

Learning Science Together - Notes for Teachers

In these notes you will find:

- General Organisation of the Family Learning Sessions
- List of electronic copies of resources available to you for using/adapting
- Kidnapping mystery - Notes for Teachers
- Outdoor: nature detectives - Notes for Teachers
- Budget example
- Contact details for Alison Eley

Each section has photographs included to help illustrate the activities, how they worked and the resources needed.

General organisation of the family learning sessions

- There were two events – a kidnapping mystery, which we did on two Saturdays in the spring term, and an outdoor learning activity (nature detectives), which we did on two Saturdays in the summer term
- Each event ran for the morning and then was repeated in the afternoon of two Saturdays – i.e. each activity was repeated four times
- Children either came to a morning or afternoon session – up to 25 children (plus their parent) were accommodated in each session (NB it was agreed afterwards that more children could have been included, although more than 32 in total would have compromised the quality of the experience)
- Every child had to be accompanied by a parent or guardian
- One parent could accompany up to two children
- All children included had to be pupils at the school - younger siblings were not included and it was not open to children from other schools
- Each family had one copy of the booklet for the event
- Four teachers took part in each of the events (so eight teachers in total were involved)
- Teachers were asked to commit to both the Saturdays for one event so we didn't need to train more than four teachers per event
- The teachers were paid £200 per Saturday that they worked
- The budget included supply cover for a half day per teacher in order to train the teachers before each event
- Each teacher 'manned' a particular activity in each event. Teachers generally chose to rotate the activities between them so that they experienced all of them by the end. In any one session, they stayed with the same activity – in other words, they stuck to the same one for the whole of a morning, and then swapped to a different activity in the afternoon, and swapped again on their second Saturday
- My role was to introduce and conclude it all, organise the refreshments, and then oversee and 'float' throughout the activities.
- See timetable in booklets for timings of activities

Electronic copies of resources available

Please ensure that the acknowledgements to Hampton Hill Junior School and the Primary Science Teaching Trust remain included in the powerpoint presentations and also on the booklet covers.

Word documents

Learning Science Together – aims and outcomes

Sample of confirmation slips

Sample of evaluation form

Kidnapping booklet for families

Chromatography background knowledge

Artwork – small hats ready for printing on stickers (7 x 3)

Artwork – large hats ready for printing on stickers (7 x 3)

Outdoor booklet for families

Powerpoints

Sample of flyer and booking form

Introduction to mystery event

Kidnapping powerpoint

Caught criminal slides

Introduction to outdoor event

Excel spreadsheets

Kidnapping evaluations

PDF documents

Info for staff (prior to event)

Circuit diagram

Video

Hostage message

Free man message

Kidnapping mystery - Notes for Teachers

Please read these notes alongside the Kidnapping Mystery Booklet

We wanted to make the kidnapping context as real as possible for the children, so we started with the introductory powerpoint and talked as if they were going to be looking at science books etc. – something that sounded a bit dull. After a few moments another teacher came in and asked us to stop immediately, put crime tape over the doors, and announced that the deputy head had been kidnapped and that nobody could leave until the police had been helped with their enquiries – we then moved on to the kidnapping powerpoint.

Four investigations are included in this – the children and their parents spent 20 minutes in each. Each investigation was introduced and supervised by a teacher from the school. The teachers stayed where they were and the families rotated round the activities. The teachers therefore did their investigation four times in one session. 25 minutes was timetabled for each activity to allow for the families to move rooms and the teachers to do any clearing up.

For each investigation, the teachers set up **three identical tables of equipment**. This meant that there were two or three children and their adults in each group.

- **The mystery powder – whose pocket was it in?**
- **The intruder alarm – who disabled it?**
- **The ransom note – who wrote it?**
- **The broken window – who threw the sandbag?**

The science skills focus for each activity was on reliability of evidence. After each investigation the teachers encouraged the children and parents to think about the evidence they have collected and how reliable they think it is.

Each activity is designed to eliminate only one suspect (two in the ransom note activity) so that they cannot find out who did it until they have done all four investigations. The solution table at the end of this document includes all the information that is needed to make it work so that there is only one possible culprit at the end of it. From this it should be straightforward to change the culprit by switching some of the items – if you run the event on more than one occasion then the culprit should probably change so that if the children have talked to others that have done it, then they won't know the new solution. e.g the first time we did it the culprit was Gribble and then just by switching their powders with Yolo, we could change the culprit to Yolo for the second day.

