Activity description

This is a very open investigation where students may set their own statistical tasks based on sleep requirements.

Suitability

Level 2 (Intermediate/Higher)

Time

3–4 hours

Resources

Student information sheet
Optional: slideshow

Equipment

Calculators
Optional: computers and spreadsheets, internet access, graph paper, compasses, protractors, rulers …

Key mathematical language

Data (raw, discrete, continuous, grouped), sample, measures of location (mean, median, mode, modal group) and spread (range, quartiles and inter-quartile range, standard deviation), statistical diagrams (pictogram, bar chart, pie chart, comparative pie chart, stem and leaf diagram, histogram, cumulative frequency graph, box and whisker diagram).

Notes on the activity

Students may like to use the internet to find information about sleep that can contribute to this assignment. A lot of the available information is from the USA, where there have been campaigns to change the early starting times used at most schools. Some websites have on-line chronotype tests that students can use to give a score indicating whether they are a lark or owl. There are also websites about shift workers and their problems.

Some useful website addresses are given below, but websites are often updated and these addresses may change. If you have problems use a search engine.

St Mary Medical Centre, USA: research report
http://www2.providence.org/wallawalla/providence-st-mary-medical-center/sleep-disorders/Pages/Teens-and-Sleep.aspx

NHS on sleep
http://www.nhs.uk/Conditions/Insomnia/Pages/Introduction.aspx

American Academy of Sleep Medicine: general information about sleep
http://sleepeducation.blogspot.com/2009/04/whats-your-chronotype-understanding.html

During the activity

Before handing out the student information sheet, you may wish to allow the group to brainstorm questions to investigate. The fourth slide is designed for you to write these up if you have the appropriate facilities.

You may wish to give students the opportunity to design individual investigations, or you may wish to restrict the questions under investigation so that the class or groups can gather and share enough data to get meaningful samples.

If students are going to gather primary data from outside, you will need to introduce the activity in one session and then allow enough time for them to gather data before analysing it.

If data is shared, students should be encouraged to make individual decisions about which techniques they are going to use for analysis.

Points for discussion

Before students start their investigation, discuss questions such as:

- How will you obtain the data you need?
- How big a sample do you need to get meaningful results?
  (There should be at least 25 data items.)
- Which techniques will be relevant in analysing and displaying the results?

At the end of the investigation, students could be asked to present their findings to the rest of the class as well as considering questions such as:

- How reliable was the data?
- Which were the clearest methods of displaying the results?
- Which were the most appropriate calculations?

Extensions

The open-ended nature of the investigation allows more able students to use more sophisticated approaches. For example, some students may decide to use histograms, comparative pie charts or cumulative frequency graphs to illustrate their data, whilst others use simple bar charts, pie charts or pictograms.