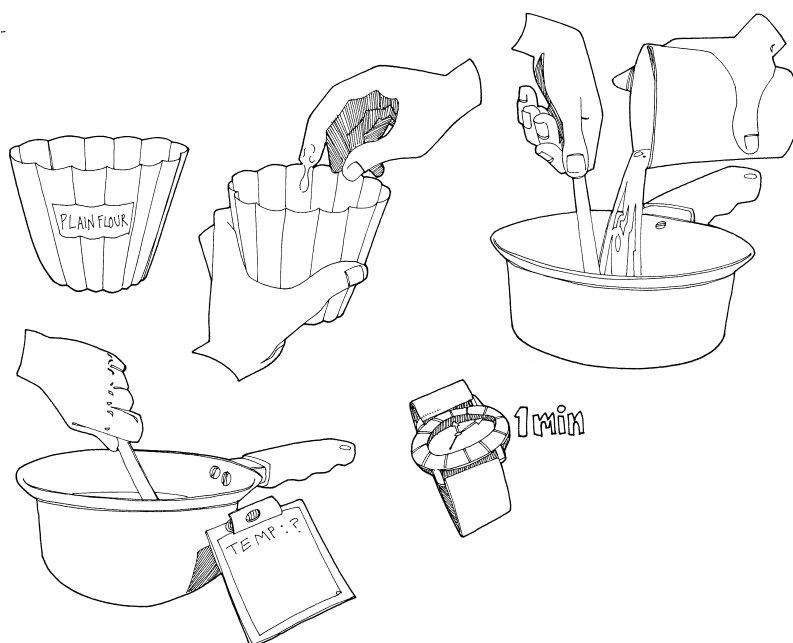
Present your results as a summary table. You can shorten the length of this task by cooperating with other students.

Imagine that you are designing a food product that has a fruit filling. You are happy with the taste of the filling, but the texture is causing you problems. When the food product is cut open, the filling runs out. It is difficult to divide into separate portions. You can use the starch found in flour to make runny food materials set.

If you work in groups and share results, you will finish this work more quickly.

Part 1: Looking at the use of different flours as sources of starch for setting

- 1 Label a dariole mould or ramekin dish with the name of the starch to be used. Wet the inside.
- 2 Place 15 g of the starch in the pan and stir in 180 ml cold water. Describe the result.
- 3 Heat slowly. Stir the starch solution all the time until it thickens. Note the temperature at which each solution thickens.
- 4 Cook for 1 minute, stirring all the time, then leave to cool.



L Learning

How to control the stiffness of gels using starch.

Student's book

How can I make my mixture set? pages 135–6

Timing

Part 1: 60 minutes
Part 2: 60 minutes
Part 3: 60 minutes

Equipment and materials

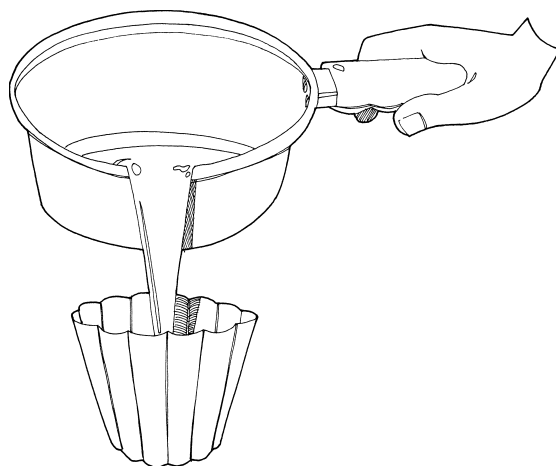
- kitchen scales
- tape measure or rule
- food probe or thermometers (0–110°C)
- access to a cooker or hotplate

For Part 1

- plain flour
- cornflour
- arrowroot
- potato flour
- rice flour
- any other starch
- water
- small saucepan
- spoon
- dariole mould, ramekin dish or beaker
- 1 sheet of A4 paper, 1 piece of A4 carbon paper, 1 piece of greaseproof paper

For Part 2

- 6 small saucepans
- 6 spoons
- 6 dariole moulds, ramekin dishes or beakers
- sugar
- cornflour



- 5 Compare the colour, clarity and stiffness of the sets obtained from the different starches by writing descriptions in a table with the following headings.

