

# Dr Oliver Mathematics

## Remainder Theorem: Part 1

1.

$$p(x) = (x + 2)(x + k)$$

If the remainder is 12 when  $p(x)$  is divided by  $(x - 1)$ , find  $k$ .

**Solution**

**EITHER**

$$p(x) = q(x)(x - 1) + 12$$

for some polynomial  $q(x)$ .

Now,

$$\begin{aligned} p(1) = 12 &\Rightarrow (1 + 2)(1 + k) = 12 \\ &\Rightarrow 3(1 + k) = 12 \\ &\Rightarrow 1 + k = 4 \\ &\Rightarrow \underline{\underline{k = 3}}. \end{aligned}$$

**OR**

For fans of sythetic division:

$$\begin{array}{r|rr} \times & x & +2 \\ \hline x & x^2 & +2x \\ +k & +k & +2k \\ \hline \end{array}$$

$$(x + 2)(x + k) = x^2 + (k + 2)x + 2k.$$

$$\begin{array}{r|rrr} 1 & 1 & k + 2 & 2k \\ \hline & \downarrow & 1 & k + 3 \\ \hline & 1 & k + 3 & 3k + 3 \\ \hline \end{array}$$

Now,

$$\begin{aligned} 3k + 3 = 12 &\Rightarrow 3k = 9 \\ &\Rightarrow \underline{\underline{k = 3}}. \end{aligned}$$