Worksheet C: Arrangements investigation teacher notes

The aim of this investigation is to develop logical thinking and allow learners to understand the basis of the product rule for counting in the context of arranging objects.

This is built upon in the Lesson slides *Arrangements*. It addresses the common error of adding values when values should be multiplied and is, therefore, worth spending the extra time on as this underpins all the work that follows.

Make sets of 10 cards with the letters ABCDEFGHIJ on them as some learners will benefit from being able to physically move the cards about.

Task 1 is more specific and is to be used for learners who need some support.

Task 2 is more general and is to be used for learners who are more able.

The two tasks have some questions in common.

Learners should be split into small groups by ability and given Task 1 or Task 2 as appropriate.

Q1 Initially, learners concentrate on arranging a whole set of different objects with no repetition.

Q2 Learners think about arranging a small set of different objects with and without repetition.

Q3 Learners think about arranging a large set of different objects with and without repetition in Task 1. In Task 2 learners find algebraic expressions for arranging n objects.

During the task, move around the class and observe. If learners need to be prompted, some possible questions to ask are:

* Can you connect the number of arrangements to the number of letters?

This is the same as the number of arrangements of the previous row. Can you explain why?

* How many different starting letters are there?
* How many numbers will there be in your list?
* How can you write that in a neater way?
* Can you explain why you did that?
* What is your strategy for getting started here?
* How did you work out your answer?
* Do you think this rule will always work?
* What difference has the option to repeat a character made to your answer?
* Is that expression easy to write down? Why not?

When learners have had enough time to complete the tasks (about 20 mins):

* **either** have a class discussion to discuss the findings (and then possibly use the *Arrangements investigation summary* PowerPoint to bring all the results together)
* **or** use the *Arrangements investigation summary* as part of a class Question and Answer session to bring all the results together.

The summary is important as all learners need to discuss all the answers to both tasks, and should last about 10 minutes.