# Lesson plan: Use of data

This scheme of work is a sample lesson plan to help teachers to structure a one hour lesson on 'use of data' as part of GCSE Physical Education (scheme of work 2016, 2 and 3 year plan). It is suggested as a guide only and can be amended to suit teachers and their students' needs.

## Learning objectives

- Develop knowledge and understanding of how data are presented.
- Develop knowledge and understanding of how to present data as a line graph or bar chart.
- Students should also start to be able to interpret data. This involves analysing the data to produce an evaluation with reasoned conclusions.

## Learning outcomes

- All students should be able to define what is meant by qualitative and quantitative.
- All students should be aware of line graphs, pie charts, bar charts and tables.
- All students should have knowledge and understanding of how to present data in a line graph or bar chart.
- Some students will be able to distinguish between the independent and dependent variable so as to label axes.
- Some students should be able to apply their knowledge to produce reasoned and evaluative conclusions from analysing data.

## Prior knowledge needed

There is no expectation of mathematical ability above Key Stage 3 mathematics. Students should be aware of the ways to gather, interpret and present data throughout the course.

## Lesson preparation

Preparation for this lesson is minimal. As data are an integral part in the course, this lesson can simply be used to fine tune the skills required for the course. However, teachers should have copies of the handouts ready and may decide to

source further examples of line graphs, bar charts, pie charts and tables as deemed necessary.

## Activity

| Duration | Activity | Group size | Learning outcomes |
|---|---|---|---|
| 10 minutes | Students should not be given handout 1. They can be asked what they think the words qualitative and quantitative mean in relation to data and asked to suggest ways that such data could be gathered.<br><br>Students can be asked about a fitness test they have done- 'What was your score'? (Quantitative).<br><br>'How do you feel it went'? (Qualitative). | Approximately four in each group. | All students should start to discuss and be aware of the terms 'qualitative and quantitative data' and be able to suggest ways that such data could be gathered. |
| 45 minutes | Presentation of data.<br><br>Students should be introduced to the rules which govern the labeling of axes (handout 1).<br><br>There are 6 major tasks to complete on handout 1. Handout 2 includes possible | For tasks 1–6, students can start individually, then compare and discuss results in pairs then compare and discuss results in small groups. | Students should develop the ability to:<br>• analyse data<br>• suggest possible findings<br>• justify these findings<br>• present data as a line graph or bar chart |

| | | | |
|---|---|---|---|
| | results and reasoned conclusions (findings).<br><br>For all types of data presentation (line/bar/pie/table), students must get used to analysing the data and proposing what they have found.<br><br>For line graphs and bar charts, students should be given the opportunity to present the data in graphical form.<br><br>For pie charts and tables students should simply be encouraged to analyse and evaluate what the data shows. | | • interpret suitable use of axes labels. |
| 5 minutes | Recap of major findings.<br>Production of homework task to find any form of datum online which has a sporting connotation, and to suggest to the group next week what it actually shows. | Whole class. | To further expand on the ways that 'sporting' data are presented. |

# Further work and reading

## Extension

Ask students to explore major sporting bodies' websites for how data are presented. They can analyse what the main points shown are.

Alternatively, teachers can present students with raw data and ask them to present this data as a line graph and/or bar chart.

## Preparation for next lesson

To complete homework and written notes on the content of the lesson.

## Homework

Homework questions: find any form of datum online which has a sporting connotation, and suggest to the group next week what it actually shows.

