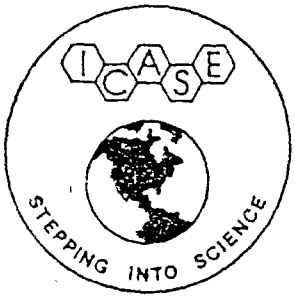
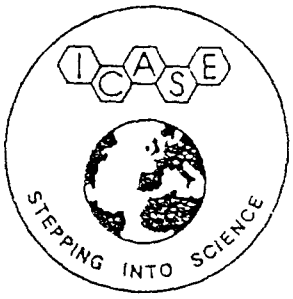
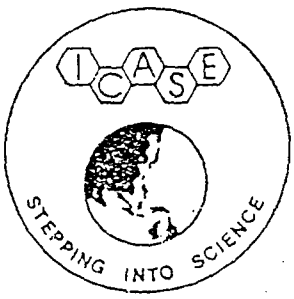
STEPPING INTO

SCIENCE

Achievement Tasks in Science and Technology







A Scheme to promote Science Learning in Primary Schools

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This is AN IDEA to encourage teachers ,parents and playgroup leaders and the children with whom they are working to join together in some science activities. Through keeping in touch through the agencies of National Science Education associations it is hoped that we might, through this umbrella of Stepping Together into Science, forge links between children and teachers internationally. This in turn may further international friendship and understanding through science and technology education.

It is hoped that children will exchange information about their way of solving some of the challenges suggested in STEPPING INTO SCIENCE with other groups of children in different parts of the world, through letter, photographs or electronic mail.

There are three domains of activities,broadly physical,chemical biological and earth sciences, referred to as A,B,C. Teachers are asked to select four tasks from A and B, at least one from each, and two tasks from the C group.

Any idea needs adapting to the local situation. The British schools work in three terms. Thus it was originally envisaged that one task will be done per child per half term and six will have been completed by the end of the year. Then the child can wear a badge-the colour corresponding to the stage. These badges can be made or purchased through educational suppliers depending upon your local circumstances. Special 'I'm Taking a Science Step' badges can be made too and we have some ICASE logos which may be appropriate.

Organisations could give their own certificate if they wish when a child has 'taken a step' or use the ICASE one.

The badges, STEPPING INTO SCIENCE and one for each STEP along with certificates are being designed at the moment.
A student who completes say 10 tasks in a year could receive a star of the colour step,fifteen tasks a bronze star and 20 tasks a silver star with the award of a gold star for 25 tasks from a step.

STEPPING INTO SCIENCE can lead into other award schemes such as YOUNG SCIENTISTS in SINGAPORE, BRUNEI and HONG KONG which start late in the primary phase of education.

THE STEPS by Dr S D Tunnicliffe

The tasks are written for the adult who can interpret them in his/her words to discuss with the child. We expect that the teacher will work at these with a small group whilst other activities are happening in the teaching area and that the topic will be illustrated with relevant books, pictures and perhaps extension work. Some schools have adopted this as the basis of their science work and have boxed up the items needed for each topic. Other teachers are using the ideas as a concrete base for the development of language especially with E2L speakers.

STEPPING INTO SCIENCE provides steps for a student from preschool to eleven years of age. However, the Steps should be flexible to enable a child to begin STEPPING INTO SCIENCE at whatever age s/he comes into contact with the scheme.

The STEPS are for ACHIEVEMENT OF PARTICIPATING, they are not a pass or fail situation. Every child investigating tasks achieves a step, each to his own capability. Naturally I hope that students will gain in expertise of using the scientific method as they STEP INTO SCIENCE.

These are only some suggestions for activities. There is a wealth of source material for young children in science. You as a teacher know your pupils and the local situation and which activities would be suitable for you.

The outline with challenge suggestions is available on the NERIS service from the United Kingdom. Anyone in the world with access to a computer (soon will be IBM-compatable), modem and telephone can call NERIS retrieve files and down load and print them for use with children. They can be wordprocessed and tailored for a teachers own needs. NERIS Maryland College, Leighton Street, Woburn MK17 9JD.
TEL: 0525 290364
Prestel mail: 05255364
TTNS: TCD 100861.

