

EXERCISE 6.2

1. Evaluate (i) $8!$ (ii) $4! - 3!$

Solution:

Using the definition of factorial,

$$(i) 8! = 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 = 40,320$$

$$(ii) 4! - 3! = 4 \times 3 \times 2 \times 1 - 3 \times 2 \times 1 = 24 - 6 = 18$$

2. Is $3! + 4! = 7!$?

Solution:

Using the definition of factorial,

$$7! = 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 = 5040$$

$$4! = 4 \times 3 \times 2 \times 1 = 24$$

$$3! = 3 \times 2 \times 1 = 6$$

$$\text{Now, } 3! + 4! = 6 + 24 = 30$$

$$\text{Therefore, } 3! + 4! \neq 7!$$

3. Compute $8! / (6! \times 2!)$

Solution:

Using the definition of factorial, $8!$ can be written as $8 \times 7 \times 6!$. Thus,

$$\begin{aligned} & 8! / (6! \times 2!) \\ &= (8 \times 7 \times 6!) / (6! \times 2!) \\ &= (8 \times 7) / (2 \times 1) \\ &= 4 \times 7 \\ &= 28 \end{aligned}$$

4. If $1/6! + 1/7! = x/8!$, find x

Solution:

$$\text{It is given that } 1/6! + 1/7! = x/8!$$

Using the definition of factorial,

$$1/6! + 1/(7 \times 6!) = x/(8 \times 7 \times 6!)$$

Multiplying both sides by $6!$,

$$1 + \frac{1}{7} = \frac{x}{(8 \times 7)}$$

$$\frac{8}{7} = \frac{x}{(8 \times 7)}$$

$$\text{So, } x = 64$$

5. Evaluate $n! / (n-r)!$, when

(i) $n = 6, r = 2$ (ii) $n = 9, r = 5$

Solution:

Using the definition of factorial, $n! = n (n - 1) (n - 2) \dots 3 \cdot 2 \cdot 1$

We will use this in each of the given problems.

(i) $n = 6, r = 2$

$$6! / (6 - 2)! = 6! / (4)! = 6 \times 5 \times 4! / (4!) = 6 \times 5 = 30$$

(ii) $n = 9, r = 5$

$$9! / (9 - 5)! = 9! / (4)! = 9 \times 8 \times 7 \times 6 \times 5 \times 4! / (4!) = 9 \times 8 \times 7 \times 6 \times 5 = 15,120$$

6.