	<i>Plain flour</i>	<i>Cornflour</i>	<i>Arrowroot</i>	<i>Potato flour</i>	<i>Rice flour</i>	<i>Other</i>
<i>Colour</i>						
<i>Clarity</i>						
<i>Stiffness</i>						

For Part 3

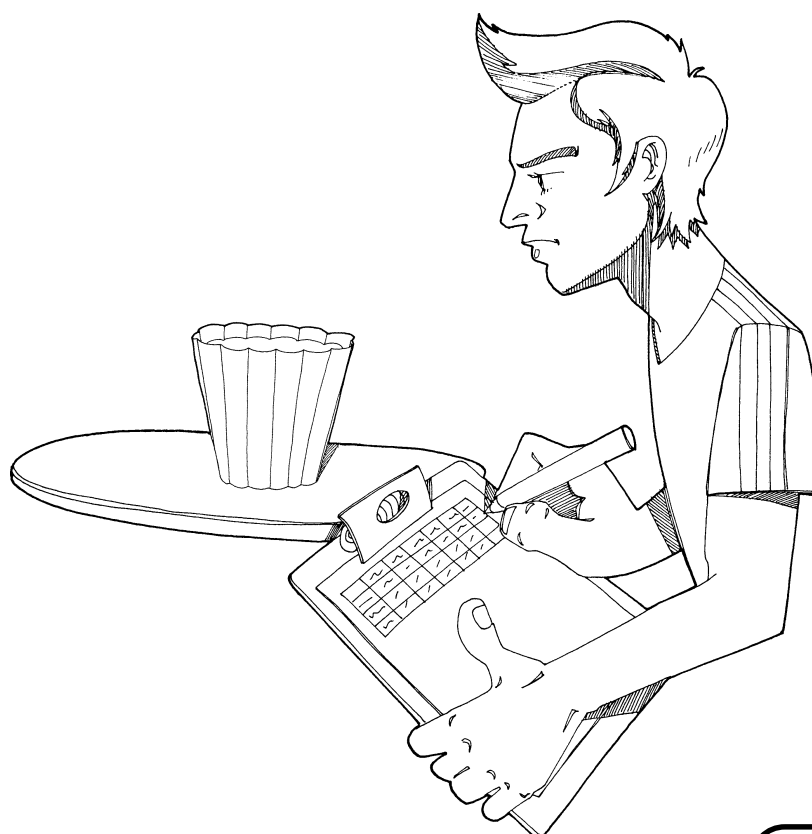
- 7 small saucepans
- 7 spoons
- 7 dariole moulds, ramekin dishes or beakers
- sugar
- cornflour
- salt
- lemon juice

