

Using simple formulae

Prior learning

- Can recognise and use common formulae such as A (area of rectangle) = l (length) \times w (width).

Learn

- Spend as much time as necessary revising the area of rectangles or squares. (If the children are unsure of the concept, return to counting squares to work out area.) Move on to presenting just the length and width of a rectangle or square, and ask the children to calculate area by using the formula. Move on to presenting the area and the width so that the length might be deduced. This last step is important as it involves manipulating the formula.

- Point out the units, and how when multiplying centimetres by centimetres, we get cm^2 .
- Continue working with the formula for area, showing how equations are like scales. They must be kept balanced at all times – whatever is done to one side must be done to the other. Show how dividing each side by ‘ w ’ we can adjust the formula to have $l = A/w$.
- Move on to perimeter, in particular showing how the formula can be simplified to $P = 2(w + l)$.
- 100 Maths Lessons Year 6, Spring 2, Week 4, Lessons 1 and 2* provide further ideas and practice with simple formula.

Talk maths

- In addition to the textbook activity, organise group oral work sessions based around *100 Maths Lessons Year 6, Summer 2, Week 2*. This looks at the creation of linear patterns from a formula, based on the ‘ n th term’. Begin by providing a small selection of simple formulae, such as $n + 4$, $2n + 1$, $3n - 2$, where n is the position of each number in the sequence. For $n + 4$, the first number in the sequence is 5, the second 6, and so on.

Activities

- The textbook activities focus on the given formulae for perimeter and area, and completing a chart to show how a formula generates a range of values. The *Year 6 Practice Book* provides a wide range of further practice in using formula and linear sequences.

Problems

- Both of the textbook problems are tricky. It may be appropriate to work through these with the children altogether. Both questions can be used to create straight-line graphs, which provide an alternative way of looking at the data created by a formula, as well as generating new data without actually calculating it.

Using simple formulae

Learn

If we need to calculate the perimeter or area of a regular shape, we can use a formula.

For the rectangle, we can say, **Area equals length multiplied by width.** In a formula, we can use a letter for each part. So, **area equals length multiplied by width** becomes $A = l \times w$.

A = area l = length w = width

In formulae, we can drop the multiplication sign. If a letter and a number, or two letters, are together, it means that they are being multiplied. The area of a rectangle is $A = lw$. For the red rectangle, $A = 4 \times 3 = 12\text{cm}^2$

For a rectangle that is 7m long and 2m wide: $A = 7 \times 2 = 14\text{m}^2$.
For a rectangular field that is 90m long and 30m wide: $A = 90 \times 30 = 2700\text{m}^2$.

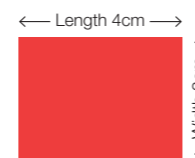
Notice that area has square units. It is shown with this symbol 2 .

Perimeter is the distance around a shape. For a rectangle $P = l + w + l + w$ or $P = 2l + 2w$. Remember, multiplication before addition. For the red rectangle, $P = 2 \times 4 + 2 \times 3 = 14\text{cm}$.

You can use other formulas in the same way. Just replace the letters with the numbers.

Did you know?

Using letters to represent numbers is called algebra.



The great thing about a formula is that you can use it again and again. The letters always stay the same but they represent different numbers.



✓ Tips

- Be sure to get your units right. Formulae are used to calculate all sorts of things: distance, area, temperature, weight, volume, and so on. You must be sure to keep everything in the same units.
- If you are calculating with different units, you must convert one unit to the other first: you must multiply centimetres by centimetres, add grams to grams, and so on.

Talk maths

Try inventing your own simple formulae, and then test them on a partner, for example:

- Some new houses are being built. If every house has seven windows, a formula for windows is: $w = 7h$, where h = the number of houses, and w = the number of windows.
- How about cars? You need five tyres per car.
- Or currant buns? There are 24 currants per bun!



Activities

- Copy and complete the chart for perimeters and areas of rectangles.

Length	Width	Perimeter	Area
5cm	2cm		
5m	4m		
7km	1.5km		
3.2m	2.3m		

- Copy and complete this chart using the formula: $h = 3f + 8$

h					
f	1	2	4	9	100

Problems

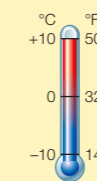
Brain-teaser

Beth wants to change some dollars to pounds. The formula for calculating the amount of pounds she receives is $\text{£} = 1.67 \times \text{\$}$. £ is the amount of pounds Beth has and $\text{\$}$ is the dollars she will receive. (1.67 is called the exchange rate.) If Beth has £200 to change, how many dollars will she receive?

Brain-buster

Here is the formula for changing degrees Fahrenheit to degrees Celsius: $C = \frac{5}{9} \times (F - 32)$. Copy this chart, then use the formula to complete it.

Fahrenheit	32°	104°	212°
Celsius			



Curriculum objectives

- To use simple formulae.
- To generate and describe linear number sequences.

Success criteria

- I can use simple formulae.
- I can identify and make linear number sequences.

100 Maths Lessons Year 6 links:

- Spring 2, Week 4 (pages 146–151): use and devise simple formulae
- Summer 2, Week 2 (pages 218–222): make and describe number sequences

Year 6 Practice Book links:

- (page 85): Express it!
- (page 90): What's next?
- (page 91): Jumping frog number patterns
- (page 92): In sequence
- (page 93): Algebra problems