

Castle View Primary School Science Curriculum

Working Scientifically

Fair Testing:

Fair testing helps us to make sure our science experiments give us *true* and *reliable* answers. Pupils will learn to work with variables to understand the element which has caused change.

Fair testing helps us to:

- Learn the real reasons things happen.
- Make results more trustworthy.
- Build skills in asking questions and solving problems.

At Castle View, we value the importance of developing our knowledge in the subject but also learning how to adopt an experimental approach towards the subject.

We have developed a progressive, scaffolded model which allows all of our pupils to work scientifically at an age-appropriate level.

Castle View Primary School Science Curriculum

Year 1 – Working Scientifically

Statutory Requirements:

To work scientifically in Year 1, pupils should:

- Ask simple questions and recognise that they can be answered in different ways.
- Observe closely using simple equipment.
- Perform simple tests.
- Identify and classify.
- Use their observations and ideas to suggest answers to questions.
- Gather and record data to help in answering questions.

Fair Testing:

Pupils should be provided with a record sheet where a focus questions has been discussed and shared with the class.

Pupils can make simple equipment lists using singular words or images.

Predictions should be made about the outcome of a experiment, which can take various forms:


- Tick boxes
- Circling responses
- Simple sentences (latter half of the year)

Pupils should draw simple conclusions to suggest answers to questions, which can take various forms:


- Tick boxes
- Circling responses
- Simple sentences (latter half of the year)

Castle View Primary School Science Curriculum


Year 1 – Working Scientifically

 The most suitable objects for the space rocket curtains was tin foil

This material was metal

 The least suitable objects for making curtains was bubble wrap


This material was plastic



ches to
which
ere opaque.

Predict

I predict that the playdoh will be the most stretchy.



The tights was the most stretchy.

This ~~was~~ / was not the same as my prediction.

Our Comparative Test Question...

Which material will be the most absorbent and the most suitable for an astro-nappy?

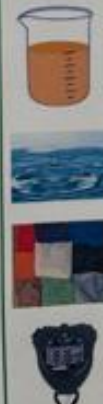
The materials I will test are...

- sponge
- metal
- fabric
- wood

My Prediction:
Which material will be the most absorbent?


- ☒
- ☐
- ☐
- ☐

Equipment...



beaker
water
Measures
stop with 20 seconds

My investigation...



Predict

Why do leaves fall off trees?

I think... I predict... because

I think because cold ✓

Leafs drop off ✓

Castle View Primary School Science Curriculum

Year 2 – Working Scientifically

Statutory Requirements:

To work scientifically in Year 2, pupils should:

- Ask simple questions and recognise that they can be answered in different ways.
- Observe closely using simple equipment.
- Perform simple tests.
- Identify and classify.
- Use their observations and ideas to suggest answers to questions.
- Gather and record data to help in answering questions.

Fair Testing:

Some pupils may need to continue to be provided with a writing frame, while others may begin to adopt their own layout.

A focus question should be discussed and generated as a class.

An equipment list should be made using short notes. Pupils should begin to understand why the equipment they've chosen is important.

Through identification and observation, pupils should write their prediction for the outcome of the experiment. Pupils should use the conjunction '*because*' to express reasoning.

Simple conclusions should be drawn, commenting on positive and negative results.




Pupils should record their results in provided tables; these may include written notes or drawings.

Castle View Primary School Science Curriculum

Year 2 – Working Scientifically

Object	Material	materials. • To know the properties of materials. • To identify and classify materials.
 bottle	 glass	✓ water ✓ strong ✗ easily ✗ smashed ✗ delicate
 house	 poly strip	✓ fun ✗ not strong ✗ blow away in ✗ wind ✗ water would soak through
 window	 Fabric	✗ ripe easily ✗ not see ✗ through ✗ the rain ✗ if throw ✗ blow away in ✗ cold
 jumper		

Object	Material	Stretch	Squash	Twist	Bend
Eraser	rubber	X	X	✓	✓
Paper	paper	X	✓	✓	✓
pencil	wood	X	X	X	X
Ruler	plastic	X	X	X	✓
hair band	Fabric Elastic	✓	✓	✓	✓
window	glass	X	X	X	X

Test if it withstands the wind. 	How will you do this and what will you use? We will use a hair dryer to blow our houses. 10 seconds
Test how waterproof it is. 	We will use the pepper to drop the same amount of water on each house.
Test how strong it is. 	We will use the weight of a book we will use the same book

I conclusion the ~~wid~~ strongest bridge is the widest because it could hold the most counters

I predict, that pepper will move away from the soap.
In conclusion
The bowl with just water the pepper didn't move and the bowl with soap the pepper moved. This is why we should use soap to keep us clean

Castle View Primary School Science Curriculum

Year 3 – Working Scientifically

Statutory Requirements:

To work scientifically in Year 3, pupils should:

- ask relevant questions and use different types of scientific enquiries to answer them.
- Set up simple practical enquiries, comparative and fair tests.
- Make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers.
- Gather, record, classify and present data in a variety of ways to help in answering questions.
- Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.
- Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.
- Use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.
- Identify differences, similarities or changes related to simple scientific ideas and processes.
- Use straightforward scientific evidence to answer questions or to support their findings.

