

LO to plan, record and present a scientific enquiry.

Success Criteria

- I can decide on the most appropriate type of investigation.
- I can explain which variables will be controlled.
- I can write a report about my findings that includes a conclusion
- I can report the degree of trust I have in my results.

Exercise lesson 1



For a short video about the importance of exercise



Click me!

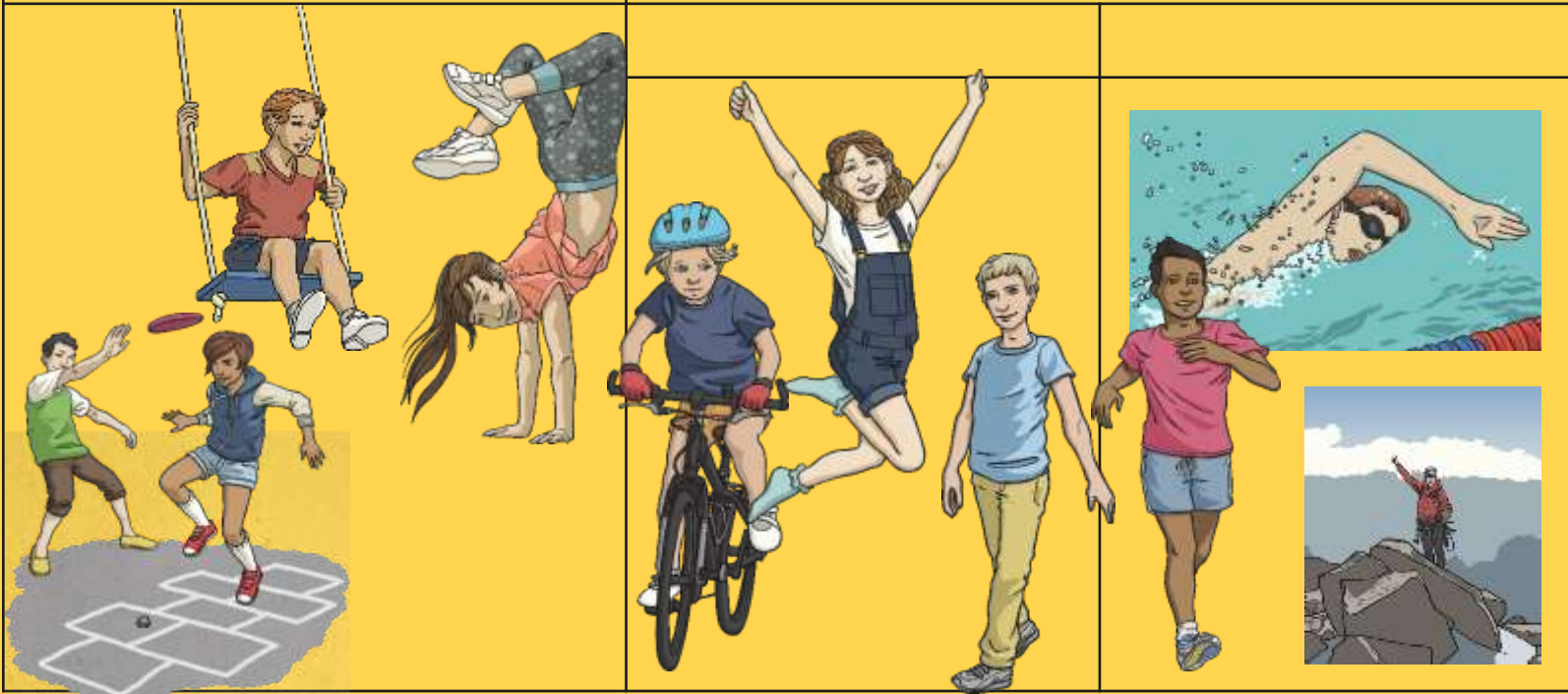
Exercise

What Counts?