Levels

Seven levels are put forward; they are yellow, green, blue, red, orange, grey and purple. These steps correspond to:

YELLOW =	preschool(nursery or playgroup)	below 5/6 years
GREEN =	reception/1st year infants,	grade 1
BLUE =	2nd year infants	grade 2
RED =	top first school/1st year juniors.	grade 3
ORANGE =	2nd year junior	grade 4
GREY =	3rd year junior	grade 5
PURPLE =	4th year juniors	grade 6

grade level refers to the number of years in school from the start of formal schooling. Grade 1 is thus the first year of formal (compulsory ?) schooling and on this basis it is usual for most school systems around the world to operate 6 years at the primary level before the student moves to the secondary level.

As mentioned earlier, the steps are progressive and give children practice at the various skills and processes of science education. Thus :-

the YELLOW/GREEN steps have the same content and are mainly observational. They also involve some student participation, such as talking to the teacher and the group. Many of the tasks are concerned with ordering and sets.

the BLUE level introduces further skills so that children are building on previous knowledge. BLUE steps require the students to develop manipulative skills and to follow instructions. The students also need to be encouraged to talk about what they think will happen when the task is done so that they are introduced to predicting and hypothesising.

the RED steps come in the category of 'challenge science', emphasising the designing of experiments, or following instructions with recall of previous knowledge. Some students should be able to fill in simple charts, flow charts etc. At this stage the students should be able to talk about what they have done and what has happened and suggest how they could improve and go on to extend the experiment or study.

the top three steps (ORANGE, GREY AND PURPLE) actively encourage designing and making equipment to assist in the investigation. The investigations suggested need planning by the students and thus encourage thinking, planning, resource deployment skills, rather than just instruction following. .

The description of levels may not be suitable for your situation and if so just adapt or ignore as you think fit.

Recording of work

This is obviously an important consideration above and beyond the experimentation. The work done by the students could be expressed through art, drama as well by a few word searches and personal writing. The students could be encouraged to keep a folder of related information where appropriate.

Teachers may find using the SHAPE SEQUENCE described below useful in helping students formulate and present a written science report or a formal verbal presentation in a logical sequence.

A thin RECTANGLE for a definition of the challenge in the student's own words.
A thin RECTANGLE for the chosen solution summary
A TRIANGLE for prediction, "what we thought might happen if....."
An OBLONG for the names of the working group and the job which carry out in the experiment.
A SQUARE for the equipment used.
A CIRCLE for what was done.
A RHOMBUS for results.
A PARALLELOGRAM for what was found out.

Summary

STEP	physical science A topics	B topics	biological C topics
GREEN beginning school	floating/sinking	states.	sets of living/non living
grade 1	ordering masses	dissolving	rubbings from environment
BLUE grade 2	movement	making crystals	observing soil
	looking through colours	potato in air	minibeasts & legs
RED grade 3	making shadows	making fizz	seed growing
	water pressure	electroplating	constancy of petal number
ORANGE grade 4	Design and make a musical instrument from a box, a twig and a rubber band or piece of string	Separate salt from sand	Does food cook from inside out or outside in ?

GREY grade 5	For how long can you keep an ice cube solid at room temperature?	Do kitchen chemicals dissolve faster or slower in hot or cold water ?	How far does a seed's root grow in 24 hours ?
PURPLE grade 6	Design an instrument to measure the strength of the wind	How much air is there in a given volume of cold water?	What happens to the weight of a seed as it grows?

Actual activities related to this scheme are given in the appendix. These are only some suggestions for investigation. There is a wealth of source material for young children in science. You as a teacher know your students and the local situation and are invited to suggest which activities would be suitable for you.

The scheme with suggestions is available on the NERIS service from the United Kingdom. Anyone in the world with access to a computer (soon will be IBM compatable), modem and telephone is able to call NERIS, retrieve files and download information for use with children. They can be modified and tailored for a teachers own needs. The contact details for NERIS are - Maryland College, Leighton Street, Wobourn MK17 9JD. tel: 0525 290364 :Prestel mail 05255364 :TTNS TCD 100861.

