Science Week – Additional Ideas

Below is a list of ideas for investigations that you could develop for science week. Even if these ideas aren't used within the week, at least they may spark of the inspiration for creating your own tests of a similar nature.

Which teacher has the best hearing?

Suggested activity/activities:

Children could develop an investigation that tests the hearing sensitivity of a participant by playing a noise of a constant volume and then incrementally playing the same noise at a further distance away from the participant. The participant could be turned away from the pupil making the noise so that they cannot 'fake' when they have heard the noise. Also, the pupil making the noise could move closer and further away from the participant, therefore 'randomising' the test and remove the potential for the participant to guess up to a point.

If the room is quiet enough, the pupils / teachers could even use a pin and hear how far they can hear a pin drop from!

In addition, further down this ideas sheet, there are also a series of pitch perception tests that could be used on willing teacher participants (or even the children themselves) to test which teachers / pupils are most acutely sensitive to changes in pitch.

Of course, you may have to be sensitive to children and teachers with hearing loss/difficulties, and, if headphones are used in conjunction with the pitch perception tests, that the volume of the headphones is monitored. If issues relating to fair-testing are to be considered, headphone volume will have to be kept constant, anyway.

Likely outcomes / Sc1 Aspects that could be covered:

Children could invent and conduct their own investigation to solve the question. This could be as open-ended and as detailed as the teacher wishes. For example, the children could receive no suggestions from the teacher and the children could be expected to invent, conduct and complete every stage of the investigation process (by completing one of the more detailed investigation prompt sheets). Alternatively, the activity could be teacher-led / suggested and written work could focus on one particular aspect of the investigating process. For example, compiling results.

Many concepts relating to 'sound' – how distance relates to volume, understanding of pitch and tone, etc – will, inadvertently, be (re)covered as part of this investigation.

The investigation may lead to a discussion on how musicians often have a better appreciation of fine differences in pitch due to the necessity of being able to tell when a note is too sharp or flat, etc.

Possible resources needed:

Children may need instruments / keyboards and various other pieces of equipment to set-up their test (for instance, trundle wheels to measure distances and cones to mark distances).

ICT:

http://www.nidcd.nih.gov/tunetest/ (distorted pitch test website – I got 25 / 26, btw)

http://www.jakemandell.com/tonedeaf/ (website that plays 2 short musical phrases alongside each other and a participant must guess whether the phrases are the same or different in someway – this particular test could be used by the children, too).

http://tonometric.com/adaptivepitch/ (this test plays 2 pitches alongside each other and a participant has to decide which one is higher or lower – out of the three tests, I think this one is the best and the most suitable to be used).

Other cross-curricular links

Numeracy - I think this investigation will lend itself particularly well to some interesting ways of communicating results which may be appropriate for some of the more able older children – scatter graphs comparing hearing sensitivity with age, bar charts with grouped results showing a class's results to some of the pitch perception tests which could then be compared with children in an another class, etc.

How can you measure wind speed?

How can you see which is the windiest day?

How can you see which is the windiest part of the day?

Suggested activity/activities:

Of course, there are various ways the children could develop a system of measuring wind speed.

They could develop a simple way of dropping something light from a consistent height and measuring the distance that the object travels.

Some children may want to create their own anemometer. Suggested instructions for building cup anemometers and spoon anemometers can be found in the book 'My Book of Science Investigations'.

Accurate local daily forecasts of wind speed can be found on the website of the Met Office (see the address below). It could be possible to turn this investigation into some kind of competition, where groups within a class will have to use their methods for measuring wind speed to measure wind speed at a certain time of the day over a series of days. A team of children could win if they most accurately order the days in terms of the wind speed.

Teachers could use the Met Office website for the actual wind speeds for Oxfordshire or, if there is interest in conducting this investigation, I will see if I can procure an actual anemometer for the week so that Teachers and children can compare the reliability of their methods against accurate readings of the wind speed at Barley Hill.

Likely outcomes / Sc1 Aspects that could be covered:

The children will develop their own system for measuring wind speed. In all likelihood, they may want to take repeat readings to reduce the interference of sudden gusts on their results and will therefore

developing an understanding of anomalous readings. Depending on the ability of the children, they may want to take an average of their results. They will need to develop a system of recording their results.