 Type of task

Extension

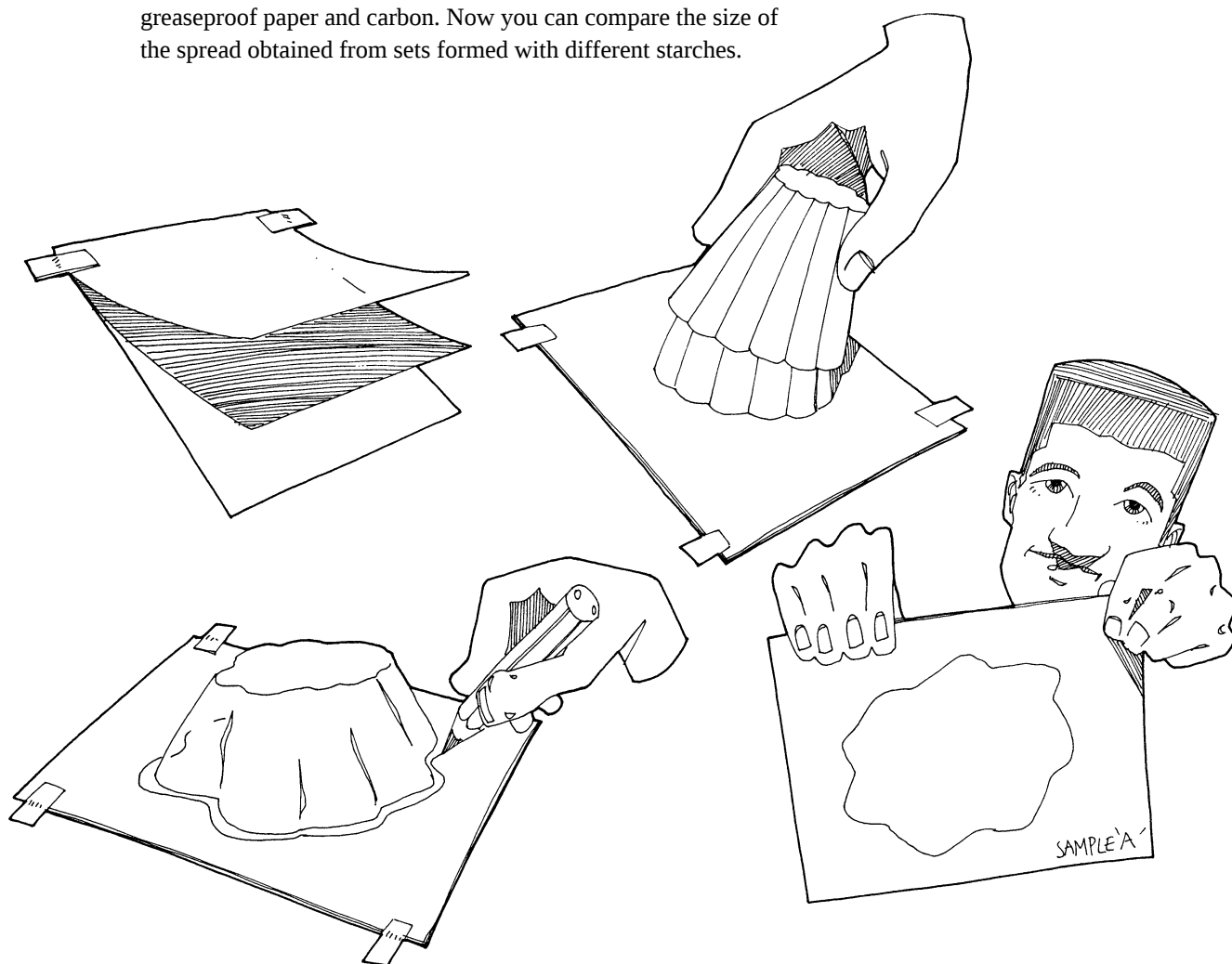
 Other subjects

Science



Making things set

- 6 If you wish to observe cold gels, then leave the dishes in a refrigerator overnight. Place a piece of A4 paper on the table with a piece of carbon paper face down on the paper. Place a piece of greaseproof paper on top and stick all three to the table with sticky tape at the corners so that they cannot move.
- 7 Turn out the starch solution and allow it to spread. Draw around the set, pressing firmly so that the outline will appear on the paper below. Label each starch set and carefully remove the greaseproof paper and carbon. Now you can compare the size of the spread obtained from sets formed with different starches.