Appendix

Suggestions for the various steps

Please note, some children will come to school never having been involved in this kind of activity whilst others may well have had some exposure. The joint yellow/green step is designed to provide a facility for "catching up". There is extension work available on request in sand, clay and water activity and in biological work. The later steps are given individually and represent a sequence that should be appropriate for most situations. However the speed of process from one step to another may need drastic revision depending on the ability range of the children and other factors,

key a = physical science activity
b = chemical science activity
c = biological or earth science activity.

Suggestions for YELLOW/GREEN steps

a1. Look at yourself in the mirror. What do you see ? Touch the tip of your nose, the top of your head, one eye, one ear. What do you see in the mirror each time ?

a2. Feel four objects with your eyes shut. How would you talk about them ? Guess what they are. Open your eyes and make comments such as items which are smooth, cold, rough, warm, furry, wet?

a3. Hold three objects and then arrange them in order of heaviness, then in order of lightness - items with masses of about 500 g, 100g and 1 g would be very appropriate.

c4. Make up two sets from a pebble, a toy car, a pencil, a rubber, a building block, sand, a flower, an animal (or toy animal) a human, a leaf - one set living, the other non living.

c5. Match the babies to their adults - use pictures or farm animals. Match daddies to mummies to babies e.g. bull to cow to calf, lion to lioness to cub. (Pictures with words on cards as well as toy animals would be very appropriate).

a6. What are these shapes ? - square, circle, rectangle. Go around the classroom, outside the school, etc and see where these shapes can be found.

a7. Touch water in the jars. Describe what they feel like. Arrange the jars in order of hotness (and then coldness) of the water in them Jars of warm, hot, cool, cold, ice cold would be very appropriate.

a8. Draw a square on a piece of paper. Write an A inside. Fold the paper in half one way and then the other. What happens? Repeat using an O, H, Z.

a9. Gather boxes of same capacity, but different shapes e.g. containers for fluid/sand. Pour sand from one container to the other and back again. What do you notice?

a10 Make a sounds-feel voice box and hum, blow on a comb and paper, talk into the box with hands on the box. What is noticed ? (sound is vibrations)

a11 Describe the odd one out in the sets e.g. different lengths - same coloured pencils, cotton reels; one heavier than others - sets of nails with one screw.

b12 Investigate dry sand by use of - seive, pouring, holding, rubbing, trying to mould. Add a few drops of water to the sand. What changes occur? Add some more water (10 cm^3 to how much ?). Examine the sand and comment e.g. spreads, can't pour, can mould, rubs differently. Can it be changed back to dry sand ?

b13 Mix paint from the powder. Add a little water (2 cm^3 to 5 g powder). What is the paint like ? Compare it with the dry powder and with just water. What happens to a paint brush put in these (both a dry and a wet brush) ? What happens when you put the paint on paper? Add a lot of water (10 cm^3 to 5g). What is the colour like compared with the case with little water and the dry powder ? Add to paper.

a14 Run water out of the cold tap. Feel it. Put water in three freezer bags and tie the bag. What does the bag feel like? Put one bag in the freezer and another in the fridge. Leave the last one in the room. After a day, get them out. What do you notice?

a15 Show children water vapour rising from hot water. Put something very cold e.g. a plate taken from the fridge over the hot water. What is seen ? Repeat using a plate at room temperature.

c16 Obtain a plant with a flower and roots e.g. Shepherds Purse. Plant or grow a pea or cress plant in class, or bizzie lizzie or spider plant. How many parts are there of the plant? What do you think the roots and shoots do?

c17 What are the colours of leaves, roots, flowers. Do they stay the same in the same kind of plant ? What about all plants ?

c18 Make sets of leaves from various plants including trees and grass.

c19 Make a rubbings of three leaves. Which way do the veins run in the leaves ? What do the edges of the leaves look like ?

a20 Obtain two sticks or rulers and rub them together. Make them both wet then rub them. What is noticed ? Rub soap on both sticks (rulers). Rub them again. What is noticed ?

c21 Make a list of the pets in the class. Obtain photographs of their kind. Describe each animal. Can you group them into sets? - furry animals, feathered animals, scales, two legged, two winged, no legs.