## Handout 1: What you need to understand (including some examples of questions on the use of data)

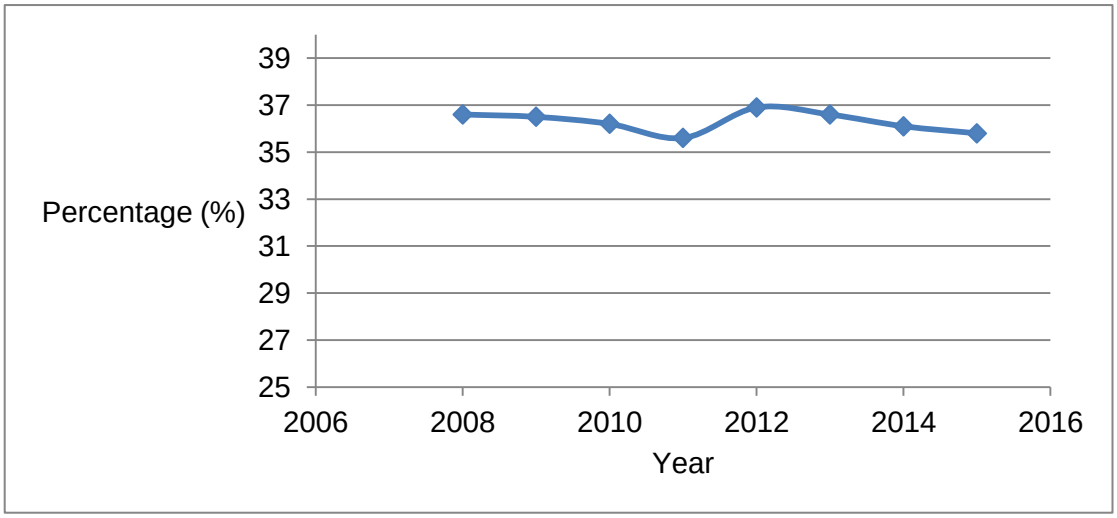
Qualitative – more of a subjective than an objective appraisal, involving opinions relating to the quality of a performance rather than the quantity (score, placing, number). Gathered via interviews, observations, opinions about fitness tests etc.

Quantitative – a measurement which can be quantified as a number, eg time in seconds or goals scored. There is no opinion expressed (qualitative). It is a fact. Gathered via questionnaires, surveys, fitness tests, heart rate monitors, etc.

You need to be able to present data as line graphs, tables, bar charts and pie charts.

Line graphs.

The graph below shows the percentage (%) of people (16+) that have exercised at least once (2006–2015).




1. What can you tell from the line graph presented above? Analyse the information.

Answer space:

2. The table below shows heart rate recorded over a period of time.

| *Period of time* | *Heart rate* |
|---|---|
| At the start | 76 bpm |
| 1 minute into exercise | 80 bpm |
| 2 minutes into exercise | 88 bpm |
| 3 minutes into exercise | 105 bpm |
| 4 minutes into exercise | 116 bpm |
| 5 minutes into exercise | 120 bpm |
| 6 minutes into exercise | 120 bpm |

Try turning the data in the above table into a line graph using the graph paper below. Work out what the axes labels should be first and then plot the points and connect them together.

3. What do you think you can tell from the graph? Analyse the data you have presented. Discuss in pairs.

Answer space:

Tables.

It is important you can interpret data in the form of a table.

This table shows the scores of a group of classmates who have performed a multi-stage fitness test.

