

1.1.3 Counting

Name: _____ Class: _____ Date: _____

KEY WORDS systematic list

<!-- Session 2 native-skill companion -->

Objective

Practise counting within the labelled native lessons. Public original tasks; locally authored answer guidance.

1 Key knowledge and worked examples

■ Systematic lists and possibility grids · Foundation

Fix one first choice and list every allowed second choice before moving to the next first choice. Use a table to check that no outcome is missing or duplicated. If combinations are forbidden, remove those entries from the list.

$$\{TA, TB, TM, JA, JB, JM\}$$

List tea-apple, tea-banana, tea-melon, juice-apple, juice-banana, juice-melon: six choices. Removing tea-melon leaves five. The codes using 1,2,3 once each are 123,132,213,231,312,321: six. These answers follow from complete lists.

State whether order matters and whether repetition is allowed. Choosing A then B can be different from B then A for a code, but not for an unordered two-person team. A restriction can make a simple product invalid.

Foundation should justify answers with a complete ordered list or grid. Higher may compress a verified structure using the product rule, but must still check restrictions.

■ Systematic lists and the product rule · Higher

Fix one first choice and list every permitted second choice before moving to the next first choice. A table gives the same structure. When every one of m first choices allows n second choices, the Higher product rule gives mn outcomes. If restrictions change the options, count the allowed rows separately.

$$\{TA, TB, TM, JA, JB, JM\}$$

The list is tea-apple, tea-banana, tea-melon, juice-apple, juice-banana, juice-melon: six outcomes. If tea-melon is unavailable, five remain. For a three-digit code with digits 1,2,3

and no repeats, choose 3 then 2 then 1 possibilities, giving six codes: 123,132,213,231,312,321.

State whether order matters and whether repetition is allowed. Choosing A then B can be different from B then A for a code, but not for an unordered two-person team. A restriction can make a simple product invalid.

Foundation should justify answers with a complete ordered list or grid. Higher may compress a verified structure using the product rule, but must still check restrictions.

A complete grid lists six choices once each

Juice + Apple

Juice + Banana

Juice + Melon

Tea + Apple

Tea + Banana

Tea + Melon

Original native-lesson illustration; labels belong to its worked example.

2 Practice

2.1 (Foundation) How many cafe choices are in the complete list?

2.2 (Foundation) How many remain when tea-melon is removed?

2.3 (Foundation) How many three-digit codes use 1,2,3 once each?

3 Exam-style questions

3.1 Decide whether this claim is true. Justify with a concrete calculation or counterexample: Three available first choices and four second choices always give twelve outcomes even if some combinations are forbidden.

Solutions

2.1 There are three listed foods under each of two drinks: six listed outcomes.

2.2 Remove one of the six outcomes: five remain.

2.3 List 123,132,213,231,312,321: six codes.

3.1 False. If one of the 3×4 pairs is forbidden, only 11 outcomes remain. The product rule needs all combinations to be allowed, or an adjusted count by cases.

Local review guidance: show the chosen method; give the checked result; explain the condition or failed shortcut. This is authored classroom guidance.