c22 Look at a potato, carrot, cabbage, beetroot, celery. Where do they grow ? Which bit of the plant do you have?

c23 From a few different flowers see which ones smell and which ones do not. Make sets of smelling/non smelling flowers. Are the colours of the non-smelling flowers the same as the smelling ones ?

c24 Are all flowers the same colours ? Are there flowers of all colours ?

c25 What are twigs like in winter ? Are they different from those on the same trees in summer ? Look at a coniferous tree in winter. What is the difference?

c26 Plant a seed by soaking in water and placing on cotton wool. What happens to it ? Draw a chart/words/drawing.

c27 Does the same kind of plant always have the same kind of leaves/flowers ? Choose a house plant or a plant from the garden that is numerous. Have they all the same name ?

b28 Add a teaspoon of cooking oil to a beaker/see through container of water. What happens?

b29 Look at different kinds of sugar - granulated, lump, castor, icing. Can they be arranged in an order ?

b30 Release the top of a bottle of coke (or carbonated water). What happens as the top is taken off ?

a31 Collect an assortment of articles e.g. small stone, rubber, yoghurt pot, ruler, tin dish, ball of plasticine. See what happens when you put each item in a bowl of water.

b32 Investigate the words solid, liquid, gas by looking at a variety of items such as plastic shapes, water, sand, plasticine, milk, tea, ice, bubbles in water.

c33 Take a piece of paper and a wax crayon outside. Feel different surfaces e.g. brick wall, manhole covers, windows, trees. Make rubbings.

Suggestions for BLUE steps

a1. Soak pieces of kitchen towel of the same size e.g. 10 cm by 2 cm. in water. What happens ? Fold up half the pieces as small as possible. Put one of the folded pieces and one of the original sheets a) into a polythene bag, b) in the fridge, c) over a radiator, d) over a heating vent. Which do you think will dry up first ? Leave for a day and then examine. Leave for another day and examine again. What happens ? Which dries out ? What can be said about the drying of wet paper ? How can you help it happen more quickly ?

a2. What do you think will happen if you put water in the fridge in a yoghurt pot with the lid fixed down and put a lolli or cocktail stick across the top ? Do this. Put the pot in the freezing compartment for a day. What has happened ? Why ?

a3 Can you make rice jump ? Use a tin or tub, a cut-down plastic bottle, taught piece of polythene across opening and held in place by a rubber band, string. Place 10 grains of rice or dry soya beans, peas, etc on the polythene or grease-proof paper. How can you make the grains jump ? (try using a pencil or finger tips and tap the side of the tin or the edge of the polythene. Which makes them jump the most ? Try sounding a triangle or mouth organ next to the pot but not quite touching it.

b4. Do you always see what you write ? Use the juice of a lemon, a cocktail stick and a piece of paper. Write your name on the paper with the cocktail stick using the lemon juice. Heat the paper over the radiator, a light, or hold the paper over a candle standing in a dish of water. What happens ? What other liquids will have the same effect ?

b5. Measure out 20 cm^3 water in a transparent container. Add five drops of food colouring. What happens ? What did the children think would happen ? Stir up the water. What happens. Try again with four drops, three drops, two drops, one drop. What is noticed ?

a5. Sit a doll in a truck with a piece of string attached. Will it be very easy to move the truck ? Try with a gentle tug. Then try with a short sharp tug. What happens ?

a6. Obtain a ruler. Can you make different noises with the same ruler ? Any suggestions. Try the ruler on the edge of a desk with 10 cm on the desk and the rest sticking out. Pluck the ruler. What happens ? Push a little more (10 cm more on the desk). What happens to the noise ? Push more on the desk. What happens to the noise ? Do the experiment again. What happened to the end of the ruler each time it is flicked ? Is there a pattern in the changes ?

a7. Is air everywhere ? What would happen if you put a glass, open end down, into a bowl of water ? Tilt the glass a little. What will happen now ? Do this and see what does happen. Can you think what it is that you have seen ?