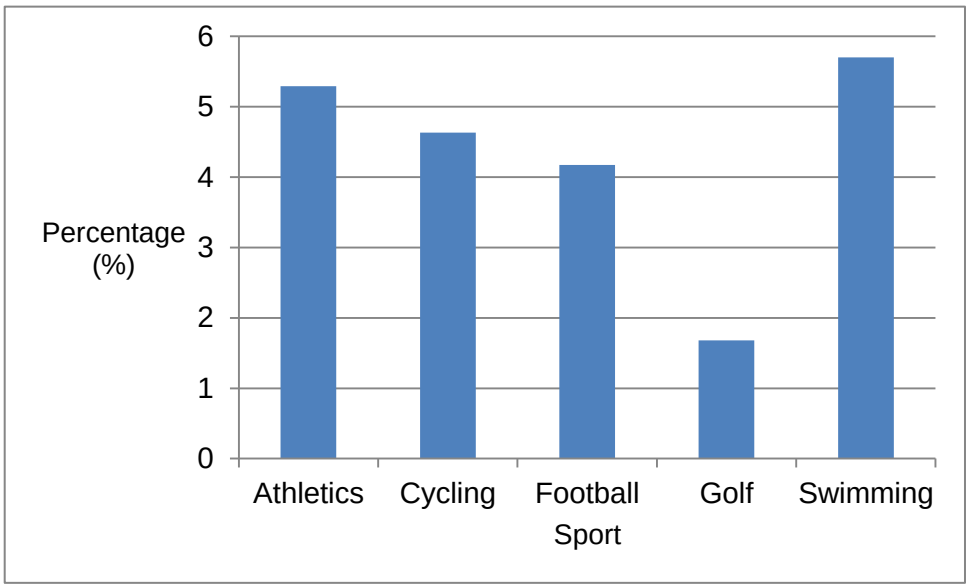
| Male participants | Female participants |
|---|---|
| 1 Level 11 bleep 4 | 1 Level 8 bleep 3 |
| 2 Level 10 bleep 2 | 2 Level 8 bleep 3 |
| 3 Level 17 bleep 3 | 3 Level 6 |
| 4 Level 4 bleep 5 | 4 Level 6 bleep 6 |
| 5 Level 10 bleep 1 | 5 Level 11 |
| 6 Level 14 | |
| 7 Level 9 | |

4. What can you tell from the table?

Answer space:

Bar charts.

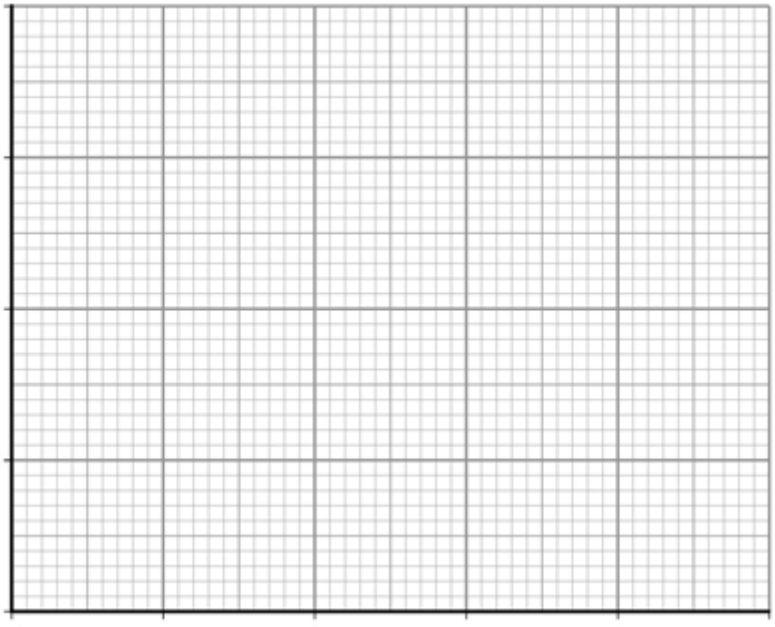
This example shows the percentage of people taking part in various sports at least once a week.




