

P15

Three Cars

There are three cars of different colours. They have to drive across a bridge. They can only go across one at a time:



In how many different orders can they cross over?
Show your thinking.

Objectives

- Use drawings or resources to help visualise the problem
- Recognise simple patterns or relationships
- Generalise and predict
- Organise the recording of possibilities eg in an ordered list or table
- Have a system for finding the possibilities, know when all possibilities are found, check for repeats of possibilities

Answer to P15 Three Cars

There are 6 possible orders: GRY, GYR, RGY, RYG, YRG, YGR

Notes

The answer given above assumes that the cars are the colours shown in the picture ie green, red and yellow.

This problem addresses the familiar question of putting a group of objects (or numbers) into an order. In this case, there are three objects to order. Some children may need to use model cars to explore the problem. Others may be able to record solutions using pictures or symbols.

As there are only six solutions, it is very possible that children will be able to fully answer this question using a 'trial and error' approach that is not systematic. However, it is a good idea to encourage pupils to think about whether there may be a systematic way of working (eg by asking 'how do you know you have found all the possibilities?')

One systematic way of thinking about this type of problem is as follows:

- a) There are three ways I can choose the first car in the queue (green, red, yellow)
- b) For each of the three choices made in a) there are two ways I can choose the second car in the queue
- c) Once the choices in a) and b) have been made, there is only one way I can choose the third car (there is only one car left to choose).

The total number of choices is therefore $3 \times 2 \times 1 = 6$

$3 \times 2 \times 1$ is known as 'three factorial' and often written as $3!$

This approach works for any number of objects.

P81 Three Cars + (Four Cars) is an extension problem to this one involving four cars instead of three.