c8. Obtain some flowers - tulips and catkins are particularly effective. Place a sheet of white paper under a flower. Gently tap the flower. What comes onto the paper ? Watch a brightly coloured flower. Do any insects visit it ? Have they anything on them ? (Rhododendrons are useful to watch in March/April as the Humble bumble bees visit and have large pollen baskets. The children need to be told that the yellow dust is the pollen. The pollen contains the male sex cell - the special part that is needed to make seeds.

a9. Obtain a flat glass bottle, a round glass bottle (a boiling tube would do), the headlines of a newspaper (big print). Lie the jar on the print. Measure the height of the letters. Measure the height without the jar over them. Fill the jars with water (and put in stoppers !). Look at the letters through the jar and the water. What is the effect?

a10 Blow on your hand. What do you feel ? Are some blows stronger than others ? Could you measure the strength of blows ? Make a wind speed measurer from paper and straws and a ruler.

a11 Look at some moving vehicles. How do they move ? Do the back wheels go round at the same time at the front wheels ? Put a chalk mark on the wheels at the back and the front. Do they move at the same time and end up at the same position relative to each other when the vehicle stops ?

a12 Does the world always look the same colour ? How could you see red ? green ? blue ? Try using pieces of coloured perspex (see Griffin primary catalogue or use sweet papers) to look through at objects and pieces of coloured paper.

a13 Do letters always look the same size ? Look at a heading in a book. Measure the height of one of the letters. Look again at the letter through a magnifying glass. Measure the size of the letter as it appears now.

a14 An extension of the above is to use a glass bottle, flat sided or otherwise. Look through the empty bottle at the letter. Fill the bottle with water and look again. What did you think would happen ? What did happen ?

a15 Use two pieces of paper the same size. Screw one up. Let both pieces fall together from a height to the ground. What is noticed?

a16 Cut some large letters, shapes and numbers into half (drawn on card). Can the children match them again ? Is there a way which could help them find out the original shape ? (mirrors)

b17 Make crystals from salt (or Alum if available) Dissolve as much salt as possible in hot water, mix to help the dissolving. When cool remove one of the biggest crystals (not very big!) and glue it to a piece of string and hang it from a pencil or straw into the solution left above the other crystals (or another solution of the salt) watch over the next day or two what happens (any offers?)

b18 What happens if you drop a large drop of ink into a small beaker of water ? Does the water change colour ? If so, is it equally coloured throughout ?

b19 What happens if you add pepper to the surface of a liquid ? Do they mix ?

a20 What happens to a drop of water when places on different surfaces e.g. wax paper, tin foil, kitchen towel ?

c21 What is soil like ? Look at a trowel full of soil. Weigh it. Dry it. Reweigh. Is there any difference in the weights ? With soil from the same place add the soil to water. What happens ?

c22 Is soil made from the same sized particles ? Look at a sample and see. Pass some soil through a seive. Make a seive from straws or card of various diameters to measure the particle size.

c23 What are the effects of exercise? Describe yourself, then run round the playground (or on the spot for two minutes). Describe yourself now. Repeat this by watching someone else. Compare your observations. Can you explain any of this?

c24 Can you identify things by smell alone ? Use a blindfold and chose a selection of items to be sniffed at -vinegar, milk, peppermint, apple, ink or paint, paper. Make a chart. Tick when right, put a cross when wrong. Try this on three more people. Who could smell the 'best' ?

c25 Do plants need water? What do you think ? How could you test the idea ? Choose two flowers of the same kind and size. Place one in a container with water with a gap between the flower and the edge of the container and cover so that water cannot get out. Put the other flower in a similar sized container, with the cover, but miss out the water. Why ? Watch each day. Note what the flowers look like. Draw them.

c26 What happens if you plant a seed in soil or in the garden?

c27 Find at least five minibeasts or pictures of them (suggest a woodlouse, snail, beetle, worm, spider, wasp, butterfly). Can you make them into sets related to factors associated with their legs - legs/no legs, with subdivision - more than 6 pairs legs, more than three pairs, three or less. Legless minibeasts subdivide into presence of a muscular foot and no foot.

c28 What happens if you leave a cut piece of potato in the air ? Any ideas ? Do it and watch after 10 mins, 20, 30, 60 mins. Does the same thing happen if you cut the potato and then cover the cut surface ?

