Combinations

6 questions | 14 marks

Equivalent correct methods earn the corresponding marks.

1. Choose 4 students from a group of 9. Count the groups. [2 marks]

$\binom{9}{4} = 126.$

Answer: 126.

2. Choose 2 red balls from 6 distinct red balls and 1 blue ball from 4 distinct blue balls. Count the selections. [2 marks]

$\binom{6}{2}\binom{4}{1} = 15 \times 4 = 60.$

Answer: 60.

3. Choose a team of 3 from 7 people, including one named person. Count the teams. [2 marks]

Fix the named person and choose 2 from the remaining 6.

$\binom{6}{2} = 15.$

Answer: 15.

4. Choose 3 from 5 adults and 3 children. How many groups have exactly 2 adults? [2 marks]

$\binom{5}{2}\binom{3}{1} = 10 \times 3 = 30.$

Answer: 30.

5. How many 3-person groups from 8 include at least one of two named people? [3 marks]

$\binom{8}{3} - \binom{6}{3} = 56 - 20 = 36.$

Answer: 36.

6. Explain why $\binom{12}{10} = \binom{12}{2}$. Evaluate it. [3 marks]

An included group of 10 determines one excluded pair.

$\binom{12}{2} = \frac{12 \times 11}{2} = 66.$

Answer: Both count choosing the 2 people left out; the value is 66.