# Problem of the Week
## Problem A and Solution
## Mathematical Mystery

**Problem**

A school of 270 students completed a survey about their favourite subject in school. The results for all subjects except Math are shown in the pictograph below.

**Favourite Subject**

| Phys. Ed. | 🧍 🧍 🧍 🧍 🧍 🧍 |
| Music | 🧍 🧍 🧍 |
| Math | |
| Science | 🧍 🧍 🧍 🧍 🧍 🧍 |
| Art | 🧍 🧍 🧍 🧍 ⌿ |

**Key:** Each 🧍 represents 10 students.

Each ⌿ represents 5 students.

A) How many students selected Math as their favourite subject? Explain your reasoning.

B) Complete the pictograph.

C) What is the mode and median for this set of data?

**Solution**

A) If each 🧍 represents 10 students, and a half 🗲 represents 5 then;

- $6 \times 10 = 60$ students chose Phys. Ed. as their favourite subject
- $3 \times 10 = 30$ students chose Music as their favourite subject
- $5 \times 10 = 50$ students chose Science as their favourite subject
- $(4 \times 10) + 5 = 45$ students chose Art as their favourite subject

The total of the known data is: $60 + 30 + 60 + 45 = 195$. To determine how many students voted for Math, you must remove the votes from the 195 students that have been counted, from the total 270 who voted. So, $270 - 195 = 75$ students voted for Math as their favourite subject.

B) Completed pictograph:

| | |
|---|---|
| Phys. Ed. | 🧍 🧍 🧍 🧍 🧍 🧍 |
| Music | 🧍 🧍 🧍 |
| Math | 🧍 🧍 🧍 🧍 🧍 🧍 🧍 🗲 |
| Science | 🧍 🧍 🧍 🧍 🧍 🧍 |
| Art | 🧍 🧍 🧍 🧍 🗲 |

**Favourite Subject**

**Key:** Each 🧍 represents 10 students.

Each 🗲 represents 5 students.

C) In order to find the mode and the median for the data set, you should arrange the data from least to greatest. In this case, the data values are:
30, 45, 60, 60, 75

The mode is the value that occurs most often in the data set, so the mode is 60.

The median is the middle value in the data set, so the median is 60.

**Teacher's Notes**

The word average is often used in general conversation, but it is an ambiguous term. Many people equate *average* to *mean*, but statisticians use several different measurements of central tendency to describe averages of data. Central tendency is a formal way of saying "the typical values in a set of numbers", and *mean*, *median* and *mode* are three standard measurement tools. The *mean* tends to be easier to calculate, since the data does not have to be sorted. However, the *median* is often a better descriptor of an average value. The *mean* weighs all values in the set equally, so small numbers of extreme values can shift the calculated average. The *median* will not be as affected by a small number of outlining values.

Statisticians measure the data in many other ways. For example, *standard deviation* is a measurement tool that describes how clustered the data is around its *mean*. If a set of data has a low standard deviation, that indicates that the individual data values tend to be close to the *mean*. If the *standard deviation* is high, then the data values are much more spread out. If you are using data to predict the future, then a low standard deviation will generally lead to better predictions in applications such as weather, finance, or polling. However, there are never any guarantees.