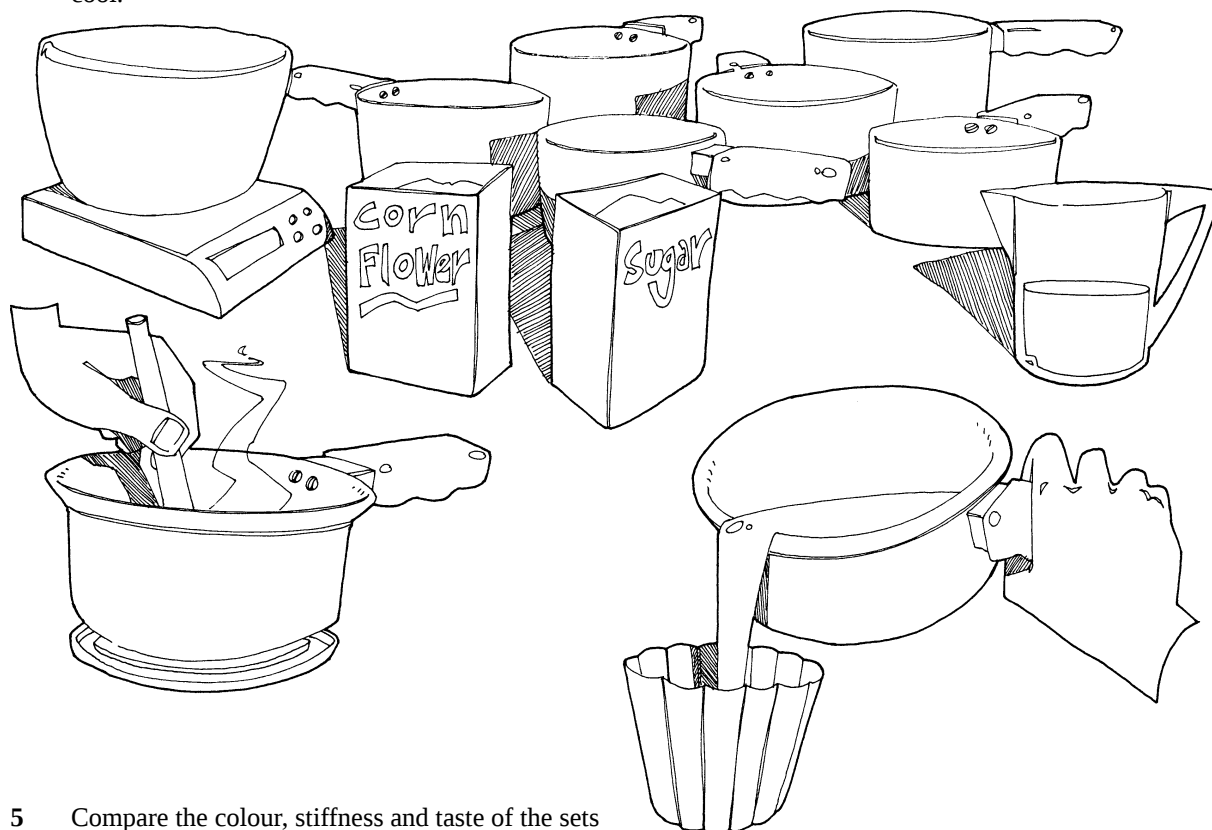
- 8 Use your results to answer the following questions.

- Which starch would be suitable for the fruit filling? Give a reason for your choice.
- Which starch would be used for a glaze and why? Give a reason for your choice.
- Which would be used for a cold, semi-solid fruit product (or mould)? Give a reason for your choice.

Making things set

Part 2: Looking at the use of different amounts of flour

- 1 Weigh out 5, 10, 15, 20, 25 and 35 g of cornflour into separate pans and carefully stir 100 ml of water into each pan.
- 2 Add 5 g of sugar to each pan.
- 3 Heat the pans slowly and stir until the solutions thicken. Note the temperature at which this happens.
- 4 Pour each solution into a separate dariole mould and leave to cool.



- 5 Compare the colour, stiffness and taste of the sets obtained with different amounts of cornflour by writing descriptions in a table with the following headings.

	5 g cornflour	10 g cornflour	15 g cornflour	20 g cornflour	25 g cornflour	35 g cornflour
Colour						
Clarity						
Stiffness						



Use your results to answer this question: what is the danger of using too much starch as a thickening agent?

Making things set

Part 3: Looking at the effects of other ingredients

- 1 Label the dariole moulds A to G.
- 2 Place the following in the pans:
 - pan A control, no addition
 - pan B 1 g of salt
 - pan C 5 g of salt
 - pan D 20 g of sugar
 - pan E 100 g of sugar
 - pan F 20 ml lemon juice and 80 ml water
 - pan G 100 ml lemon juice.
- 3 To each pan, add 10 g of cornflour.
- 4 Add 100 ml of water to pans A to E and stir well.
- 5 Stir pans F and G.
- 6 Heat slowly, stirring all the time until the mixture thickens, then cook for 1 minute, stirring all the time.
- 7 Pour the contents of each pan into its matching labelled dariole mould and leave to cool.
- 8 Compare the colour, clarity, stiffness and taste of the sets obtained by writing descriptions in a table with the following headings.

	<i>Control</i>	<i>With 1 g salt</i>	<i>With 5 g salt</i>	<i>With 20 g sugar</i>	<i>With 100 g sugar</i>	<i>With dilute lemon juice</i>	<i>With pure lemon juice</i>
<i>Colour</i>							
<i>Clarity</i>							
<i>Stiffness</i>							

- 9 Use your results to answer the following questions.