Fair Testing:

Before beginning an enquiry, pupils should be given greater time to explore the most appropriate type of enquiry to answer questions.

After a question has been generated, an equipment list should be written using bullet points. (While there are no grammatical rules here, a lowercase format should be favoured.)

Predictions should be written with thought using the conjunctions '*when*' and '*because*' to provide a logical explanation for their thought.

Pupils should record their observations in a variety of ways, including a table of results, drawings and labelled diagrams.

When drawing conclusions, straightforward evidence should be used to support their findings.

Castle View Primary School Science Curriculum

Year 3 – Working Scientifically

I predict that it will break completely

I predict the egg won't break once

we added water

Year 3: Animals including humans

LO: I can identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat.

WS: I can record my results in a table.

SE: I can research the nutritional values of foods by reading data from food labels.

Type of Food	Amount of fat per 100g	Amount of carbohydrates per 100g	Amount of fibre per 100g	Amount of protein per 100g	Amount of salt per 100g
flour	1.6g	71g	3.9g	10g	0.03g
rice	1.9g	28.2g	0.7g	2.9g	0.03g
Soup	3.0g	6.6g	0.4g	0.9g	0.5g
yoghurt	5.8g	4.8g	0g	3.3g	0.14g
crisps	33.2g	52g	3.6g	5.6g	1.00g

Year 3: Animals including humans

LO: I can identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat.

WS: I can explain what I have found out by applying my scientific knowledge.

SE: I can identify and classify different food groups.

My balanced meal (Remember to label)

Explain how your meal is balanced.

because it has got all 7 vitamins the chocolate is fats chicken wrap is carbohydrates, protein chips have carbohydrates in them peas are fibre water is a drink and chocolate is a fat.

Change	Measure
Then type of material	the amount of light coming through
mesh	1-500
card	5-50
tin foil	1-2
acetate	1-4
	1-1000
	5-570

I have found that the card was the best because the highest was 2 lux and it was opaque the acetate's highest was 1000 lux.

What happened, did this support your prediction?

When we shook the jar with water and the egg it broke the water

it did not break because it protected it

Castle View Primary School Science Curriculum

Year 4 – Working Scientifically

Statutory Requirements:

To work scientifically in Year 4, pupils should:

- Ask relevant questions and use different types of scientific enquiries to answer them.
- Set up simple practical enquiries, comparative and fair tests.
- Make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers.
- Gather, record, classify and present data in a variety of ways to help in answering questions.
- Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.
- Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.
- Use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.
- Identify differences, similarities or changes related to simple scientific ideas and processes.
- Use straightforward scientific evidence to answer questions or to support their findings.

Fair Testing:

Before beginning an enquiry, pupils should be given greater time to explore the most appropriate type of enquiry to answer questions.

After a question has been generated, an equipment list should be written using bullet points. (While there are no grammatical rules here, a lowercase format should be favoured.)

Predictions should be written with thought using the conjunctions '*when*' and '*because*' to provide a logical explanation for their thought.

Pupils should record their observations in a variety of ways, including a table of results, drawings, labelled diagrams, bar charts and keys.

When drawing conclusions, straightforward evidence should be used to support their findings, and they should comment on similarities and differences that they have found. Pupils should also learn to comment on or suggest improvements for further investigative work.

There should be careful thought in Year 4 about the presentation and layout of a written fair test.

Castle View Primary School Science Curriculum

Year 4 – Working Scientifically

Thursday 28th November
Does the length of the string affect the sound you can hear?

What you will need for:

- tin x 2
- string
- data logger
- 2 people for talking

Method

- 1) Find a quiet area.
- 2) One person will hit their ear against the inside of the tin.
- 3) The other person will put the tin around their mouth.
- 4) Make sure the string is tight.
- 5) Use the data logger to record the decibels of the sound.