They will be encouraged to keep their tests as fair as possible (for instance, measuring wind speed from the same point each day in a part of the grounds that is not likely to be interfered / shielded by the school buildings – i.e. the field).

If the children are using some sort of 'dropping' method to gauge wind speed, they may have to measure in cm or measure in non-standard units (e.g. number of 'feet' – children's feet not 12"!).

If the children are using their own anemometer, they may want to record the number of spins in 15 seconds and will therefore be learning to use a stopwatch accurately.

Possible resources needed:

Measuring tapes. Cyclamen seeds. Materials to make a device to drop.

If you anticipate that you will want to encourage the children to make their own cup anemometer, then resources may need to be purchased (2 long strips of balsa wood for the 'arms' of the anemometer, etc.). So please let me know! In this regard, the children may also need stopwatches to count the number of spins in one minute.

ICT:

http://www.metoffice.gov.uk/ (using this link you can find detailed wind-speed forecasts / results for Oxfordshire, accurate to different times of the day).

Other cross-curricular links

Numeracy – it seems sensible in this particular investigation to take repeat readings. Depending on the ability of the children, an average of these results can then be found.

How can you stop an egg from cracking?

Can you make your own egg safety helmet?

Suggested activity/activities:

Children could talk about the types of materials used in packaging and why these materials are used. What types of materials would not be sensible to use?

They could also link this to the design of bicycle safety helmets. What types of materials are bicycle safety helmets made of? Why?

You could discuss road safety and the vigorous test that cycle helmets are put through to ensure their safety

The children could make their own packaging / safety helmet for an egg. You could specify certain conditions (e.g. the size / weight of the helmet / has to be made from recycled materials, etc.). A fair test could be developed to compare the effectiveness of the packing materials / helmets that would, in all likelihood, involve dropping them from increasingly large heights.

Likely outcomes / Sc1 Aspects that could be covered:

Children will consider the types of materials that are used in packaging / helmets and why these materials are suitable. Children will make predictions, based on their knowledge of actual packaging / helmets, as to whether their materials are suitable and which packet / helmet is likely to be able to withstand the greatest impact.

They will develop a fair test to ensure their results are comparable. The test will serve as a model of an actual situation.

Children may make criticism on the effectiveness of the test as a model. E.g. eggs can crack easily, the test only models an impact with a flat service (the ground).

The children will draw conclusions on the most effective packaging / helmet.

They will develop an understanding of relating to impact of a fall is related to speed which is dependent on the distance that the object has fallen from.

Possible resources needed:

Eggs, a method of releasing the egg from different heights (step ladder or a length of guttering to pull the helmet / packaging up on), various materials to build the helmet / packaging with (these could be brought-in by the children).

Please see 'Problem Solving in School Science' Robert Johnsey p.56-58.

ICT:

http://www.cyclesense.net/fset.htm
(cycle safety information for older children)
http://www.disney.co.uk/DisneyChannel/cyclesmart/index.html
(cycle safety information for younger children)
http://www.cyclehelmets.org/papers/c2023.pdf
(a short paper – for adults – that explains the design of cycle helmets)

Other cross-curricular links

D & T – This investigation could be expanded so that includes elements of D & T.

Literacy / **Art** – Children could use information from the suggested websites to design a persuasive poster about Road Safety or, perhaps, an advert for their helmet that contains road safety information.

Which is the crispiest crisp?

Suggested activity/activities:

Children could develop an investigation that tests the 'crispiness' of crisps. For example, the children could use very light 'push meters' to measure the force required to snap a crisp. They could even use the sensing equipment to record the volume of a crisp snap. They may want to take repeat readings, think about how to keep the test fair, present their results, etc.

Likely outcomes / Sc1 Aspects that could be covered:

I think this investigation principally lends itself to thinking about setting up a fair test. In all likelihood, they may use some science equipment that they haven't used before (push meters and sensing equipment, etc.).

Possible resources needed:

Crisps, push-meters, sensing equipment.

