

Dr Oliver Mathematics
Worked Examples
Ratio 1

From: Edexcel 2018 November Paper 2H (Calculator)

1. p and q are two numbers such that $p > q$.

(5)

When you subtract 5 from p and subtract 5 from q the answers are in the ratio 5 : 1.
When you add 20 to p and add 20 to q the answers are in the ratio 5 : 2.

Find the ratio $p : q$.

Give your answer in its simplest form.

Solution

Well,

$$(p - 5) : (q - 5) = 5 : 1 \Rightarrow \frac{p - 5}{q - 5} = \frac{5}{1}$$

multiply by $(q - 5)$:

$$\Rightarrow p - 5 = 5(q - 5)$$

$$\Rightarrow p - 5 = 5q - 25$$

$$\Rightarrow \boxed{p = 5q - 20} \quad (1)$$

and

$$(p + 20) : (q + 20) = 5 : 2 \Rightarrow \frac{p + 20}{q + 20} = \frac{5}{2}$$

multiply by $2(q + 20)$:

$$\Rightarrow 2(p + 20) = 5(q + 20)$$

$$\Rightarrow 2p + 40 = 5q + 100$$

$$\Rightarrow \boxed{2p = 5q + 60} \quad (2).$$

Simultaneous equations! Do (2) - (1):

$$p = 80 \Rightarrow 80 = 5q - 20$$

$$\Rightarrow 5q = 100$$

$$\Rightarrow q = 20.$$

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Hence,

$$\begin{aligned} p : q &= 80 : 20 \\ &= 20 \times 4 : 20 \times 1 \\ &= \cancel{20} \times 4 : \cancel{20} \times 1 \\ &= \underline{4 : 1}. \end{aligned}$$

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