The mystery powder – whose pocket was it in?

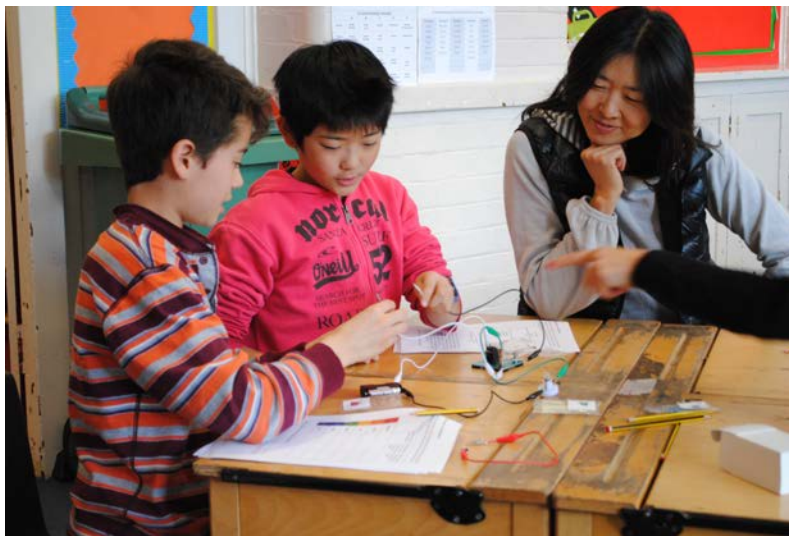
This is fairly straightforward. Encourage families to test for dissolving first and then the reaction with vinegar (it doesn't matter if the beakers are wet with water for the vinegar test, so saves time).



The intruder alarm – who disabled it?

This is a difficult circuit to make because of the two way switch. Most families needed some sort of help with it. However, it did not delay the completion of the activity and we felt that it was good to leave it as it was as (a) it was more like a real life situation, e.g. how an electrician might work and (b) the children liked the two way switch and it was different from the electricity they had done at school. Do not give the families a buzzer. All the buzzers that seem to be available have high resistance and so when in series with a light bulb it means that the light bulb does not light. This means that the description of how the alarm works ceases to make sense, so we decided just not to give them the buzzer – probably sensible anyway to keep the noise down!

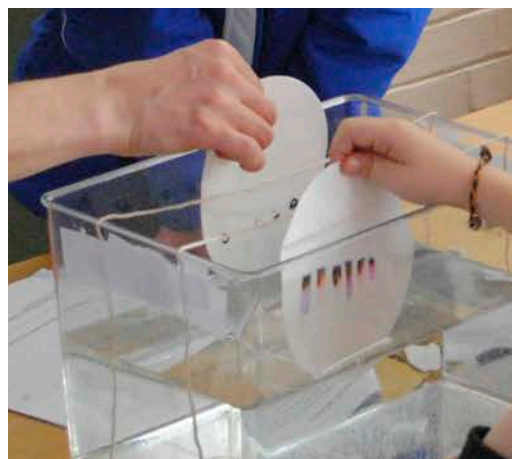
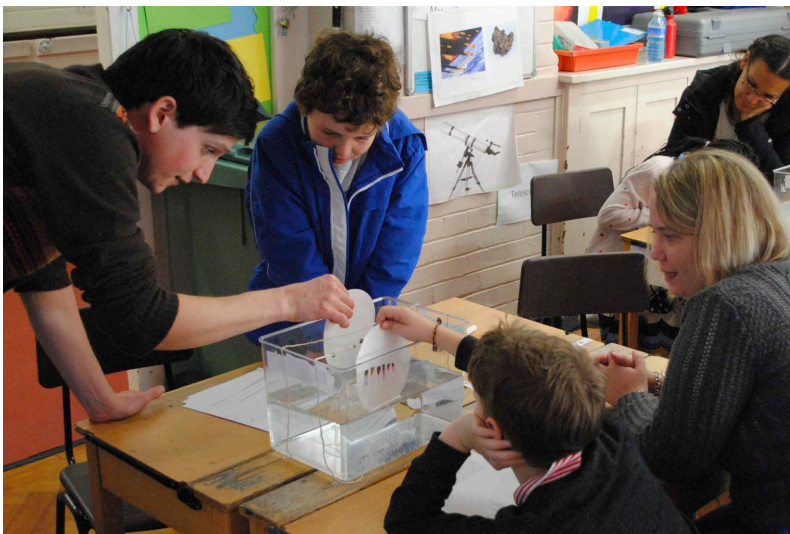
There was only one object that did not conduct (the crayon), and so only this suspect was eliminated. There were two objects included to promote discussion around conductors and insulators which were the pipe cleaner (insulator on outside and conductor in middle, so could have been used) and the clothes peg which was mostly plastic but had a metal spring – again could have been used.