How much do we know about what exercise is and the different types of exercises?
Exercise is physical activity that

There are two main types of exercise:



Exercise Investigation

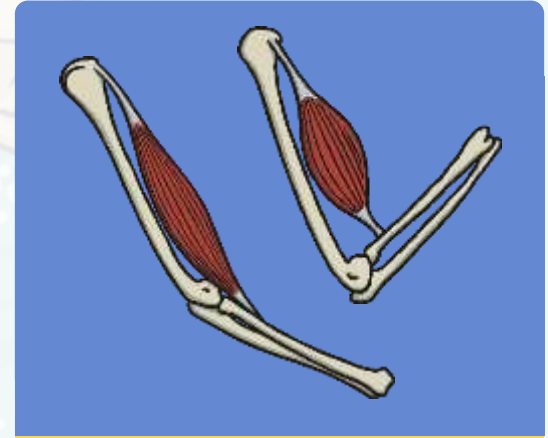
You will be creating an investigation about exercise. Before you start - look at the definition of exercise:



Requires effort



Raises your heart rate



Works your muscles

Of these three, only one, the heart rate, can be measured accurately.

The amount of effort spent on an activity is subjective; it will depend on the activity and will differ from person to person.

While we can use specialist equipment to identify which muscles are being worked during exercise, we can not easily measure how well the muscles are working.

Heart rate, on the other hand, can be easily measured by taking our pulse.

Pulse



You can measure your heartbeat by measuring your pulse. Your pulse is also known as your heart rate. It is the number of times your heart beats in a minute. You can measure it by taking your pulse for a minute, or count for 30 seconds and multiply by 2.

Tips for finding your pulse:

- Use your index and middle fingers to find your pulse.
- Press gently and lightly. If you press too lightly or too firm you will not be able to detect your pulse.
- Do not use your thumb. Your thumb has its own pulse that you may feel which would affect your results.

1. Find your pulse in your neck by pressing your fingers on the side of your neck. This should be the soft hollow next to your windpipe.
2. Find your pulse in your wrist by holding out one of your hands with your palm facing upwards and your elbow slightly bent. Put your fingers on the inside of the wrist at the base of the thumb of the hand facing outwards.



Planning Your Investigation



You will need to think of a question to answer and to predict what you think will happen. In order to carry out the investigation you will need to choose which type of investigation is the most appropriate to answer your question.

The three main types of investigations are:

- 1) Practical Enquiry: a simple practical enquiry is one where you just observe what happens.
- 2) Comparative Test: in a comparative test you have to:
 - a) Record observations at **regular intervals of time**.
 - b) Compare results.
 - c) Spot patterns.
 - d) You need to be clear about your **independent variable** (what you will change and compare), **dependent variable** (what you will measure – there should only be one dependent variable), and **controlled variables** (these are aspects of the investigation you will keep the same so that they don't affect your results because you end up measuring their effect).
- 3) Fair Test: A fair test is the same as a comparative test but with the addition of a **control (group)**. The **control (group)** is to detect what happens without changing the **independent variable**.

You need to think how you will carry out your investigation and plan:

- Your question
- The **variable** you will change.
- What will you measure / record?
- The **variables** you will keep the same to make it a fair test.

- Your prediction.

- How will you collect your results?

Some ideas of how to set it up (jumping is just an example)

- You could pick an exercise and either increase the speed you do it or the amount you do
- Eg jumping – a set number of jumps, but in a shorter time will increase the intensity of the exercise,
- Independent variable is amount of time for jumping, dependant variable will be your heart rate per minute.
- or you could increase the number of jumps in a set amount of time.
- Independent variable will be the number of jumps and the dependant variable will be your heart rate per minute.
- Remember, you will need to work out what needs to stay the same each time.

Conducting Your Investigation

Think about how you will record your results.
What is the best way to do this?
What categories do you need?

While you conduct your investigation you may need to make changes and adjustments. Make a note of these.

Make sure you take a resting heartbeat! This is one before any exercise has been taken. If you are conducting a fair test this will be your control.

One of the problems with comparing exercises is that, if you do it too soon after the previous activity, the heart rate will already have been increased. This will affect your results. Be sure to leave enough time between exercises for your subject to return to their resting heartbeat.