5. Analyse the bar graph above. What do you notice?

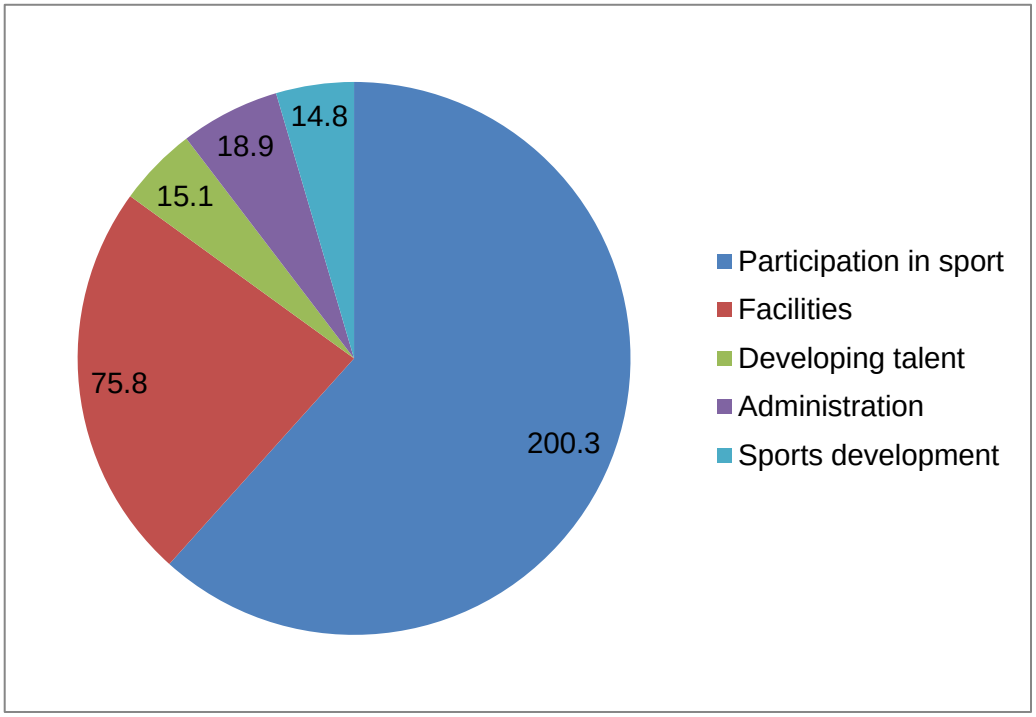
Answer space:

6. Turn the same data used to make the line graph (question 2) into a bar chart. Use the graph paper below.



Pie charts.

The below pie chart shows the spending of Sport England (£ millions).




7. Analyse the data. What do you notice?

Answer space:

Labelling the axes (the rules).

The “independent” variable goes on the x axis (the bottom, horizontal one) and the “dependent” variable goes of the y axis (the left side, vertical one).

Time is often the independent variable. So for example if a graph shows heart rate over a period time, heart rate is the thing you really want to know so it is the dependent variable on the y axis.

Other examples include: miles walked per day. You want to know the miles walked so this is the dependent variable (y axis). The days are the independent variable (x axis).

## Handout 2: Answers (including some examples of what may have been analysed)

1. In 2006–2015 the percentage of people doing exercise once per week never goes above 37%.

Stays fairly constant.

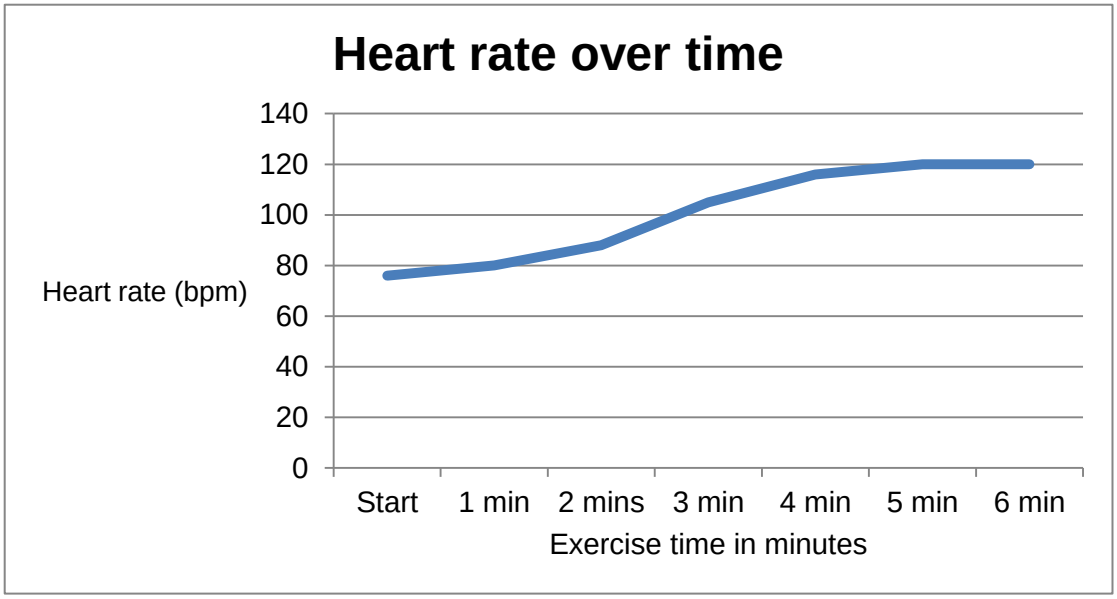
Perhaps campaigns have not worked as there is no marked rise.