The ransom note – who wrote it?

You need to write a new ransom note and take a photo of it to put into the kidnapping presentation. You also need to cut strips of filter paper with a 0 at the bottom of each, written in the culprit's pen. Each family is given one and told it is an actual piece of the ransom note (one of the zeros from the million pounds). The families then write a 0 in each of the other pens on one piece of filter paper and hang this next to the ransom note strip. You must use filter paper that is the same quality secondary schools use.

It is difficult to find pens that look different from each other on the outside but have ink similar enough to each other. It means trying out lots of different ones until you get four that are as similar as possible, so you will then eliminate two suspects. If you have only three pens that are similar, you will eliminate three suspects and they will find out who did it before they have done all the investigations (unless they are doing this one last). We found that the cheapest felt pens tended to have similar inks to each other, but they also ran out sooner so you need spares. We stressed that in order to eliminate any suspect, the pen has to be **definitely different** from the ransom note pen – if it is at all similar, then they are still a suspect. This helped stop them jumping to conclusions too quickly. NB they all need to be water soluble not permanent markers.



The broken window – who threw the sandbag?

We used balloons to make the sandbags – colour coded to match the suspects' colours. The balloons that are normally used for filling with helium are good ones as they are a bit bigger and stronger than standard ones, and also come in perfect colours. To fill them with sand, blow them up first and then let the air out. Use a funnel to put the sand in. With the heavier ones, it is a good idea to make sure it has been blown up a lot first so that the sand all fits – otherwise it means blowing a bit more when the sand is half in the balloon which is likely to give you a mouthful of sand when you let go. We used kitchen scales to get the exact weights.

Each group had a small white tie handle plastic bag with 50cm of elastic attached – sewing elastic 5mm wide is ideal. They put each sandbag in the bag in turn and measured and recorded the stretched length of the elastic. They then did the same with the known weight of 200g. We didn't give the families the 200g weight until after they had tested all the sandbags – otherwise they would not have needed to do them all.



Solution

This gives details of which powder, object (for alarm), pen and sandbag weight to give each suspect to ensure that there is only one possible culprit. You can see from this that the only one with all 'YES' is Gribble so they are the culprit. You can also see that the only difference between Gribble and Yolo is in the powder they had, so switching these powders would make Yolo the culprit.

		Did they have a matching white powder?	Could they have disabled the intruder alarm?	Could their pen have written the ransom note?	Could their sandbag have broken the window?
1	Rapston	YES caster sugar	YES pipe cleaner	YES crayola	NO 180g
2	Ocky	YES citric acid	YES nail	NO WH Smith	YES 350g
3	Yolo	NO bicarb of soda	YES foil	YES red HW	YES 400g
4	Gribble	YES gran sugar	YES clothes peg	YES fat plain black	YES 320g
5	Blaze	YES salt	NO crayon	YES thin plain black	YES 250g
6	Pluto	NO flour	YES coin	NO blue berol fine	YES 280g

Summary of equipment needed for each investigation:

Three lots of each of the following (for three groups/tables per activity)

