# Problem of the Week
## Problem A and Solution
### Blind Soccer

**Problem**

Blind people play soccer in the Paralympics. Blind soccer is just like soccer for the sighted, except that each half lasts 25 minutes, rather than 45 minutes.

Jordan plays blind soccer on the Screaming Eagles team. In order to win a match, Jordan's team must win 3 of 5 games. Her team won the match.

A) What is the minimum number of minutes her team must play to win a match?

B) How many hours is this?

C) What is the maximum number of minutes her team could play to win a match?

**Solution**

A) Jordan's team would need to play a minimum of three games to win the match. Since each game has 25 minute halves, the total playing time in a game is $25 + 25 = 50$ minutes. This means that in three games, the team plays a total of $50 + 50 + 50 = 3 \times 50 = 150$ minutes.

B) Since,
   1 hour $= 60$ minutes, then
   2 hours $= 2 \times 60 = 120$ minutes, and
   3 hours $= 3 \times 60 = 180$ minutes.

   So 150 minutes is more than 2 hours, but less than 3 hours. In fact, it is $150 - 120 = 30$ minutes more than 2 hours. So, the minimum amount of time Jordan's team must play is 2 hours and 30 minutes. Since 30 minutes is half of an hour, we could also say they play for $2\frac{1}{2}$ hours.

C) Jordan's team could play a maximum of five games in a match. This would be a total of $50 + 50 + 50 + 50 + 50 = 5 \times 50 = 250$ minutes of playing time.

## Teacher's Notes

We could also determine the number of hours that is equal to a given number of minutes by using division. We could calculate the quotient and remainder when we divide by 60 which is the number of minutes in an hour. For example:

$$150 \div 60 = 2 \text{ remainder } 30$$

So 150 minutes is equal to 2 hours and 30 minutes.

Converting from one unit of measurement to another can often be done by multiplying one unit's measurement by a *conversion factor*. For example, if we wanted to convert hours to seconds, the conversion factor is 3600, since there are 3600 seconds in one hour. If we want to convert from seconds to hours, the conversion factor is $\frac{1}{3600}$ since $\frac{1}{3600}$ of an hour is one second. In the case where the conversion factor is a fraction, we can either multiply by the fraction or break up the calculation into two parts where we multiply by the numerator of the fraction and divide the result by the denominator of the fraction.

Sometimes conversion factors, such as the number of minutes in an hour or the number of metres in a kilometre, are easy to remember. Other times, conversion factors, such as the number of feet in a mile or the number of minutes in a week, are more difficult to remember.

Conversion factors are not always helpful. For example, converting between Celsius and Fahrenheit is tricky. This conversion is unlike the previous examples, because 0° Celsius is not equal to 0° Fahrenheit. In all of the previous examples, the measurement value at 0 is the same. For example, 0 minutes is equal to 0 hours and 0 metres is equal to 0 kilometres. You can figure out how to convert between two different units like Celsius and Fahrenheit if you know two pairs of values that are equal to each other (e.g. the boiling point of water is 100° Celsius and 212° Fahrenheit, and the freezing point of water is 0° Celsius and -32° Fahrenheit), and you know how to use these two points to derive the equation of a line. This kind of calculation is done in later mathematics, but as a point of information you can convert Celsius to Fahrenheit using this formula:

$$F = (C \times \frac{9}{5}) + 32$$

and you can convert Fahrenheit to Celsius using this formula:

$$C = (F - 32) \times \frac{5}{9}$$