Perhaps campaigns have worked as there is no marked fall.

The two peaks occurred in Olympic years (2008 and 2012).

After each Olympics, there is a drop in participation.

2.




3. Heart rate went up.

It appears to level off.

Perhaps the athlete went into 'steady state'.

It took 4 minutes to reach 'steady state'.

Intensity has not gone up after 4 minutes.

4.Males have generally performed better than females.

There is clearly one very good student in the class who has a higher aerobic power/cardiovascular endurance than the others.

Some people dropped out at the same time – perhaps driven by peer pressure?

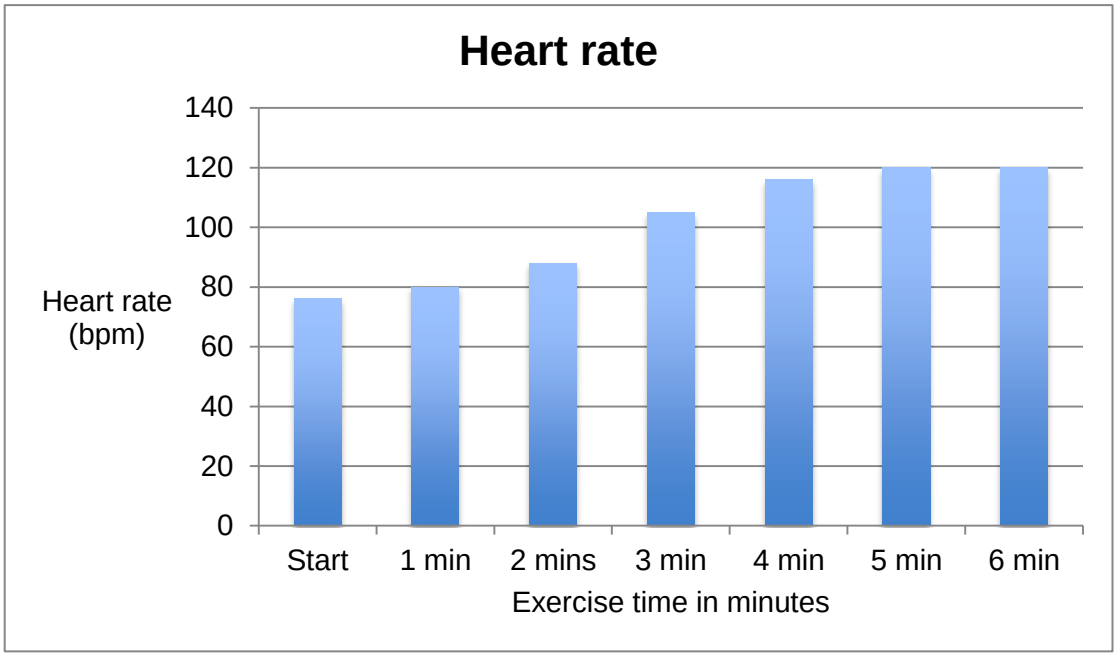
1/3 of the participants dropped out when they reached a level – psychological?

5. Swimming is the most popular sport.

Golf is the least popular sport.

None of the sports have 6% or more.

6.



7. Participation is deemed the most important/most money spent

Administration, developing talent and sports development all command roughly the same amount.

Facilities take up nearly 1/4 of the budget

Perhaps the sizeable budget on facilities has led to the large budget on participation?