Suggestions for RED steps

a1. What will happen if you shine a torch at a white piece of paper 30 cms away, 1 metre away ? What will happen if you put your hand between the torch and the paper ? Can you explain why this has happened ? What is the name of what you made ? Fill in a chart of what happened.

where you put hand	torch near to screen	torch far from screen(1m)
in front of torch		
side of torch		

a2. Investigate what happens if you make a hole in the side of a washing up bottle or lemonade bottle, 20 cm from the bottom, and fill the bottle with water ? What happens if you make a hole in another bottle higher up ? Draw what happens.

a3. What do you think will happen if you put a pencil in a piece of plasticine and stand it in front of a a flat mirror ? What do you know about looking in mirrors ? What would happen if you put a mirror the other side of the pencil as far away as the first one and looked in the first mirror ? Try the experiment and see. What happnes if you move one of the mirrors next to the other to make a T shape in front of the pencil ?

a4. Using a bulb, bulb holder, two wires with crocodile clips on each end and a battery, make an arrangement so that the bulb lights up.

a5. Using a magnet and everyday things investigate what can you find out about a magnet ?

a6. Light a cangle. What can you observe about the candle ? What happens if you light the candle and put a jar over it ? What happens if you put a very small jar (like a paste pot) and a big one (like a pickled onion jar) or pint milk bottle over the candle ? Can you offer any explanation ? What happens if you do this with the candle standing in a tank/ice cream container with water in the bottom ?

a7 What would happen if you weighed a 500 g mass in air on a spring balance and then weighed the same mass in water using the same balance ? Try it and fill in a chart.

	1st try	2nd try	3rd try
weight of mass in air			
weight of mass in water			

What did you find out?

a8 Will a car run as far over different surfaces e.g. carpet, newspaper, grass, shiny floor ? What do you think ? How can you make the test fair ? Using the same car each time, measure how far the car runs over each surface starting off with same amount of "push".

Fill in a results table and a prediction table.

surface	what I think will happen ?	my reasons why ?	what did happen?
carpet			
corrugated card			
grass			
tile floor			

b9. What would happen if you add water to 'bicarbonate' powder ? How much of each will you use ? What might happen if you add vinegar to 'bicarbonate' powder ? Will it be the same or might it be different ? Try each and see what happens. Fill in a chart.

test 1.	what may happen?	what did happen?
adding water to a hydrogencarbonate		
test 2 add vinegar to a hydrogencarbonate		

b10 How can you make more sugar dissolve in the same volume of water ? What do you know about sugar in solutions ? How much sugar will dissolve in a known amount of cold water. Try it and see. How will you measure the sugar ? What can you do you make more dissolve ? What else ? Make a chart and try out your suggestion.

kind of water	amount of sugar added	what happens?	what else you did?	result
cold				
warm				

b11 How many ways can you think of to separate a mixture of rice and water ? (clue for teachers - filtering using a kitchen towel to let the water pass through or use a seive).

c12 Do the same kinds of flower have the same number of petals ? How could you design an investigation to find out ? What is your prediction ?

c13 Are the leaves on the same kind of plant the same size ? How could you find out ? Would you expect the leaves to be the same size on every plant ? What did you find out ? Put the results in a bar graph. If the answer is no, can you think of any reasons to explain it and any further investigations. If the answer is yes, does the same happen on all kinds of plant ?

c14 What do seeds need for them to grow ? What do you know about growing things ? Can you do an experiment to find out some of the things seeds need ?