Powders	<p>6 pots containing: caster sugar, citric acid, bicarbonate of soda, granulated sugar, salt and flour. Each pot and lid coded with coloured hat sticker to identify which powder was found on which culprit</p> <p>Vinegar, beaker of water, stirrers and spoons</p> <p>six small beakers for testing each powder, large beaker to pour the waste into (to avoid anyone needing to move around)</p>
Alarm	<p>6 items where only one is an electrical insulator – we used pipe cleaner, piece of foil, nail, clothes peg, crayon and a coin – they were given in tiny plastic bags with hat stickers to identify which object belonged to which culprit. The stickers could just as easily be put on the actual objects</p> <p>two way switch, six wires with crocodile clips, battery holders and batteries, bulb in bulb holder</p>
Ransom note	<p>water tank with string across the top and enough water so the bottom of the filter paper will just dip into it</p> <p>filter papers – one per child</p> <p>strip of filter paper with a zero written on it in culprit's pen, as if from ransom note</p> <p>set of six water soluble black felt or fibre tip pens - (see notes above) with hat sticker on each pen to identify which culprit had which pen, pencil to write underneath which pen was which</p> <p>selotape or clips to fix the papers to the string</p>
Sandbags	<p>set of sandbags – coloured balloons filled with sand to give particular weights for each colour – see solution chart for these; colours to correspond to the culprit who had the sandbag</p> <p>tie handle plastic bag with length of elastic attached to the handles (50cm or 5mm sewing elastic)</p> <p>metre ruler</p> <p>200g weight</p>

Outdoor: nature detectives - Notes for Teachers

Please read these notes alongside the Outdoor Booklet

Three investigations are included in this – the children and their parents spent 35 minutes on each. Each investigation was introduced and supervised by a teacher from the school. The teachers stayed where they were and the families rotated round the activities. The teachers therefore did their investigation three times in one session. 40 minutes was timetabled for each activity to allow for the families to move rooms and the teachers to do any clearing up.

Two activities were outside – one pond dipping and the other pooting for insects and doing a nature scavenger hunt (egg box activity). The third was indoors – designing a home for woodlice – essentially making a choice chamber with four quadrants as below:

dark and damp	dark and dry
light and damp	light and dry

We used large pond dipping trays with a layer of sand over the bottom of all of it. The families poured a small amount of water down one side of the tray so the sand was damp, and covered one end with black paper to make that end dark. We gave them about 20 woodlice each which they put into the centre of the tray. They then recorded how many in each quadrant after five minutes and again after ten.

It is worth having an bad weather back up activity for at least one of the outdoor investigations.

For the egg box scavenger hunt they were given an egg box with some things to find stuck in the lid:

Something which has never been alive	Something that uses energy from sunlight to make its own food
Something which is not biodegradable	Something that was once alive

Summary of equipment needed for each investigation:

What's in the garden	Egg boxes with 'what to find' (see above) stuck in lid, pooters, hand lenses – one per child of each, trays
Pond dipping	Selection of nets and trays, identification sheets in booklets – one net per child – trays can be shared, handlenses
Home for woodlice	Three sets of: trays with sand on the bottom, black paper, water in beaker, around 20 woodlice, teaspoon, timers

Budget example

This would be roughly what you would need to run **one** of the events **four times** (i.e. over two Saturdays, doing a morning and an afternoon session on each day).

Please note that this is not necessarily what the PSTT have agreed to fund for anyone wanting to run this project in their school. You will need to put in your own bid to the Trust. This budget example is included to give an idea of what an appropriate budget would look like, and to help you with putting in a funding bid to the Trust.

It includes paying the staff which might be something the school would be prepared to do, given the value of the event to the school and the excellent CPD it offers the staff. Note – this does not include any payment towards your time for the preparation of the event, or the days itself. Again – something to discuss with the school before putting in a bid to the Trust.

Area of funding	Details	Cost (£)
Hire of school	To include heating, power, cleaning, science equipment already in school	(depends on school; for us was provided by school)
Materials	Resources for investigations	200.00
Staffing – planning and preparation of materials	Supply cover for a half day preparation time with four teachers plus your time	500.00
Staffing – delivery of sessions	4 members of staff per day @ £200 per day	1,600.00
Admin support	Advertising, printing and photocopying, refreshments	300.00
TOTAL		2,600.00

If you have any questions, or need any advice or help, please contact me on:

ali.eley@btinternet.com

If you have run this event in your school, I would love to hear about how it all went, and if you have any suggestions for anything that you think should be included in these notes, please do get in touch.

Hope it goes well!

Alison Eley

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