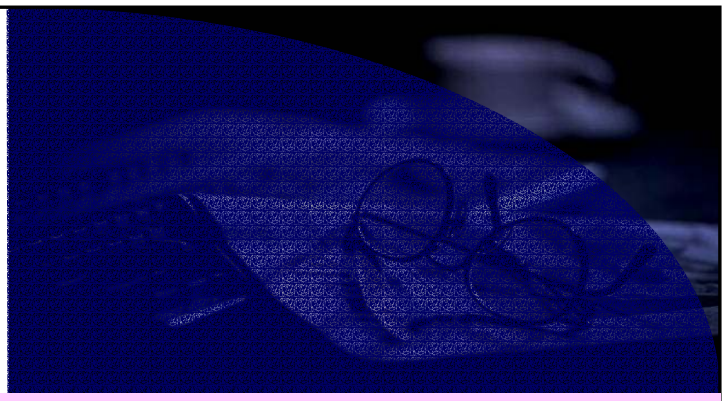
GCSE Science Coursework



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GCSE Science coursework…Preparing year 9 for GCSE coursework:

Year 9

<u>GCSE coursework starts in Year 9</u> – after SATS – with practice coursework projects enabling teachers to introduce pupils to the mark schemes, prompt sheets and the skills required for coursework.

Suggestions for Year 9 investigations are:

1: What affects the stretch of an elastic band?
2: What affects the dissolving of a refresher sweet? (worksheet attached)
3; What affects the bounce of a ball?
4: What affects the fall of a shuttlecock? (Worksheet attached)
5: What affects the strength of a cup of tea? (This investigation will introduce the use of data logging using a light meter).

General notes:

Lessons should be planned to 'teach' understanding of planning, analysis and evaluation of investigations. Students should use GCSE mark schemes to note how marks are awarded. Students should write up their investigations in GCSE style. These investigations should be marked and returned to the pupils so that feedback can be given to improve future investigational work.

Pupils should use the Departmental Prompt sheets and Mark Sheets for coursework to encourage development of coursework skills through to Year 11.

YEAR 9 INVESTIGATIONS
PLANNING PROMPT SHEET

Used lined A4 paper for your work.

PLAN
Discuss with your teacher the variables for an investigation and decide which one you are going to do.

Write a brief introductory paragraph — write briefly about what you have decided to do and what you think you will find out.

Preliminary Work — what do you need to find out before you can plan this experiment properly? Write down some questions you need to answer and then find out the answers.
(example — do I need to use a test tube, boiling tube or beaker to hold the water for the refresher to dissolve?)

Research — you will need to find out the science behind this investigation (e.g. what does dissolving mean? What does rate mean?). You can use any science book during this lesson (set yourself homework to research from books, CDs or websites).

Decisions - When you have chosen the variable — you must decide on a range.
Example — if you are measuring the effects of "amount of water" you will need to choose a range of five measurements — such as 5 cm^3, 10cm^3, 15 cm^3, 20cm^3, 25cm^3. Remember all good science experiments are repeated three times so an average result can be taken and errors avoided.

Write out a method in detail — include the range and how often you will repeat the experiment
Write out an apparatus list (make sure you include all the measuring instruments you will need — remember science is all about measuring).

Write out how you will keep your experiment safe

Fair Test - Write in detail about how you will keep your experiment fair (example — I will keep the temperature the same, - Room Temperature — 22°C) Write in as much detail as you can.

Prediction — predict what you think will happen.

Explain your prediction — use the science you have researched to help you to explain in detail what you have predicted.

Design a table for your results

Pupil Worksheet

What affects the rate of dissolving a refresher ?

A student in Year 9 decided to investigate the effect of size of refresher. She took a range of refresher sizes and timed how long it took for the refresher to dissolve.

Working in a group they used 200 cm^3 water, at 40°C, and stirred the solution in the beaker all the time. They then took results from two other groups who had done a similar experiment. Group 2 had used the same temperature water and same amount of water, but had not stirred the solution.

