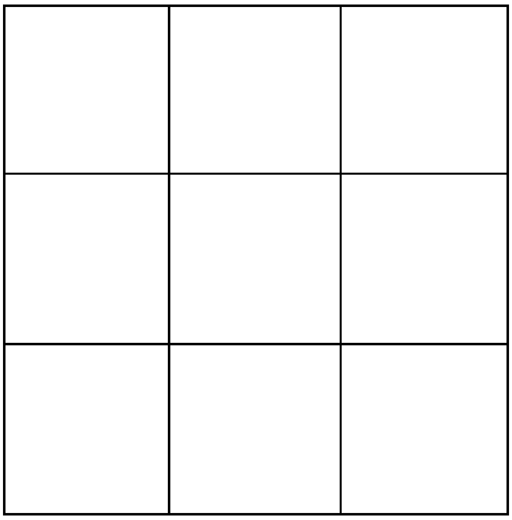
Ideas for games.

- Dominoes is a good game to play
- Play different versions of dominoes- the total of the whole domino, subtract the larger number. Any of your ideas.
- Play lots of 'dice' game.
- Play the game normally.
- Then you could play backwards.
- Use 2 dice, use the total to move forwards/backwards.
- Any of different ideas?

Dotty 6 game

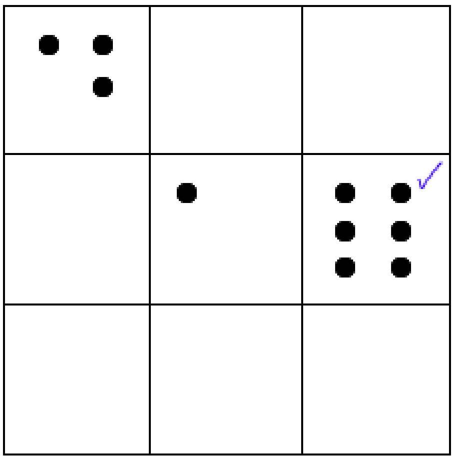
You need a partner, a 1-6 dice and a grid like this;



Take turns to throw the dice and draw that number of dots in one of the boxes on the grid.

Put *all* of your dots in one of the boxes. You can't split them up and you can't have more than six dots in a box.

When a box is full, you could put a tick in the corner like this:



Keep going until there are three ticks in a row or column or diagonal. The winner is the person who puts the last tick.

Why play this game?
The game as introduced is intended for KS1 children who are just beginning to become confident with small numbers. However there are many variations, some suggested below, that make it suitable for older children. It consolidates basic number facts and is combined with an element of strategic thinking.

Instructions

- take turns to throw the dice and put the dots into a box
- you can put your dots anywhere but you can't have more than six dots in any one box
- you have to put all your dots in one box
- you win if you finish the line, row or diagonal of complete boxes
- if you can't go you miss a turn.

When everyone has played a few times, you can change the game:

- by making the total different (10, 12, 15, 20)
- by giving different dice (with only even numbers, only odds, dice to 10 etc)
- by making the grid bigger (4 by 4)

Key questions
Where will you put your dots? Why?
How do you know where to put your dots?
How many more do you need to win?

Extension ideas
This is a great game for children to use their creativity and to work at a level at which they feel comfortable. The sophistication of their recording will change with their confidence.
Provide a range of dice including blank ones. They could:

- change the total in each box
- make the winner the first to complete a *whole row* that adds to a certain total (e.g. 20)
- change the shape of the grid (triangles rather than squares perhaps)
- use a different sort of number - fractions, decimals, percentages ...
- change the rules completely.

combinations. multiplication & division. working systematically.representing numbers. investigations.addition & subtraction.reading and writing numbers. generalising. counting.trial and improvement.

Under the microscope

Choose any two odd numbers, such as 5 and 9. Add them together.

Draw a picture or make a model to show how the numbers add together.

You could find some dominoes with 5 and 9 spots on them:
You could a model using cubes:
You could draw a picture of 5 add 9

What do you notice about the answer?

Look closely at the models and pictures.

Can you see anything in any of them that would work in exactly the same way if you used two different odd numbers?

Can you use your one example to prove what will happen every time you add any two odd numbers?

See if you can explain this to someone else. Are they convinced by your argument?

Once you can convince someone else, see if you can find a way to show your argument. You might draw something or take a photo of things you have used to prove that your result is always true from your example.

Why do this problem?

This problem supports the development of the idea of generic proof with the children. This is a tricky concept to grasp but it draws attention to mathematical structures that are not often addressed at primary school level. It is possible that only very few children in the class may grasp the idea but this is still a worthwhile activity which provides opportunities for children to explore odd and even numbers and the relationship between them. Proof is a fundamental idea in mathematics and in encouraging them to do this problem you will be helping them to behave like mathematicians.

By addressing the case of adding two odd numbers, a generic proof that adding two odd numbers always gives an even answer is developed based on the structure of odd and even numbers.

Possible approach

Ask the children to choose two odd numbers and add them together. It is probably easiest if they choose ones that are easy to model and numbers that they are secure with.

Suggest that they make a model of their numbers using apparatus. After some time exploring they may need some prompting to move them towards looking at the pairing of their dots or cubes.

The idea is that they take a particular example and then see if they can see the general structure within that one example.

Key questions

How would you like to show these numbers?

What do you notice about the answer?

Can you see anything in your example that would work in exactly the same way if you used two different odd numbers?

Can you say what will happen every time you add any two odd numbers?

Can you convince your friend that this is true?

Possible extension

Even plus even

See what happens if you add two even numbers such as 4 and 12.

Can you 'see' in this example what will happen every time you add two even numbers?

You may find it helpful to work in a similar way to the way you worked for odd numbers.

Adding an odd and an even.

See what happens if you add an odd and an even or an even and an odd such as 6 and 9.

Can you 'see' in this example what will happen every time you add an odd and an even or an even and an odd number?

You may find it helpful to work in a similar way to the way you worked before.

mathematical reasoning & proof . interactivities . properties of numbers . generalising . place value . working systematically . comparing and ordering numbers . odd and even numbers . addition & subtraction . factors and multiples .