+ − × ÷ **Compound measures**
A compound measure is a measure that involves two or more different units.

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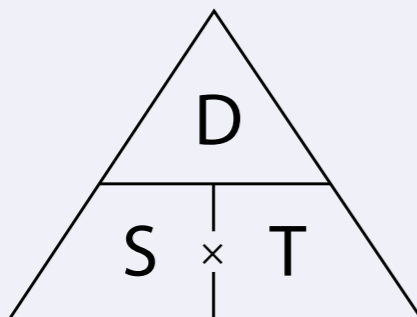
Speed, distance and time

Examples of compound measures include m/s, g/cm^3 and mpg. The symbol / and the letter **p** in these units stand for the word **per**, which means 'for each'. Therefore, m/s is a measure of the number of metres for each second.

Speed

The formula for the speed of an object is:

$$\text{speed} = \frac{\text{distance travelled}}{\text{time taken}}$$

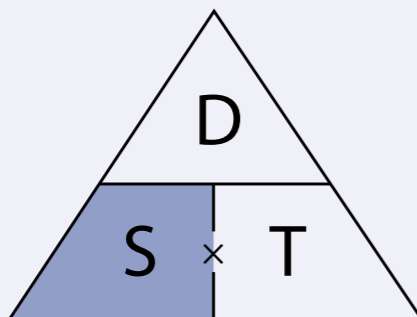This diagram can be used to memorise the different relationships between speed, distance travelled, and time taken.

For example:

To find speed, highlight the S.

We are left with $\frac{D}{T}$.

So $S = \frac{D}{T}$.

$$\text{time taken} = \frac{\text{distance travelled}}{\text{speed}}$$

$$\text{distance travelled} = \text{speed} \times \text{time taken}$$

Example 1

An athlete runs 400 m in 48 seconds.
Calculate the average speed of the athlete.

Answer

We can use the formula for the speed of an object to answer this.

$$\text{speed} = \frac{\text{distance travelled}}{\text{time taken}}$$

We know the values for distance travelled and time taken, so can substitute these in:

$$\text{speed} = \frac{400}{48} = 8 \cdot 3 \text{ (to one decimal place)}.$$

The distance travelled was in metres, and the time taken was in seconds. This means the units will be m/s.

Therefore, the answer is $8 \cdot 3$ m/s (1 d.p.).

REMEMBER!

You may need to convert the values you are given to match the units needed in the answer. Practice converting between seconds, minutes and hours to make sure you are comfortable with this.

Check that you can:
◆ convert between seconds, minutes and hours, and between km and m
◆ substitute into a formula
◆ rearrange a formula that contains multiplication and division.

Example 2

A train travels 30 km in 15 minutes.
Calculate the average speed of the train in km/h.

Answer

Again, we can use the formula for the speed of an object to answer this:

$$\text{speed} = \frac{\text{distance travelled}}{\text{time taken}}$$

As we need the speed of the train in km/h, it means that the time taken needs to be in hours.

$$15 \text{ minutes} = 15 \div 60 = 0 \cdot 25 \text{ hours}$$

$$\text{speed} = \frac{30}{0 \cdot 25} = 120 \text{ km/h}$$