

Self-assessment answers: 1 Counting principles

1. (a) $\binom{18}{5} = 8568$

(b) $7! = 5040$

(c) $7 \times 6 \times 5 = 210$

[4 marks]

2. There are two options:

One girl and four boys: $\binom{10}{1} \times \binom{12}{4} = 4950$

Two girls and three boys: $\binom{10}{2} \times \binom{12}{3} = 9900$

Total number of possible groups is $4950 + 9900 = 14850$

[5 marks]

3. $8! \times 2! = 80640$

[3 marks]

4. Arrange the five vowels first and fit the three consonants into the gaps.

[1 mark]

Arrange the five vowels: $5! = 120$

There are six gaps to fit the three consonants: $\binom{6}{3} = 20$

[1 mark]

The number of arrangements of the consonants is $3! = 6$

[1 mark]

The total number of arrangements is $120 \times 20 \times 6 = 14400$

[1 mark]



5. (a) $8! = 40320$ [1 mark]
- (b) (i) $6! \times 3! = 4320$ (ii) $2! \times 3! \times 5! = 1440$ [4 marks]
- (c) $\binom{5}{3} \times \binom{3}{1} = 30$ [3 marks]
- (d) $\binom{n}{2} = 45 \Leftrightarrow \frac{n(n-1)}{2} = 45 \Leftrightarrow n = 10$ [4 marks]