



EMPIRIBOX

Primary School Science

Scientific skills –
Presenting and analysing data
Teacher Guide

General guidance

This activity is designed to ascertain children's *Working Scientifically skills of evaluation*. The context of the activity is narrowed to a familiar topic of fitness and one therefore that all children will understand. It is not intended to test their knowledge but their progress in the acquisition of science skills. It may also be repeated at the end of a term or school year to assess their progress.

It is not intended to be conducted like a test. Ideally, children will work collaboratively at the activity to allow discussion and to support peer-teaching. Ideally, you will circulate around the groups of children during the activity to listen to their conversations and ask questions to probe their thinking and misconceptions. Circulating around the groups offers an opportunity to record assessment information during the activity. For example, noting that a child has said something that shows they have some understanding of an idea even though they might not be able to write it down.

Relevant LKS2 *Working Scientifically* objectives:

- Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers;
- Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions;
- Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables;
- Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions;
- Using results to draw simple conclusions, [make predictions for new values, suggest improvements and raise further questions].

Relevant UKS2 *Working Scientifically* objectives:

- Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate;
- Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs;
- Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of [and a degree of trust in] results, in oral and written forms such as displays and other presentations.

Animals including humans topic specific guidance

Children will already have learned about the importance of exercise for humans and eating the right amounts of different types of food, and hygiene in KS1. They will also have made casual observations. They will also have noticed the effects that playing games and taking exercise have on their bodies, but this should not cause a problem for the activity.

You may wish your children to carry out and evaluate the investigation if time permits although it does not form part of this activity.

Investigating the effect of exercise

Children are shown an image of children taking part in exercise at school and told that they will be investigating how their heart rate changes when they exercise, and that heart rate is the number of times our heart beats in one minute. The children can then carry out their investigation in small groups.

Children are provided with a table in which to record their results. The children are then asked to calculate the mean value for each heartbeat measurement. Children may spot anomalous results during data collection although this does not form part of this activity. However, if they do spot an anomalous result, they should be encouraged to record them and determine which of the results is anomalous once they have completed the repetitions.

Children are asked to plot a graph of the results supported by a sketch graph showing the correct axes and labels. Their first task is to plot a good scale for the axes. They should be encouraged to plot a scale where each 5 mm square represents 1, 2 or 5 cm. If a larger scale is required, each square should represent 0.1, 0.2 or 0.5 cm. For a smaller scale, 10, 20 or 50 cm.

In the next part of the activity, children seek patterns in the results from their graph as it is normally easier for children to spot visual patterns in data rather than number patterns.

In the conclusion, children should start to analyse the shape of the graph. They should be encouraged to use comparative statements. For example, *the longer the exercise the time, the higher the number of heart beats in one minute.*

In the final part of the activity, the children seek to explain their conclusion for example, they may state that *the longer the exercise time, the more blood (carrying sugar and oxygen / energy) is needed for the muscles so the heart beats faster to pump more blood.*



EMPIRIBOX

Primary School Science

Group/Name:

Class:

Marks	
Total	18

Scientific skills – Presenting and analysing data

Investigating the effect of exercise

You are going to investigate how heart rate changes when you exercise.

Heart rate is the number of times our heart beats in one minute.



Method

1. One person will sit down and rest for one minute.
2. We will count the number of times we can feel their pulse in 15 seconds and multiply by 4 to get beats per minute. This is the pulse rate with 0 minutes exercise. The measurement will be repeated.
3. We will record the result in the table.
4. The same person will then slow their breathing down by breathing in for 2 seconds, holding their breath for 2 seconds and breathing out for 2 seconds.
5. The same person will then exercise for 0.5 minutes (30 seconds) and we will repeat steps 2-4.
6. We will repeat steps 2-5 for exercise periods of 1.0 minute, 1.5, 2.0, 2.0, 3.0 and 3.5 minutes.
7. We will then plot a graph of the data.

Here are the notes of your results.

Time	Try 1	Try 2
0	17	17
0.5	18	18
1.0	20	20
1.5	19	21
2.0	24	22
2.5	24	24
3.0	25	25
3.5	26	25

1) Results table

Record the data you collect in the table.

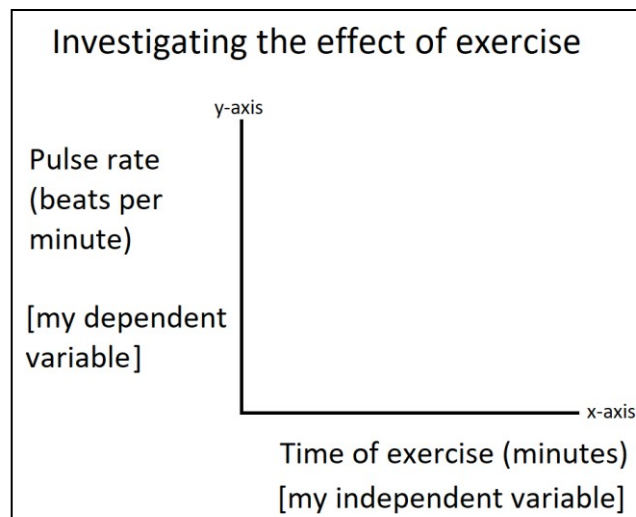
Time of exercise (minutes)	Beats in 15 seconds			Pulse rate (beats per minute)
	Try 1	Try 2	Mean	
0 (at rest)	17	17	17	68
0.5	18	18	18	72
1.0				
1.5				
2.0				
2.5				
3.0				
3.5	26	25	25.5	102