ICT:

Data Harvest Sensing Equipment.

PLEASE LET ME KNOW IF YOU'RE PLANNING TO DO THIS INVESTIGATION AS WE WILL NEED TO PURCHASE A NUMBER OF WEAK PUSH METERS AND THE DATA HARVEST EQUIPMENT THAT WE HAVE IS ONLY COMPATIBLE WITH A FEW OF OUT LAP TOPS.

Which is the stickiest tape?

Suggested activity/activities:

The real challenge of this activity is the children's ability to develop a reliable and measurable method for testing the stickiness of tape. A suggested activity would be to set-up equipment similar to that shown on p.79 of 'My Book of Science Experiments' where an empty CD case is fastened with string and the string is run of the edge of a table. The other end of the string can then be fastened to the metal hoop hanger of the slotted masses set. The tape to be tested can be secured to the reverse of the CD case and then pushed flat against the table. Progressively, masses can be added to the hanger until the CD slides and the tape gives way.

Safety had to be considered with regards to falling weights. A large cardboard box with newspaper inside could be placed beneath the suspended weights in case they fall.

Likely outcomes / Sc1 Aspects that could be covered:

As suggested, the real challenge of this investigation is the children's ability to problem-solve: How will they set-up a reliable test to measure the stickiness of tape? Hopefully, this will also encourage a small discussion of increasing and reducing friction.

Possible resources needed:

Various sticky tapes, set of masses, string, CD cases, card boxes, newspaper.

Other cross-curricular links

Numeracy – results could be presented in a bar graph and, therefore, this investigation may be appropriate for children in lower KS2.

Which is the strongest bag?

Suggested activity/activities:

This is a simple investigation of a similar nature to the one above. The children could develop a fair test but will have to think about safety considerations (i.e. a box with newspaper in to catch falling masses). In all likelihood, the children will need a greater number of masses before the bag fails and so will have to be supervised closely.

Likely outcomes / Sc1 Aspects that could be covered:

The children will have to consider how to make the test fair (for instance, gentle placement of weight is far less likely to produce sudden tears than drops). Children could make predictions based on their knowledge of the type of materials used to make the bags.

Possible resources needed:

Various bags (variety of paper and plastic bags), card boxes, newspaper & lots of supervision!

Which is the best tissue?

Suggested activity/activities:

Again, this is another activity that could be attempted in a variety of ways and part of the challenge could be for the children to think how they can develop a reliable and measurable test to solve the question. You could test the strength of a particular tissue. This could be done by securing a section of the tissue between two clamp stands and carefully stacking weights on top of the section of tissue until the tissue tears. Alternatively, a section of tissue could be fastened at either end by two bulldog clips. One end of a bulldog clip can be secured to a desk. A piece of string can be thread through the other and at a set of masses can be hung over the edge of a desk with progressively more weights attached to it. The children could see what difference there is to the outcome of their tests if the tissue is wet. Again, consideration must be given to falling weights (card-board box with newspaper should be used to brace the fall).

The children could develop a test for tissue absorbency. This could be done in a variety of ways. One way would be to perhaps hold a small section of tissue into water and see how far (within a particular time) water can soak up through the paper. Perhaps, the children could find some way of saturating a tissue and then weighing the tissue afterwards (perhaps using the electronic scales).

Likely outcomes / Sc1 Aspects that could be covered:

Part of the challenge will be to set-up a reliable, fair and measurable test. Almost all aspects of the investigative process can be conveniently by this investigation: Children could make simple predictions and conclusions. Results can be presented in a variety of ways. Children could comment critically on the reliability of their tests. Repeat readings could be taken. Children may use some new science equipment (electronic weighing scales).

Does putting a coat on a snowman stop him from melting so quickly?

Suggested activity/activities:

A common misconception is that some materials have the property of making things warm. In this case because we put coats on to keep warm there is a tendency to believe that the coat will also make the snowman warm so that it will melt quickly. In fact that coat acts as an insulator, reducing the movement of energy in either direction. On a person it can prevent energy loss, while it prevents the snowman from getting warmer. The snowman will therefore not melt easily while wearing a coat.

