Counting principles and factorials

Learn and practise | Free preview

A sample from this topic. The complete topic collection contains three different resources and worked solutions.

Read the explanation and worked example. Show your working; use a calculator only where asked.

What you will practise

• Count ordered and unordered outcomes and connect counting to equally likely probabilities.

• Explain a method and check the reasonableness of a result.

Useful starting skills: Use the prerequisite operations and representations shown in the worked example.

When a process has m choices followed by n choices for each first choice, the multiplication principle gives mn outcomes. Factorial n! counts arrangements of n distinct objects; 0! is defined as 1. Specify whether repetition is permitted and whether order matters.

Ordered selections of r distinct objects from n have n(n-1)…(n-r+1) possibilities. For unordered selections, divide by r! because rearranging the selected objects does not create a new group. For probability, favourable-count divided by total-count requires equally likely elementary outcomes.

Worked example

How many ordered two-letter codes can be formed from A, B, C, D without repetition?

There are 4 choices for the first letter.

There are then 3 remaining choices for the second.

Answer: $4\times3=12$

Try it yourself

Name: _____ Date: _____

1. A menu has 3 mains and 4 drinks. How many main-and-drink combinations are possible?

2. Evaluate 5! and 0!.

Answers and explanations

Check the method as well as the final answer. An alternative correct method is also valid.

1. 12

Choose one item independently from each category.

2. 120 and 1

$5! = 5 \times 4 \times 3 \times 2 \times 1$; $0!$ is defined as 1.

Curriculum reference: VC2M10AP01

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