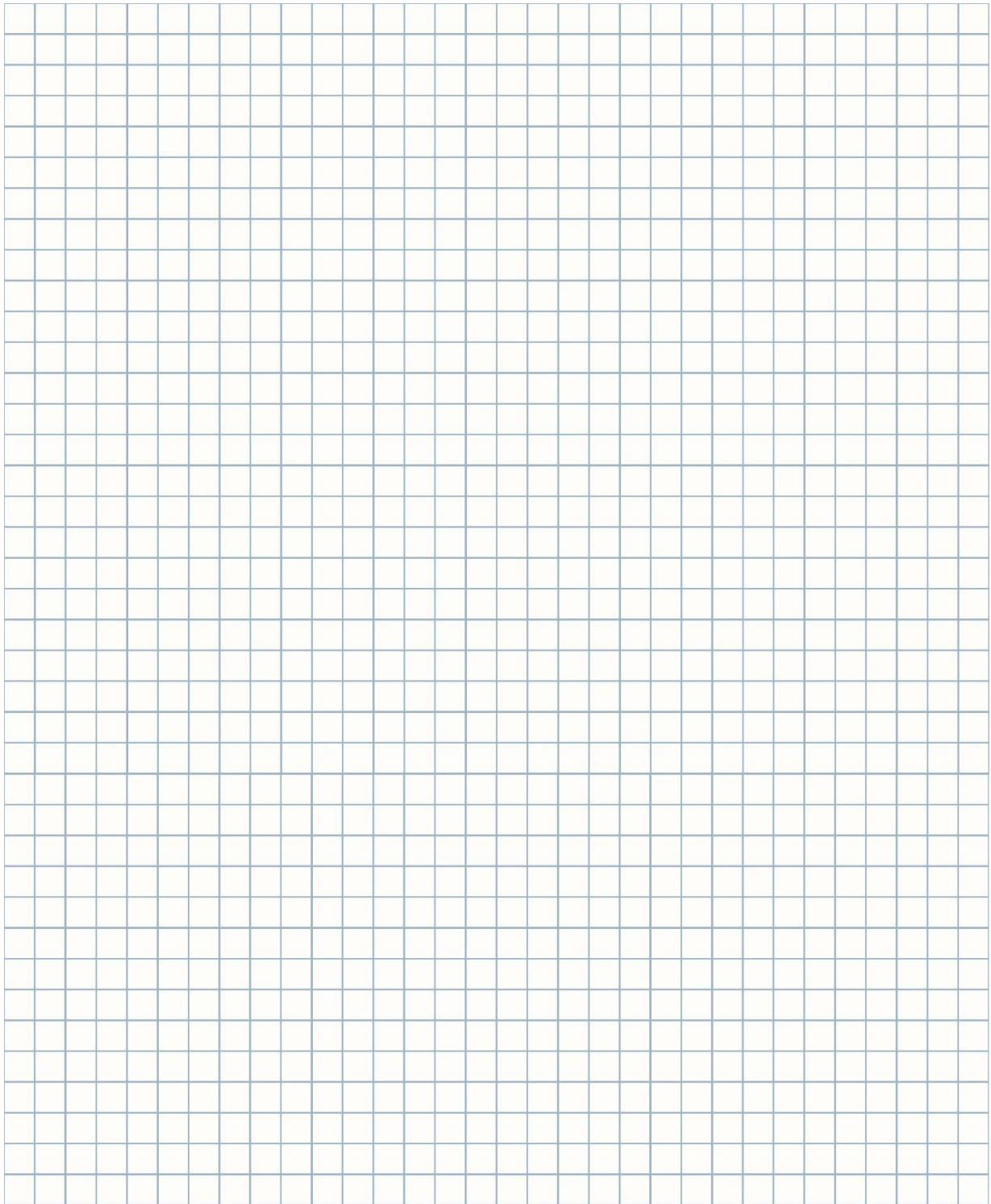


6 marks

2) Graph of results

Draw a graph of your results on the graph paper on the next page using the sketch graph below to help you. Work out a good scale for the axes first.





6 marks

3a) What patterns does your data appear to show?



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2 marks

3b) What conclusions can you draw from your experiment?



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2 mark

3c) How can you explain your conclusions?



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2 marks