Repeating the results: Repeating results ensures that your results are more precise. By repeating the investigation you can check if the results were precise the first time around. If the results are very different then it would indicate a problem with how you conducted your investigation.

If you repeat your results you will need to decide how to record this.

Carry out your investigation.

Remember to record your results as you go along.

Session 2

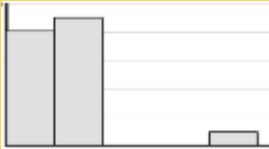

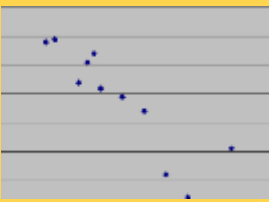

LO to record and evaluate a science investigation.

- Layout for your write up:
 1. The question
 2. The variable you will change.
 3. What will you measure / record?
 4. The variables you will keep the same to make it a fair test.
 5. Your prediction.
 6. Your table of results.

- Next you need to decide whether to draw a graph.

Present Findings

Now that you have your results you need to decide how to present them. There are a number of different ways to show your data using graphs and charts.

Type of graph or chart	Illustration	Uses of the graph or chart
Bar Graph		Uses bars to show how many. Allows for easy comparison between two categories.
Line Graph		Shows changes over time
Scatter Graph		Compares data to see if there is a relationship between the independent and a dependent variable – i.e. a positive or negative correlation.
Pie Chart		Shows both the parts and the whole picture of the data. Used to represent percentages.

Go back to your data and decide which graph is most appropriate for your data.

Draw a graph of your results if you wish.

- The next part of your recording is the conclusion.
- This is very important, a lot of scientists begin by looking at this before they decide whether to read the whole report, so it needs to summarise all the important details.
- You also need to say how much you think we can trust your results, the next slide will explain this.
- After that we have included a PEEL conclusion for you to base your own on.

Degree of Trust

Scientists conduct lots of investigations that have a big impact on living things. For example, scientists conduct investigations that tell us what type of food humans should eat and what chemicals are safe to use on plants.

Because we act on scientific data, we need to make sure that we have a high degree of trust in it before making our conclusions. This is particularly true if we are going to recommend that others act or behave in a particular way based on our results.

How can we ensure there is a high degree of trust in our results?

Degree of Trust



Be Objective: have you reported the results honestly? Have you included all the results even when they did not match your prediction? Did you have a control group?

Accuracy: was your measuring equipment accurate?

Reproducibility: can your investigation be repeated? Have you repeated your results? Did you get the same or very similar results?

Consensus: this does not mean that all the data has to show the exact same results, but if the majority of other investigations show results that are the same or very similar then we can have a higher degree of trust in our results. If your results are completely different to all the other datasets for similar investigations, then it is necessary to consider why that is.

Sample Size: this is how many were included in your investigation. The more data you have the more likely it is to show the 'real' picture.

In your group, discuss what degree of trust you have in your data. Why is this? How could the degree of trust in your data be improved?

How to write a great Conclusion for your Science investigation



P

Make your POINT

E

Give your EVIDENCE

E

EXPLAIN your evidence
using scientific explanations

L

LINK back
to your prediction/hypothesis
& then evaluate your investigation

Example Conclusion to Mrs Bodycote's Isle Investigation:

In our investigation we found that the plastic pot moved the most unit cubes. This is shown by our results where we measured the average number of unit cubes carried in 30 seconds was 13 for the plastic pot, compared to 5 or 6 for the chip fork or cocktail stick. We think that a bird with a beak like the plastic pot (eg a pelican) would be most likely to survive on Mrs Bodycote's Isle. They would be able to eat the most of the available food. The bigger beak had a bigger volume so it could safely move with the unit cubes without dropping them. The thinner beaks kept dropping the unit cubes. So my prediction was correct. I feel that my results are reliable because I took care to control all the variables by making sure of the same time, distance and grip on the 'beak'. Also we repeated the results many times to get to our final class averages. Therefore I am confident that the plastic pot is the best adapted beak.

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Read through your investigation, have you met your LO? Send a photo to show us, we would love to see it!