Prediction:

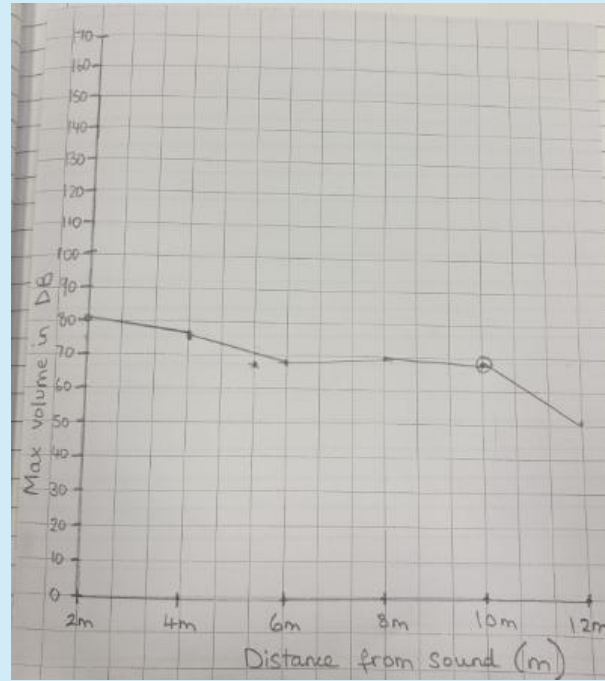
I predict that the longer the string, because you have more space.

Results:

Distance (m)	Decibels (dB)
0.720m	67.108
1.436m	70.08
2.130m	68.08
3.40m	62.08
4.249m	66.08
5.235m	63.08
6.229m	63.08
7.181m	60.08
8.173m	55.08
9.164m	56.08
10.155m	60.08
11.146m	60.08

Conclusion:

We found that the closer you are to the sound source, the higher the decibels the further away you are from the sound source, the lower the number of decibels.



prediction

I predict that the egg in the water will be the cleanest because the water is clean and coffee was worst.

results:

My prediction was wrong because the vinegar caused the most damage. My prediction was correct the candle not many however the vinegar broke down on the egg.

I think that the the hottest water is odd because it you can drink it.

the tissue because you can wipe your nose the bubble wrap because you can see through it.

Castle View Primary School Science Curriculum

Year 5 – Working Scientifically

Statutory Requirements:

To work scientifically in Year 5, pupils should:

- Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.
- Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.
- Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.
- Use test results to make predictions to set up further comparative and fair tests.
- Report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.
- Identify scientific evidence that has been used to support or refute ideas or arguments.

Fair Testing:

In Upper Key Stage Two, pupils should use their scientific experiences to explore ideas and raise questions. They should plan different types of scientific enquiry, knowing where to control variables.

Pupils should write an equipment list following the questions, where bullet points are favoured to present the equipment. Pupils should be aware of grammatical rules and ensure that bullet points are written with lowercase information.

Pupils should have a clear understanding of variables and be aware of which variables must be kept the same and which must be changed in order to achieve an outcome.

When writing predictions, it is important that pupils draw upon prior or existing knowledge to support their reasoning.

When reporting on findings, pupils may present their information in tables, labelled diagrams, graphs and charts. Pupils should have more precision when drawing tables, including accuracy with plotting results.

When drawing conclusions, evidence should be used to support their findings, and they should comment on similarities and differences that they have found. Pupils should also learn to comment on or suggest improvements for further investigative work. Pupils should include test results within their conclusions to provide evidence for their findings.

Castle View Primary School Science Curriculum

Year 5 – Working Scientifically

Can you grow new plants from different parts of the parent plant?

Equipment:

- soil
- parts of the plant
- pot - clear cups
- water
- sunlight
- window sill

Variable:

- which part of the parent plant

Variables to keep the same

- size of the cup
- how much water
- how much soil
- how much sunlight
- same amount
- the time of sunlight
- same type

Prediction = I predict that the roots will grow because that's what appears when a plant grows and the sepals will work not the petals because these are at the bottom.

Comparing Life cycle

Gecko

They can drop their tails
They can change into different colors
They can see in the dark
They have eye lids

Cats

adult cats have 30 teeth
while kittens have 26
cats can run around 48 km/h

have a variable spine third eye lid

Castle View Primary School Science Curriculum

Year 6 – Working Scientifically

Statutory Requirements:

To work scientifically in Year 6, pupils should:

- Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.
- Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.
- Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.
- Use test results to make predictions to set up further comparative and fair tests.
- Report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.
- Identify scientific evidence that has been used to support or refute ideas or arguments.

Fair Testing:

In Upper Key Stage Two, pupils should use their scientific experiences to explore ideas and raise questions. They should plan different types of scientific enquiry, knowing where to control variables.

Pupils in Year 6 should be competent in selecting the equipment they need themselves and setting up an enquiry independently. They should be familiar with using a range of materials to support their research, including data loggers, thermometers and pulsometers.

Pupils should write an equipment list following the questions, where bullet points are favoured to present the equipment. Pupils should be aware of grammatical rules and ensure that bullet points are written with lowercase information.