The children could suggest a way of investigating this using real snow or ice. Water can be frozen inside plastic drinks bottles or plastic containers and used as model snowmen. An old glove or sock will make a model coat and allow the effect of the coat to be investigated. A useful extension is to investigate the effect of other factors such as the nature, colour and thickness of the coat.

Likely outcomes / Sc1 Aspects that could be covered:

Much of the investigative process can be can be covered well with this investigation. Notions of fair testing can be considered. Children will make predictions. Children can use measuring cylinders to measure the amount of melted ice / water and measure to the nearest millimetres, etc. Results can be presented quite simply. Conclusion can be draw (which often conflict their initial predictions).

The children will obviously (re)cover concepts relating to changes of state.

Possible resources needed:

Empty drinks bottles, socks / scarves, measuring cylinders, stop watches, 'Concept Cartoons' CD.

ICT:

The idea for this investigation was taken from the 'Concept Cartoons' CD (8.2 'Snowman). The cartoon could be used as a good introduction to the investigation.

Other cross-curricular links

Numeracy – this investigation lends itself to simpler ways of presenting results appropriate to children in lower KS2.

Does toast really land butter-side down?

Suggested activity/activities:

Children tip toast of a table and record results on tally table, present their results and draw conclusions. Essentially, an object the size and shape of bread typically rotate 180degrees as it falls from a work-surface / table. The children may work this out for themselves, but you could use a camera to record several falls and slow the images down to help the children identify this.

Likely outcomes / Sc1 Aspects that could be covered:

Many aspects of the investigative process can be covered with this investigation. The children will need to think about how to keep the test fair and record their results as they work.

Possible resources needed:

Toast, butter, video cameras.

ICT:

Use of video cameras to record falls.

Other cross-curricular links:

Numeracy – this investigation lends itself to simpler ways of presenting results appropriate to children in lower KS2.

Do people who are left-handed text faster than people who are right handed?

Suggested activity/activities:

This is a fairly simple investigation. Children can develop their own fair test to investigate an answer to the problem. They can make predictions and draw conclusions. One would expect that it makes no difference whether you are right handed or left handed but certain pads may have particularities that favour right-handed people. E.g. the 'space' button may be in a more comfortable position for a right hand thumb.

Likely outcomes / Sc1 Aspects that could be covered:

Children will develop a simple fair test. They may make predictions based on the lay-out of the phone and may draw comparisons with the difficulties that left handed people have with cursive writing. The children are likely to use stopwatches to time the speed with which they text a short message. Results can be presented in an age appropriate way.

The investigation will likely throw-up issues relating to the 'fairness' of the sample of the people involved. For instance, whether those that have been sampled (particularly from the left-handed contingent) have more experience of texting with their left hand, etc.

Possible resources needed:

A mobile phone (that is not currently active), stopwatches.

Is it quicker to text using your fingers?

Suggested activity/activities:

A simple investigation of a similar nature to the one above. Perhaps this one is a little less controversial as it won't set one part of the class against the other and may negate any effects a child's spelling ability may have on the outcome.

Likely outcomes / Sc1 Aspects that could be covered:
The children will develop a simple fair test. They may take repeat readings. They will record their results as they work and present them in an age appropriate manner. They will have gained experience at having used a stop watch. They will draw a simple conclusion from their results.

Possible resources needed:

A mobile phone (that is not currently active), stopwatches.

Do children have faster reactions than adults?

Suggested activity/activities:

Part of the challenge of this investigation is for the children to develop a simple, reliable and measurable test to answer the question. Traditionally, this particular investigation has been approached with a participant holding their thumb and forefinger in position around the bottom of an up-held ruler. The ruler is then dropped by the instigator and the participant has to catch the ruler between their thumb and forefinger as quickly as possible. The distance along the ruler until the ruler is caught is an indication of reaction speed.

The website addresses below are online reaction time tests.

Age is a factor in reaction time speed, but so is conditioning and fatigue. Could the children test reaction time before and after a PE session? At different points throughout the day?