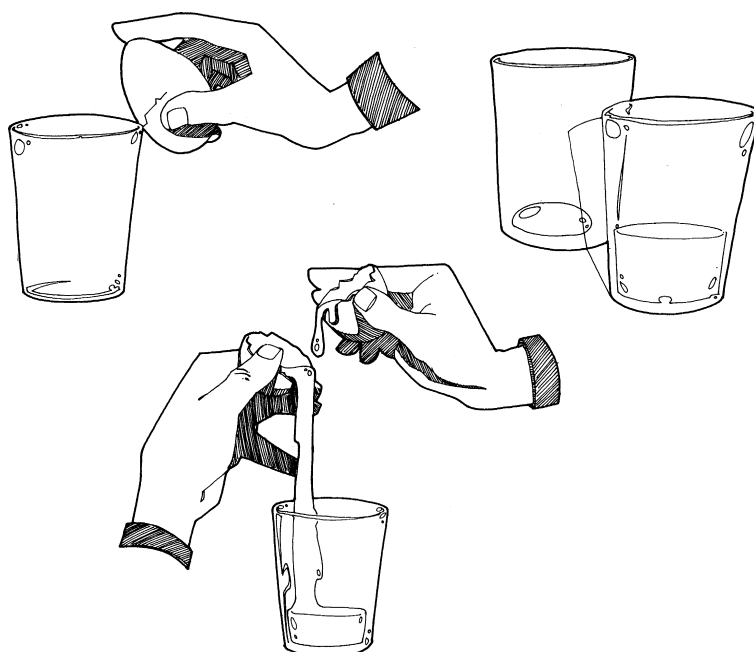
- Which additives affect gelatinization?
- What implications has this for products such as lemon meringue pie or fruit pie fillings?

Further/homework

Make a sequence of annotated drawings that describe the formation of a gel when starch molecules are heated in water. You could turn this sequence into a flick book and animate the process!

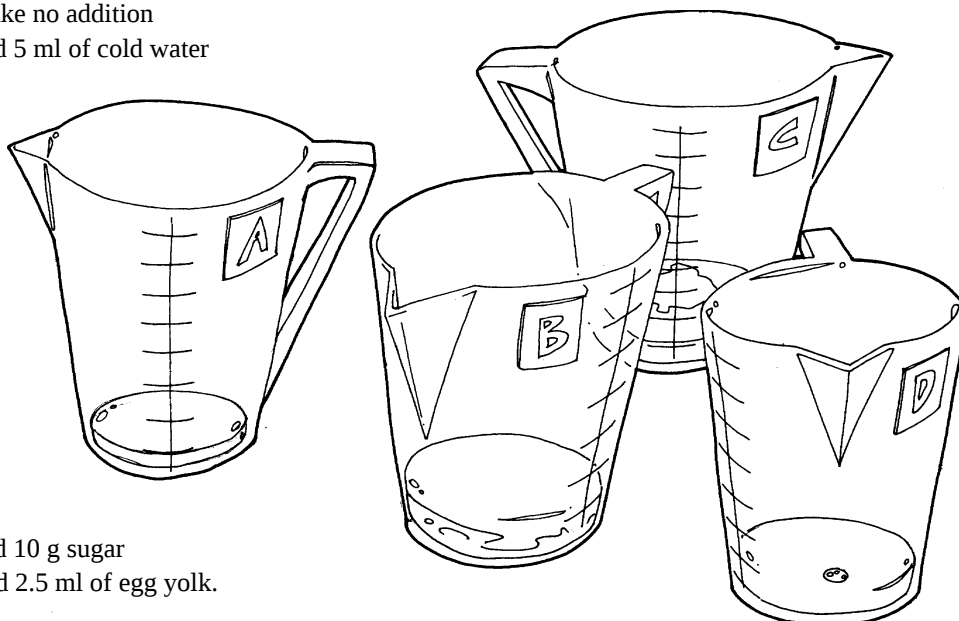
Eggs, particularly egg whites, will form a foam when whisked. This foam will give a light, fluffy texture to sold sweets, fritter batters and will make meringues. The foam needs to be stable and not break down. At the end of this investigation, each working group will have two usable egg white foams that can be used for cooking.