What I know about things growing
What things I think a seed needs to grow,
How I could grow a seed without each thing.
How I can make it a fair test
One plant pot needs to have everything e.g. light, water, soil, air, warmth. The others each need one factor missing. Use the same kind of seed, the same amount of soil and in all other ways treat each pot and its seed the same. Plant them the same distance under the soil.

c15 What do your teeth do ? Do they all do the same thing ? How many kinds of teeth do you have ? How could you find out ? How could you investigate what your teeth do ?

b16 What happens if you add 5 drops of kitchen colouring to 20 cm^3 of water ? What happens if you then pour off half the water into another container and add a further 10 cm^3 of water ? What happens if you repeat this again ? And again ?

b17 For this experiment you need copper sulphate solution - 1 teaspoon mixed in 50 cm^3 of warm water. You need a 4.5 volt battery (the flat kind with two flat parts to attach the wires easily), a door key and a copper strip (see a primary science catalogue). The key and strip need to be clean. Clip the wires to the battery and one of the other ends of each wire to the key and the other to the strip. What do you think may happen it you put the two objects in the solution ? What would have happened if you had put the clips, that are not attached to the battery, to the screws on a bulb holder containing a bulb (if you try it make sure the bulb in the holder is a 6 volt one) ? What happens ?

Suggestions for ORANGE steps

1b. Design an experiment to separate salt from sand (or two other substances suggested by your teacher).

2b. Investigate an ice cube. How heavy is it ? What happens if you place it in cold water ? What is the surface temperature of the ice cube ?

3c. Design an experiment to grow mould on a piece of food. What conditions are necessary for mould to grow ?

4c. Obtain a soil sample. How can you investigate the size and distribution of soil particles ?

5a. How can you increase the rate at which an ice cube melts ?

6c. Can you devise a system to show in which direction the wind blows ?

7a. Can you design and make a machine which will let you see around corners, or over people's heads, or a fence or screen which is taller than you ?

8c. How much rain falls in a day, a night, a week, an hour ? How can you measure the depth ?

9c. What happens if you "press" a flower ? Can you design and make a flower press which you can use ?

10c Are some containers more successful than others for growing plants ?

11a Using a ruler or stick, a rubber band or piece of string, and a small empty box, design and make a musical instrument.

12a What happens if you drop some powder e.g. pepper, onto the surface of water in a small container ?

13a How can you make sand grains and/or salt crystals look bigger ? Once you have decided how this can be done, draw and talk about what you see, compared with what you notice with eye power alone.

14c Do plants need a hole in the bottom of the container in which they are growing ? If you find out that they do, can you find out why ?

15c Does food cook from the inside out or the outside in ? Design an investigation and report on your investigation.

16a Why do we cook with wooden spoons ? Devise an experiment to test your hypothesis.

17c Do you know of a plant from which a piece of the stem containing leaves will grow into a new plant ? Investigate some readily available plants.

18c Which insects live in the air near your home and/or school ? Design and conduct an experiment to investigate their behaviour.

19b What happens if you add 5 different solids e.g. pebble, salt, a piece of wood, paper, cereal grains to the same volume of water ? If you a) increase, b) decrease the volume of water, do you obtain similar results ?

20c Do animals live on plants ? Choose one plant and find an answer for this chosen plant.

21c Do seeds grow in the light ? Devise an experiment to find out.

22c Are birds feathers waterproof ? Devise an experiment to find out.

23b Investigate how can you make a piece of cloth or paper waterproof ?

24c Choose a plant. Do any animals use it for food ? How did you find out your answer ?

25c How much "rubbish" does your class or family make in a day, a week ? How will you measure the amount ? Will you measure the amount by weight or by volume ?

26b What material forms the most rubbish in a chosen rubbish site ? How did find this out ?

Suggestions for GREY steps

1a. How could you measure the density of various salt solutions ?

2c. Devise a method of finding out how many blades of grass there are in a given area e.g. one square metre in the school/home lawn ?

3a. For how long can you keep an ice cube as a cube at room temperature ? (hint - Investigate the insulating properties of various substances).

4c. Devise a way of telling the time using the sun.

5c. Devise a system to enable you to identify a known star constellation.

6c. Does the wind blow in one direction more than another during a day. a week, a month ?

7a. Design and construct an apparatus to look through to make things appear bigger ?

8c. By how much does a seed root grow in twenty four hours ?

9c. Do all seed roots grow at the same rate ? How will you carry out a 'fair' test ?

10c Determine the hardest substance in a soil sample you have collected. Record your procedure.

11a Determine whether the air temperature stays the same all day?

12a Which surface in your room provides the greatest level of friction ? How can you measure the force of the friction ?