Likely outcomes / Sc1 Aspects that could be covered:

The children will develop a fair test. They may take repeat readings. They will record their results as they work and present them in an age appropriate manner. They will draw a simple conclusion from their results.

Children will develop an appreciation of reaction times which could lead to a discussion of road safety among the older children. The average reaction time to unexpected and varied stimuli is 0.7 seconds. This could be used to work-out how far cars could travel before a driver could react to a dangerous situation.

Possible resources needed:

Rulers, ICT room.

ICT:

http://getyourwebsitehere.com/jswb/rttest01.html
(online reaction time test)
http://humanbenchmark.com/tests/reactiontime/index.php
(online reaction time test – careful with this one, though – it sometimes has slightly inappropriate banners)
http://cognitivelabs.com/mydna_speedtestno.htm
(online reaction time test)

Other cross-curricular links

Numeracy - I think this investigation will lend itself particularly well to some interesting ways of communicating results which may be appropriate for some of the more able older children – scatter graphs comparing reaction time with age, bar charts showing reaction times at different points in the day etc.

Can you make the slowest falling object?

Suggested activity/activities:

Obviously, this investigation will inadvertently bring up conversations on air resistance and how rate of fall is affected by surface area. The children will no doubt talk about parachutes and how these work can be discussed in simple terms. The video of the 'hammer-feather drop' from the first lunar landing (website link below) will help to reinforce the idea of air resistance.

The children could potentially go through all of the investigative process with this particular question.

Likely outcomes / Sc1 Aspects that could be covered:

The children will gain an understanding of air resistance.

All aspects of the investigative process can be covered with this investigation in an age appropriate manner.

Possible resources needed:

Resources for making parachutes, step ladder and timers.

ICT:

http://nssdc.gsfc.nasa.gov/planetary/image/featherdrop_sound.mov
(Quick time video of hammer & feather drop from the first lunar landing)
Concept Cartoon CD 11.2 'Falling'
(good to use as a starter / plenary activity)

Outside of a fridge, which is the best place in the school to preserve food, why?

Suggested activity/activities:

Given the topic of the activity, perhaps this is an investigation that would be more suitable for the older children. Children will revise how to preserve food and will discover, with the absence of a fridge, where the best place might be to keep food as fresh as possible. Children could use thermometers and humidity dials to gauge the temperature and humidity of various points around the school and draw conclusions from their results. Children could also comment on the likely 'cleanliness' of the environment – an outdoor shed, for instance, may harbour more bacteria than a clean classroom desk or a disinfected kitchen work surface.

Obviously, children will have to be made aware that refrigeration is still the most reliable and safest way of preserving food and, although the children may have found the next best environment to store food, leaving food in such a place for later consumption could be very dangerous.

Likely outcomes / Sc1 Aspects that could be covered:

Children will (re)cover the concept of micro-organisms and how to preserve food.

Children could make predictions based on their prior understanding of preserving food. Children will record their results and present them in an age appropriate manner. Children will draw conclusions from their results. Children may comment critically on the reliability of their test (e.g. did the children measure temperatures / humidity at different times of the day).

Possible resources needed:
Thermometers, humidity dials.

ICT:
Concept Cartoons 7.1 'Rotting Apple'

Can you weigh air?

Suggested activity/activities:

This is a problem solving activity that won't involve many aspects of Sc1. You could challenge the children to think of a way in which they could weigh air. The most typical way of doing this is by setting up a simple lever balance with a long piece of cane. On one end attach an inflated balloon, on the other end attach an un-inflated balloon. If the cane is long enough and pivots about the mid-point, then the end with the inflated balloon will lower demonstrating that air has weight.

This activity could be used to (re)cover the concept of gas and the composition of air.

Likely outcomes / Sc1 Aspects that could be covered:

The children will gain an appreciation that gasses, even though they sometimes can't be seen, have weight.

Possible resources needed:

Balloons, cane, string.

How can you make lemonade lighter? (without drinking it!)

Suggested activity/activities:

This is another problem solving activity that could be linked to the activity above to further demonstrate that gasses have weight. Children will notice that when a fizzy drinks bottle is opened, carbon dioxide gas is released. If they have done the activity above, they may guess that this will result in the bottle of lemonade weighing less given enough time.