- 1 Separate the eggs and measure 35 ml of egg white into each measuring jug.



- 2 Label the jugs A to D, then:

- to jug A, make no addition
- to jug B, add 5 ml of cold water



- to jug C, add 10 g sugar
- to jug D, add 2.5 ml of egg yolk.

L Learning

How to control the stability of egg white foams.

S Student's book

How can I make a mixture light and fluffy in texture?
page 137

! Timing

60 minutes

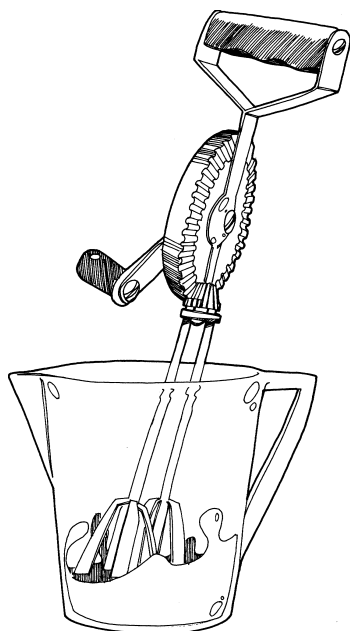
E Equipment and materials

- workbook and pencil
- 4 measuring jugs
- whisk
- kitchen scales
- 2 x 5 ml spoons
- 4 eggs
- 10 g sugar

t Type of task

New

Looking at foams



- 3 Whisk the egg whites in each jug to the soft peak stage, which is the point at which, when the whisk is lifted out of the foam, the peak formed will flop over, just holding its shape.



- 4 Note the volume of foam in each jug.

Use a table like this for recording your results

	<i>Volume of foam immediately after whisking</i>	<i>Volume of foam 15 minutes after whisking</i>	<i>Liquid seepage from foam after 15 minutes</i>
35 ml egg white			
35 ml egg white plus 5 ml cold water			
35 ml egg white plus 10 g sugar			
35 ml egg white plus 2.5 ml egg yolk			

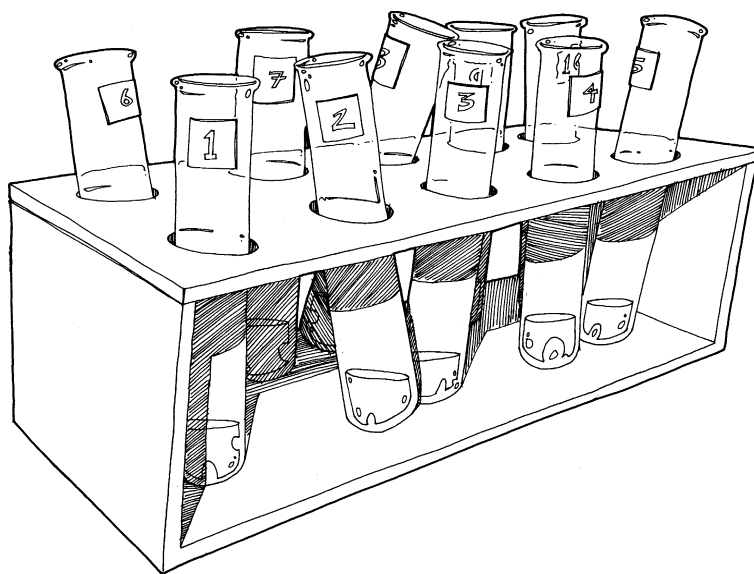
- 5 Leave for 15 minutes. If you are making a dish with the foam, you could prepare the other ingredients.
- 6 Compare the stiffness of the foam now to then and measure the liquid that has seeped out of the foam. Note down your observations in the table.
- 7 Use your results to answer these questions.
- Which jug produced the most stable foam with the greatest volume?
 - Why is it important to be careful when separating egg yolks from egg whites?

Further/homework

Find out why egg yolk causes egg white foams to collapse.

Looking at emulsions

- 1 Label the test tubes one to ten.



- 2 Place 5 ml of vinegar in each.