13b Do kitchen chemicals dissolve faster in hot or cold water ? Does the temperature of the water make much difference ? How will you keep the temperature the same during the time it takes the chemical to dissolve ?

14c How much water does a known seed (e.g. a pea) absorb before it begins to germinate ?

15b How can you speed up the rate at which a large piece of a kitchen chemical (e.g. a jelly block, a lump of sugar) dissolves in a given volume of water at a known temperature ? How will you ensure the temperature does not change during the dissolving ?

16a Devise a machine which will lift an object of known mass 20 cm up from the table or floor with an effort less than the force needed to lift the object straight up.

17c Why do seeds not start growing in the packet ?

18c Does rain fall straight down or does it fall at an angle ?

19a How high can you get a known ball to bounce ?

20a Investigate whether the surface on which you bounce a bal affects the bouncing ? If it does, how much effect does i have ?

21b How strong are different kinds of cotton material ? plastic paper ? Record the experimental procedure used to determine your result. What factors did you need to control for ?

22a What is the most stable shape you can make for a small (e.g 20 g mass lump of plasticine or clay) plus 4 equal pieces of wood (match sticks) ? How can you test the stability ?

23a Carry out an investigation into how high can water drops splash ?

24c Do insects make noises ? If so, what and how ?

25c How many different cloud formations can you see in an hour, a day ? Make the observations at regular intervals.

26a Which shape of paper dart flies the furthest ? Suggest an explanation for this ?

27a If you shine two different coloured lights at the same spot on a white surface, what colour does the surface become ? If you mix coloured paints, do you get the same result ?

28a Design and make a dip stick to indicate the depth of water in a river or pond.

Suggestions for PURPLE steps

1b. Design an investigation. to find out what can affect the rate at which sugar and salt dissolve in water.

2a. How could you make an instrument which will show someone in which direction is north ? Can you devise more than one method ?

3a. How can you investigate and record the temperature of an object or fluid without using a commercial thermometer ?

4a. How long do birds feed at at time ? Design and construct a bird table to help this investigation.

5c. Choose a familiar and easily obtainable harmless insect. Suggest how you could study its life cycle.

6c. Devise a system to identify ten animals (from different groups) for another student who does not know the names.

7c. Devise a key to identify ten common plants.

8a. Construct and calibrate your own weighing machine to weigh objects without using masses/weights.

9a. How could you accurately time an activity (such as a ball bouncing until it stops) ?

10c Can you grow a plant in a bottle ? Explain how you are able to do this.

11c What happens to the weight of a seed as it germinates ? Illustrate this by plotting a suitable graph.

12a Design and make a system which will investigate the strength of the wind ?

13b How much salt is there in sea water ? (Note for the teacher - care will need to be taken on evaporation as spitting will occur as the liquid is nearly all evaporated. Besides being potentially dangerous, it will result in loss of product.)

14c Does the shoot (stem) of a seed grow straight up or does it trace a curving path ? Explain how you carried out your investigation.

15c Does a seed root grow continuously at the same rate ?

16c Does the shoot of a plant exert any force as it grows upwards ? If so, how can investigate this ?

17b How do fish breathe ? Devise an experiment to determine how much air is dissolved in a known volume of water ?

18a How are rainbows formed ? Can you make a 'rainbow' ?

19a How can you increase the speed at which a mobile object (ball, toy car) runs across a surface ?

20a Construct a solar heater for heating water.

21b Design an experiment to extract the green colour from grass. Can you devise a way of showing that this colour is made up of two coloured substances ?

Primary Science and Technology

STEPS INTO SCIENCE

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of Class .....

.....School.

has taken a

Step into Science

during 19.... - 19....

Signed .....

Date .....

STEPS INTO SCIENCE			
NAME			
CLASS		DATES	
CLASS		DATES	
CLASS		DATES	
TASK LEVEL		TOPIC	COMPLETED
GREEN	AREA TERM 1		
	TERM 2		
	TERM 3		
BLUE	TERM 1		
	TERM 2		
	TERM 3		
RED	TERM 1		
	TERM 2		
	TERM 3		