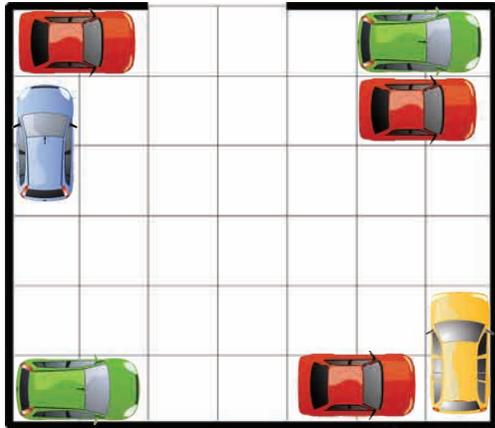


Supermarkets usually have their own car parks.

Investigate efficient ways of arranging parking spaces in car parks.



Planning guidance

Parking spaces are twice as long as they are wide (2 x 1).

Parking spaces need a 2 x 1 space in front or behind them so that cars can get in and out of the parking space.



Cars need a 2 x 2 space to turn through 90°.



Entrances and exits need a 2 x 2 space free of cars for access.



shopping around

Find a **car park** near the school.

Make a careful plan **Improve the layout of the parking spaces in the car park.**



Note

– each car needs a parking space measuring 4.8m by 2.4m

shopping around

Shopping around : Supermarket car parks

Description

This activity explores the efficient use of space in car parks.

Activity 1: Parking spaces

Activity 2: Car park improvements

Resources

Multilink cubes.
2cm squared paper.

In **Parking spaces** pupils investigate efficient ways of arranging parking spaces in car parks. Encourage your pupils to experiment, working in pairs or small groups, in the first instance using 'cars' made of two multilink cubes which fit a parking space of 2 squares on 2cm squared paper. Prompt them to record their solutions, remind them to check whether their solutions account for the constraints outlined on the activity sheet and ask them to note any other constraints they think about. You may need to exemplify the turning space constraint:



This is ok...



but this is not.



Ask your pupils to work systematically to find the optimum arrangements for each rectangular size of car park.

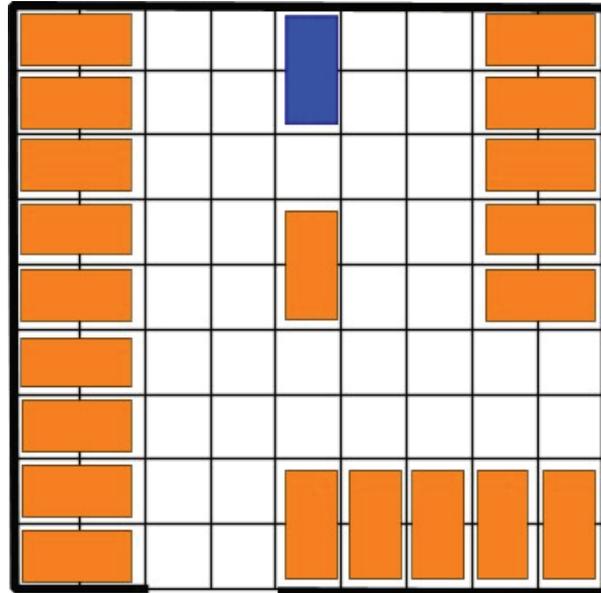
Width \ Length	6	7	8	9	10
6	12	14	16	18	20
7	14	14	16	18	20
8	16	16	18	20	22
9	18	18	20	20	25

Having theoretically investigated arrangements of parking spaces in car parks your pupils can use this thinking to support the practical investigation of the use of space in a real car park in **Car park improvements**. The theoretical model of 2 x 1 car parking spaces will need to be modified to 4.8m by 2.4m.

The first task is to take measurements of the car park and create a scale drawing of the available area. An aerial view of the car park will be helpful – look for an appropriate local one on the internet.

Shopping around : Supermarket car parks

Encourage your pupils to review the theoretical planning guidance and decide which constraints can be relaxed in the light of practical observations. For example, relaxing the second planning guidance constraint may make room for extra cars by having only one square in front of the blue car like this:



This situation is comparable to cars parked on a street and motivates discussion about mathematical modelling.

You may want to extend the activity by asking your pupils to research the various ways in which supermarkets provide for customers with particular needs – parents with children, those who need disabled car parking spaces and so on.

The work can be drawn together by each group presenting, explaining and justifying their car park improvements to the class.



The mathematics

These are two-dimensional ‘best fit’ problems which require logic and a systematic approach to find effective solutions. They give students the chance to devise and test out strategies using systematic trial-and-improvement techniques. Measuring and scale drawing are needed for **Car park improvements**.