Likely outcomes / Sc1 Aspects that could be covered:

Children will gain a further appreciation that gasses have weight.

They may make a prediction based on their prior scientific understanding (see activity above). They may use sensitive electronic scales to measure the weight of the lemonade bottle over time. It would be appropriate to plot results on a line graph.

Possible resources needed:

Lemonade, sensitive / electronic scales, timers.

ICT:
Concept Cartoons 8.5 'Lemonade'
(a concept cartoon that would be useful to use as a plenary activity)

Can we improve our fitness in a week?

Suggested activity/activities:

Children could develop a short circuit of fitness activities and measure their performance – be it time or heart rate immediately after completion. They could attempt the circuit at regular intervals through-out the week (Monday, Wednesday, Friday, etc).The children could try to ensure that their test is as fair as possible. This will be difficult as there will be an enormous temptation for the children to 'cut-corners' and not do a full press-up the second time around, for instance.

Likely outcomes / Sc1 Aspects that could be covered:

Inevitably, class discussion will focus on many aspects of improving fitness. Depending on the difficulty / duration of the exercise and the age of the children, discussion may also focus on recovery times, etc., as measures of fitness. Discussion could also focus on the types of food that could be helpful in ensuring a good response time to a difficult aerobic exercise.

Children will have to set-up a fair test. They will need to measure a dependent variable (be it heart rate, time, distance, etc.). Results could be presented in an age appropriate manner. Anomalous results could be discussed. Conclusions could be made.

Possible resources needed:

PE equipment to create the circuit of activities, timers, stethoscopes (and anti-septic wipes).

Other cross-curricular links
PE – Obvious link to PE. Time could be given to demonstrating different exercises that the children may not have used before ('burpees' etc.), how they exercise different parts of the body / muscles, safety aspects could be talked about.

Which material makes the best filter?

Suggested activity/activities:

Mix sand with water and try filtering using muslin, filter paper, blotting paper, kitchen paper etc. Large quantities of the mixture can be filtered then resulting filtrate / filtrand can be measured in some way (e.g. weight of viltrant / volume of filtrate).

Likely outcomes / Sc1 Aspects that could be covered:

Children will revise concept of flitration. They will set-up a fair test. They will measure resulting filtrate / filtrand using either scale on beaker or sensitive electronic weighing scales. They wil present their results in an age appropriate manner and draw conclusions.

Different materials could be looked at under-microscope / electronic microscope to look at cross-hatching / density of fibres of different materials.

Possible resources needed:

Muslin, filter paper, blotting paper, kitchen paper, etc., sand, water, large funnels, large beakers, electronic scales, (electronic) microscopes.

ICT:
Electronic micro-scopes.

Do rocks absorb water?

Suggested activity/activities:

Children could suggest test to solve the problem. You will need a selection of rocks (see science cupboard) and pumice, which is a very porous rock (from Boots, etc.). Obviously, the children will need to weigh the rocks, submerge the rocks in water, then take them out of the water and weight them at regular intervals.

Likely outcomes / Sc1 Aspects that could be covered:

Children will gain an understanding of pervious and impervious rocks. This understanding could be linked to the formation of rivers from springs.

Children will use electronic weighing scales or other weighing equipment.

Children may make predictions based on the density of the rocks.

Children will draw conclusions.

Children will present results in an age-appropriate manner.

Possible resources needed:

Rocks (including pumices), water beakers, electronic weighing scales, timers.

Further ideas for investigation…

Which teacher's car is the hottest (on a sunny day)? Which colour is the 'hottest'?

Can you make an egg float? – investigation into buoyancy / buoyant materials and by (possibly) changing density of the water / floating in brine.

What types of tree / shrubs are located around the school?

Is there biodiversity between the field and the nature area? Why?

What magnet is the strongest?

How can we measure friction (without using a forcemeter)?

Ideas to spark science discussion…

What if there was air in space?
What if there was no day or night?
What would the world be like if we didn't have electricity?
How can we save energy? How can we tell how much energy we have saved?