

# Maths and Nature Activities

**Arise Home Education**

$$M = \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

# Mathematical Thinking

The following activities are taken from or adapted from [Maths Week Scotland page](#), there are many resources which are all free to use.

## The Game of Fifteen

This is a counting strategy game for two players based upon a noughts and crosses grid.

Aim of the game: To be the first player to make a straight line of three numbers total 15 be this vertically, horizontally or diagonally.

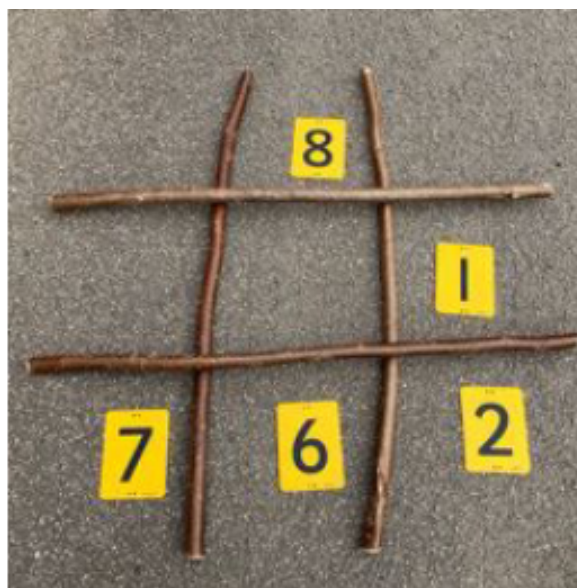
### Materials needed:

You need a set of numerals from 1 through to 9. These could be bean bags, number pebbles, wooden cookies, Numicon or anything else you have to hand that is a manipulative.

Make a grid like the one shown, either with sticks, or with chalk.

### Instructions

Players take turns to place a numeral onto the grid. The first numeral may not be placed in the centre square. The first person to make a line that totals 15 wins.



$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

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## Tapatan

This is similar to noughts and crosses in that it's all about making three-in-a-row. It's from the Philippines.

It's for two players.

Aim of the game: To make three-in-a-row.

### Materials needed:

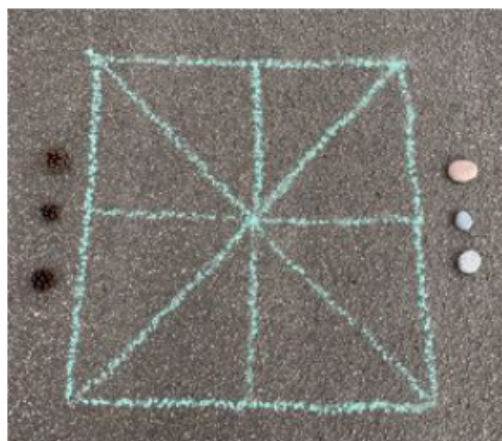
- Chalk or sticks for making the grid, as shown in the photo
- 3 objects for each player, e.g. stones for one player and cones for the other

### Instructions

- Players take turns to put an object onto the grid, taking care not to let their opponent get three-in-a-row
- Once all six objects have been placed, the players take turns to move an object to an adjacent empty spot. No jumping allowed.
- Sometimes a stalemate is reached where moves are repeated but the game can't move on. This is a draw.

### Notes

- You can change a rule. For example, what happens if you can move any counter into any empty spot, i.e. jumping is Allowed.



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## Fives

A strategy game played on a 5x5 grid, it's harder than first appears.

Aim of the game: To create a line of 5 objects on the grid before your opponent does.

Materials needed: 5 cones for one player, 5 stones for the other player.

### Instructions

- Take it in turns to put your objects into the squares on the grid.
- Continue the play by moving one object to an adjacent square in turns. You can move in any direction.
- The winner is the first person to make a line of 5 objects horizontally, vertically or diagonally.