Refresher size	Group 1	Group 2	Group 3	
	Results (s)	Results (s)	Results (s)	Average (s)
Whole	6.56	23.02	6.21	
Half	4.34	15.23	4.15	
Quarter	3.45	12.13	3.55	
Third	2.22	7.32	2.36	
Powdered	1.06	2.28	1.55	

USE LINED PAPER — remember to put your name on the top.

Put the heading "Rate of dissolving a Refresher"

Draw out this table and calculate the average (add each group's results together and divide by 3)

Draw a graph of your average results (size along the bottom, time up the side!) Think do you need a bar graph or a line graph?

Answer the following questions in FULL SENTENCES

a) What did (s) mean in the table headings?

b) Why do you think the results of Group 2 were so different?

c) Why was it important to take an average of the results?

d) If you have done a line graph draw a "line of best fit on it"

e) Are there any odd results? (Some results not on line of best fit?)

f) Write out which results you think are "odd".

g) Can you explain (give a reason) for these odd results?

h) Are there any trends or patterns you can explain?

i) Explain what dissolving means — does it mean that the refresher has disappeared or does it mean that it has become so small that it can no longer be seen?

j) How would you tell that the refresher molecules are still there
(Clue: do refreshers have a "taste")

k) Why would it be dangerous to test for sweetness by drinking the solution in a school laboratory?

<u>NOW THINK ABOUT YOUR OWN EXPERIMENT</u>

a) Did you make your experiment a "fair test"

b) How careful were you with your measurements — did you use a measuring cylinder to measure out the water?

c) How sure were you of the temperature of the water?

d) Could your observations have been more accurate.

e) NOW DO A GRAPH OF YOUR OWN RESULTS -just use the one set of results which you obtained.

f) What did your results show — is there a trend or pattern?

g) How accurate do you think your results were?

h) What problems did you have — and how could you have solved those problems?

i) Did you get any odd results?

j) How certain are you of your data — can you say you have enough evidence for a firm conclusion.

k) How could you improve your work in the future?

l) Well done — you have now considered carefully the experiment you have done. Have you done your best work — is it neat?

Pupil Worksheet

What factors affect how shuttlecocks fly?

Your teacher should have asked you to brainstorm all the variables which you think will affect the shuttlecock. You have probably come up with these and maybe some others.

List of Variables:
Angle of feathers
Weight of bottom
Length of feathers
Type of feathers
Spacing between feathers
Amount of feathers

You are going to investigate:

Does the weight at the bottom of the shuttlecock affect the way it can fly?

The science behind this investigation: To help you to understand the science behind this investigation, complete the following questions:

a) Gravity is a force between...
b) Weight is...
c) Air friction happens because...
d) The effect of air friction is to
e) Forces can make objects speed up when
f) When forces are balanced...
g) The forces acting on a shuttlecock when it is falling are
H) I think that when it is released, a shuttlecock will fall.

Prediction
Now write a prediction and include some of the science from the questions above to show why you have chosen your prediction.

Controls

Variable	How will I control it	Details
Shuttlecock	Same make	Dunlop
	Same number of feather	? 15 ? (you need to count these on the shuttlecock
	Same angle of feather	10^0
Height dropped	Arm's length	130 cm ? measure this distance

Range and Repeats

There will be five experiments using 2grams of blue tack added to the bottom each time. Each experiment will be done three times.

Method

Make a paper cone and "feather" it by cutting the top to make it into a paper shuttlecock.
Weigh out blue tack in 2 gram pieces.
Drop the shuttlecock, firstly without any blue tack and then with 2g added each time.

Apparatus list.

Write out your own apparatus list — remember to include all the measuring instruments.

Draw a results table.

It should look something like this:

	1	2	3	Average
0g				
2g				
4g				
6g				
8g				

NOW THINK ABOUT YOUR EXPERIMENT

a) Did you make your experiment a "fair test"

b) How careful were you with your measurements?...Could your observations have been more accurate.

NOW DO A GRAPH OF YOUR RESULTS

c) What did your results show — is there a trend or pattern?

d) How accurate do you think your results were?

e) What problems did you have — and how could you have solved those problems?

f) Did you get any odd results?

g) How certain are you of your data — can you say you have enough evidence for a firm conclusion.

h) How could you improve your work in the future?