Solution to example 23

The trapeziums in this diagram are similar.

Find the shaded area
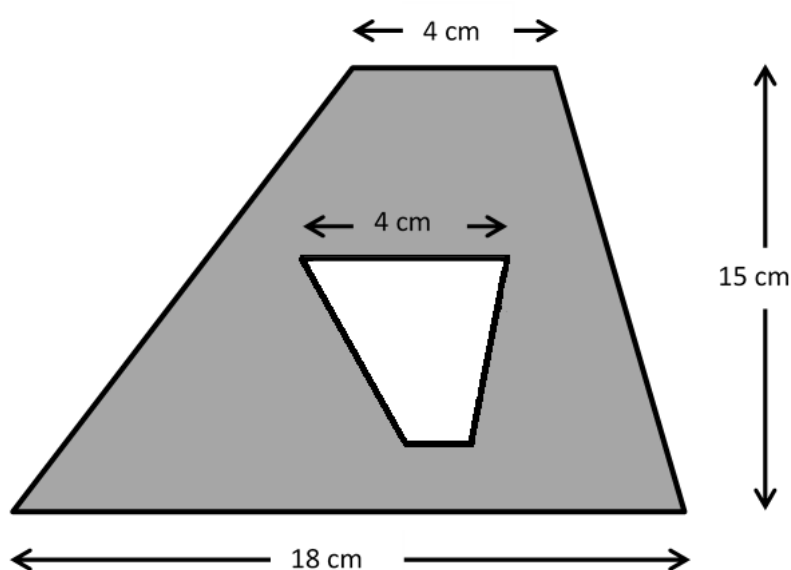
The outside trapezium has area $\frac{1}{2} \times 15 \times (4 + 18) = \frac{1}{2} \times 15 \times 22 = 15 \times 11 = 165$ cm².

The height of the inner trapezium is $\frac{4}{18} \times 15 = \frac{10}{3}$

The length of the unknown parallel side is $\frac{4}{18} \times 4 = \frac{8}{9}$

The area of the inner trapezium is $\frac{1}{2} \times \frac{10}{3} \times \left(\frac{8}{9} + 4\right) = \frac{1}{2} \times \frac{10}{3} \times \frac{8+36}{9} = \frac{1}{2} \times \frac{10}{3} \times \frac{44}{9} = \frac{10}{3} \times \frac{22}{9} = \frac{220}{27}$

The shaded area $= 165 - \frac{220}{27} = \frac{4235}{27} = 157$ cm² to 3 s.f.

Note: Foundation GCSE students would be expected to use a calculator and express their values as decimals.