

# Dr Oliver Mathematics

## Worked Examples

### Factorial 1

**From:** Mathsmood, 12 June 2024 (Non-Calculator)

1. If

$$\frac{10!}{6!} = x!,$$

find  $x$ .

#### Solution

Well,

$$\begin{aligned}\frac{10!}{6!} &= \frac{10 \times 9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1}{6 \times 5 \times 4 \times 3 \times 2 \times 1} \\ &= \frac{10 \times 9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1}{\cancel{6 \times 5 \times 4 \times 3 \times 2 \times 1}} \\ &= 10 \times 9 \times 8 \times 7\end{aligned}$$

now,

$$\begin{aligned}10 &= 2 \times 5, \\ 9 &= 3 \times 3, \\ 8 &= 2 \times 4:\end{aligned}$$

$$= (2 \times 5) \times (3 \times 3) \times (2 \times 4) \times 7$$

rearrange:

$$\begin{aligned}&= 7 \times (2 \times 3) \times (5) \times (4) \times (3) \times (2) \\ &= 7 \times 6 \times 5 \times 4 \times 3 \times 2\end{aligned}$$

add in  $\times 1$ :

$$\begin{aligned}&= 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 \\ &= 7!\end{aligned}$$

and, finally,

$$\underline{\underline{x = 7.}}$$