Pupils should have a clear understanding of variables and be aware of which variables must be kept the same and which must be changed in order to achieve an outcome.

When writing predictions, it is important that pupils draw upon prior or existing knowledge to support their reasoning.

When reporting on findings, pupils may present their information in tables, labelled diagrams, graphs and charts. Pupils should have more precision when drawing tables, including accuracy with plotting results.

When drawing conclusions, evidence should be used to support their findings, and they should comment on similarities and differences that they have found. Pupils should also learn to comment on or suggest improvements for further investigative work. Pupils should include test results within their conclusions to provide evidence for their findings.

Castle View Primary School Science Curriculum

Year 6 – Working Scientifically

Scientific question:

Do sugary drinks affect an egg's 'enamel' more than others?

Variable to measure:

- how the shell will be affected.

Variable to change:

- drink;
- quantity of sugar contained within each liquid.

Variables to make it a fair test:

- same amount of liquid;
- same egg type and size;
- same size beaker;
- same length of time;
- ensure consistency of location and its conditions.

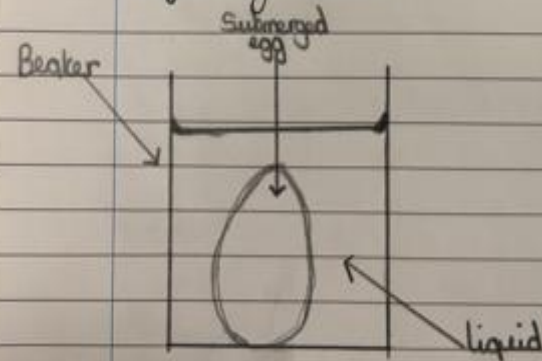
Prediction:

Thanks to the previous studies of long-standing scientific research, it is well known, and understood, that sugar leads to the rotting of tooth enamel also known as tooth decay. Therefore, I hypothesise that the drinks with a higher sugar content will have a more detrimental affect on the egg's enamel.

Conclusion:

As seen in my results, the drinks with the highest sugar content brought the most enamel decay. This was most clear given that the sugared coke left the egg extremely discoloured with the orange juice causing full disintegration. This largely supports my prediction. However, the orange juice (containing less sugar than the coke) had a greater effect on the enamel which was surprising. My research into tooth decay has taught me that levels of acidity also leads to tooth decay. Therefore, I predict that if I were to test again with liquids that possess ^{higher} levels of acidity, I would find that some would have a greater effect than others.

Diagram of method:



Evaluation:

Drink	Observation day 1	Observation day 2	Observation day 3	Observation day 4	Observation day 5	Observation day 6	Observation day 7
Coke 33g in 120mls 33g	Egg has floated to the top of the surface. Egg sunk.	Shell is discoloured. Red. Dark lines on shell. Egg sunk.		Brown residue. Liquid is brown and slimy.	Greasy film. Very pale.	Very brown. Mostly no change. Egg is sticky and discoloured.	
Coke zero No sugar	Egg floated to the surface. Egg sunk.	Shell colour is slight stained. Shell in tact.			Slimy film. Light brown patches. Residue.	Greasy residue. Slimy film on shell. Slightly brown.	Bitter liquid. Thick residue. Hot.
Tea 0g	Egg has sunk.	Stained brown/orange. Water is brown. Egg has later colour.			Still stained. No noticeable change.	Slight residue on beaker. Egg white patches. In tact.	Discoloured. Very moldy. Egg white is brown/grey.
Coffee 0g	Shell has observed colour in parts. Egg in tact.	Egg has sunk.			Lumpy and stained. No change.	No liquid. Discoloured. Still lumpy. No change.	Red and brown. Grey egg white.
Milk Some Sugar 17g-170mls	Egg has sunk.	Shell in tact. No smell. mold. No change.			Milk has set but egg is in tact. No change.	Milk is off. Very lumpy and powdery. Milk stuck to egg.	No egg shell change. Shell is peeling. Molding.
Water No sugar	Egg has sunk.	No change. Quite pale and white.			No change.	No change.	No change.
Oasis 21g-170mls	Egg sunk.	Frothy water. Shell is discoloured. Patchy/slimy.			Scratches, peeling and rough.	Mold is growing. Bacteria. Shell is cracking.	Molded and discoloured.
Orange juice 33g in 120mls	Egg also sunk.	Shell is foamy / bubbly. Slimy. In tact.			Egg is peeling. Orange residue.	Egg is floating. Bubbles. More residue. Shell is cracking.	Very moldy. Shell has disintegrated. Red.

Castle View Primary School Science Curriculum

Year 6 – Working Scientifically

