Writing an Investigation – CORRECTLY!

- Use your two planning sheets (Pink Pig and Blue Cat) to write a full Scientific Report on your investigation.
- The report should be in full sentences (unless otherwise stated) on ruled up, loose lined paper.
- Below is an outline of what you should try to write for each section of the report and the order in which you should write them.
- These are also listed and explained on your Pink Pig and Blue Cat.
- There is also an example for each section to give you an idea of what and how much to write.

EXPERIMENT TITLE:
This needs to be relevant to the experiment that you are conducting.

E.g. The Effect of Exercise on Breathing Rate.

BACKGROUND:
For this section you need to write a paragraph to state what you already know about the topic. This could be from a personal point of view or from previous lessons in Science.

E.g. I have noticed in the past that when people exercise or play sport, they seem to breathe a lot heavier and faster than normal. I have also observed that when I play football and run after the ball that I have to put in a lot more effort to breathe. In Science when we have studied the human body and respiratory system, we did activities that explained how our muscles work to breathe and the need to keep oxygen and energy pumping to our muscles and organs. I think there may be more of a need for oxygen to our muscles when we are exercising.

AIM:
For this you need to write the purpose of the experiment.

E.g. The aim of this investigation is to determine whether breathing rate increases with exercise.

PREDICTION:
You need to write what you think will happen.

E.g. I think that the breathing rate will increase with exercise.

VARIABLES
Variables are all the things that may affect (or vary) an experiment. There are three different types of variables that you need to identify:

(a) Independent Variable – the variable you change in the experiment
(b) Dependent Variable – the variable you measure in the experiment
(c) Controlled Variables – all the other variables that you need to keep the same. There should be several of these.

E.g. Variables:

Independent – Level of exercise
Dependent – Breathing Rate (how fast you breathe)
Controlled – the person exercising, time doing the exercise, type of exercise, speed of exercise, weather, health of the person, surface the person exercised on, stopwatch, environment, time of day.

HYPOTHESIS:
You need to explain what you think will happen by writing a relationship between the independent and dependent variables. It is not the same as a prediction, but it is similar. You do not say “I think” etc…, factual statements only. Written – “as the _________________, then the ________________ will ______________________.”

E.g. As the level of exercise increases, the breathing rate of the person exercising will also increase.

FAIR TEST:
You need to explain how many times you will repeat the test to make it a fair test and also state why this is important.

E.g. I am going to test the breathing rate of a person exercising six times, one test after the other with five minutes break in between each test. It is important to repeat the test, as another factor may affect the breathing rate, as stated in the controlled variables section.

SAFETY:
You need to make a list of all the safety precautions (just the major ones) that you need to take into account for this experiment.

E.g. There are not a lot of safety precautions for this investigation. The only safety precaution required for this investigation is to get the person to exercise on a safe surface that does not cause the person to slip and fall.

APPARATUS OR MATERIALS REQUIRED:
You need to list (and I mean list!) every single object that you use.

E.g. Stopwatch
    Person to do the exercising

METHOD:
This section requires you to write out the procedure in detail, so that someone else can pick up your work and do the same experiment.

E.g.
1. Collect all the equipment needed for the experiment.
2. Check how many breaths the person has in one minute before they exercise by counting each breath and then record the result.
3. Time the person running on the spot for one minute.
4. Check how many breaths the person has in one minute as soon as they finish running and then record the results.
5. Rest the person for five minutes.
6. Repeat steps 2 – 5 five more times.

DIAGRAM OF MATERIALS:
You need to draw these using a scientific drawing for your diagram. For this you need to use a LEAD PENCIL, a RULER and the diagrams need to be LABELLED.

E.g.
RESULTS:
Where possible, results should be written in tables, and can include written observations. Tables should have 
descriptive headings, includes correct units, show repetitions and averages.

E.g.

The Difference in Breathing Rate Before and After Exercise

<table>
<thead>
<tr>
<th>TEST</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>BREATHS PER MINUTE BEFORE EXERCISE</td>
<td>32</td>
<td>34</td>
<td>32</td>
<td>32</td>
<td>34</td>
<td>33</td>
</tr>
<tr>
<td>BREATHS PER MINUTE AFTER EXERCISE</td>
<td>42</td>
<td>40</td>
<td>45</td>
<td>47</td>
<td>40</td>
<td>50</td>
</tr>
</tbody>
</table>

AVERAGE BREATHS PER MINUTE

32.6

45.5

GRAPH:

You need to choose the correct graph – line, scatter or bar graph. You must include all labels on axes, a title and 
correct units.

E.g.

The Difference in Breath Rate Before and After Exercise
OBSERVATIONS AND ANALYSIS:
For this you need to write a general description of what you observed, you do not need to go into great detail – this is in the discussion section. You will also need to write a description of any patterns or relationships that seem to have occurred in this experiment.

Eg. My results showed that as the exercise increased, the breathing rate also increased. This occurred in each of the six tests that I conducted. For each test the breaths per minute increased by around 10 breaths per minute each time after the exercise was done.

EVALUATION:
This is usually by far the worst part of the experiment write up – you need to put effort into this section and use science terminology to write it the investigation up. You need to summarize the results and state whether or not they agree with the prediction and hypothesis.

The discussion needs to include:
- Do our results support your aim, prediction and hypothesis? Why or why not?
- Try to explain the patterns or relationships using your scientific knowledge.
- How do you explain what happened?

E.g. The findings in this experiment were to be expected. The aim stated that there would be an increase in the breathing rate after exercise and this did occur. Breathing rate increases during exercise, because the lungs need to breathe in more oxygen for the body. This happens because the oxygen breathed in goes into the lungs and then the bloodstream which is then pumped all around the body. The blood is pumped around the body so the oxygen in it can go into the cells of the body to keep the body functioning. Therefore, the longer and faster you exercise, the more your breathing rate increases so the body can get oxygen and keep up with the work. Also, when you exercise you also produce more carbon dioxide which leads to an increase in breathing rate to exhale this gas.

CONCLUSION:
This section is basically a wrap-up of the investigation and is a reflection of what could have been done better and any improvements that could be made for the next investigation.

Eg. One of the difficulties that were experienced during the experiment was trying to get the person exercising to get a relaxed breathing rate. That was resolved by resting the person longer. The experiment could be improved by doing more than one person’s breathing rate. In doing that, there would be more accurate results because it will show the breathing rate increase average of a number of people.

When doing this experiment, I learned that a person’s breathing rate increases considerably after exercise and that it supported the aim that I had at the beginning of the lesson.