- 3 Add the other ingredients as listed below:

- test tube 1: 5 ml oil
- test tube 2: 10 ml oil
- test tube 3: 15 ml oil
- test tube 4: 15 ml oil and 5 ml mustard
- test tube 5: 15 ml oil, 5 ml mustard and a pinch of salt
- test tube 6: 15 ml oil, 5 ml mustard and a pinch of pepper
- test tube 7: 15 ml oil and 5 ml egg yolk
- test tube 8: 15 ml oil and 5 ml egg white
- test tube 9: 15 ml oil, 5 ml mustard and a pinch of paprika
- test tube 10: 15 ml oil, 5 ml mustard and 2.5 ml of crushed garlic.

L Learning

How to produce a stable emulsion.

S Student's book

Strategies, Applying science, Understanding colloids, pages 86–7

! Timing

60 minutes

E Equipment and materials

- 10 test tubes and bungs
- test tube rack
- tape measure or rule
- spatula
- oil
- malt vinegar
- ready-made mustard
- salt, pepper
- egg
- paprika
- crushed garlic

t Type of task

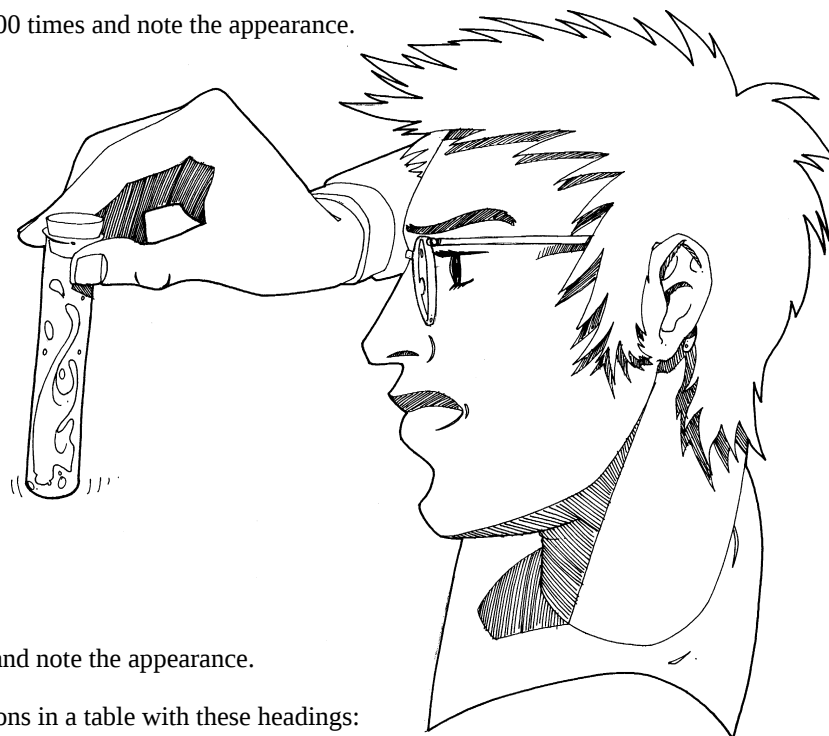
New

Other subjects

Science

Looking at emulsions

- 4 Shake each test tube 100 times and note the appearance.



- 5 Leave for 10 minutes and note the appearance.
- 6 Record your observations in a table with these headings:

	5 ml oil + 5 ml vinegar	10 ml oil + 5 ml vinegar	15 ml oil + 5 ml vinegar	15 ml oil + 5 ml mustard + 5 ml vinegar	15 ml oil + 5 ml mustard + pinch salt + 5 ml vinegar	15 ml oil + 5 ml mustard + pinch pepper + 5 ml vinegar	15 ml oil + 5 ml egg yolk + 5 ml vinegar	15 ml oil + 5 ml egg white + 5 ml vinegar	15 ml oil + 5 ml mustard + pinch paprika + 5 ml vinegar	15 ml oil + 5 ml mustard + 2.5 ml crushed garlic + 5 ml vinegar
Appearance after shaking										
Appearance after ten minutes										

- 7 Use your results to answer the following questions.



- Which test tubes contained temporary emulsions and which permanent emulsions?
- Which ingredients help *immiscible liquids* (the oil and the vinegar) stay mixed?
- Which ingredients would you use to make a French Dressing for a green leafy salad?

Further/homework

Examine the labels of a commercially produced French dressing and identify the emulsifying agent(s).

What are the ingredients of mayonnaise? Which ingredients makes the emulsion stable?