### Notes

- This game could be simplified by playing on a 4x4 grid with 4 objects for each player.
- The 3-in-a-row game is Noughts and Crosses
- What happens if the grid is changed from a square to a rectangular array, e.g. 5x4?



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## Game of Nim

2 player game. Ancient strategy game, thought to have originated in China.

Materials: 16 pine cones/matchsticks/pebbles.

Instructions:

- Arrange the materials as in the picture



- Players take turns in taking any number of pine cones from a single row.
- The loser is the player left with a single pinecone.

## Tower of Hanoi

Move the stack of discs from one section to the far section, so they are ordered as you see them to begin with. You can only move one disc at a time, and you cannot place a larger disc on top of a smaller disc. Can you find a pattern? Try starting with 3 discs, then 4, and finally 5.



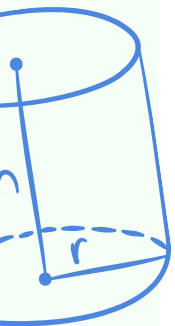
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$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

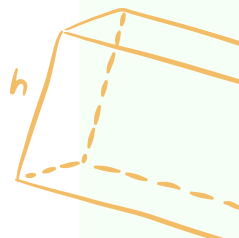
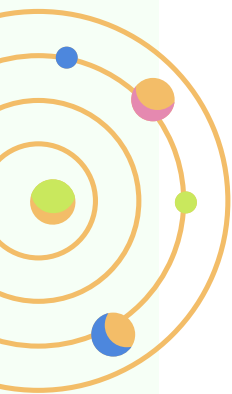
$$M = \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

# Lower Primary Summer Maths Scavenger Hunt

- Find 3 sticks and make a shape. What is the shape?
- There are 5 bees in a flower garden. 2 fly away. How many bees are left? Find that many flowers.
- Make a pattern with things you find outside.
- Find a long stick and a short stick
- What is  $5+4$ ? Build the sum with stones.
- Find a spiral (clue: look closely at a pine cone, or the inside of a flower)
- Can you balance 4 rocks?
- 2 rabbits are in a meadow. They are joined by 5 more rabbits. How many rabbits are in the meadow? Build the sum using leaves.



$$V = \pi r^2 h$$



$$V = Lwh$$



$$V = \frac{4}{3}\pi r^3$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$M = \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

# Summer Math Scavenger Hunt

- I am an irregular pentagon. Find enough straight, different items to build me.
- Show: 1:3 red and 2:3 blue.
- Find a summery pattern.
- Fibonacci numbers are everywhere in nature. Find something that has a Fibonacci number, for example a flower, a pineapple, a pine cone....

1,1,2,3,5,8,13,21,34

- How many zeros are in one billion: find that many different objects.
- Stand in the middle of the room/outdoor space. Take 3 paces north. Turn east, take 2 paces. Turn north go one pace. Turn west and go four paces. Pick up what you find closest to you.
- Build a tower that is 10 cm high.
- What do all the numbers on the keyboard add up to?
- There are 4 watermelons in a shop. What is their mean weight? They weigh: 9kg, 10kg, 9.5kg, and 7.5kg. Find a picture or an actual melon.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

# Starting Nature Study



If you are new to nature study, begin gently. It is better to create habits that are doable than create heavy burdens that you are likely to give up. Therefore, if nature study is simply a 10-minute walk around a local park or a nice forgotten wild place close to home, then make that your beginning. Although, some families will do a nature walk every day set realistic goals for your family.

Start by choosing a set time each week to be your nature walk. Choose a place easily accessible to you. There is something special about creating an intimate relationship with one place. This allows you to recognise the subtle changes that occur as the seasons spread across the year.

Go to observe, and to simply be in nature. Learn to observe. It is helpful to grow a library of field guides. However, allow your interests to determine how you do this. When choosing field guides, look for ones with good illustrations, or photographs, that will help you to determine species. It can be disheartening to try to identify a flower, or bird and be let down by the field guide. As a starting point, try the local library before committing to buying one.

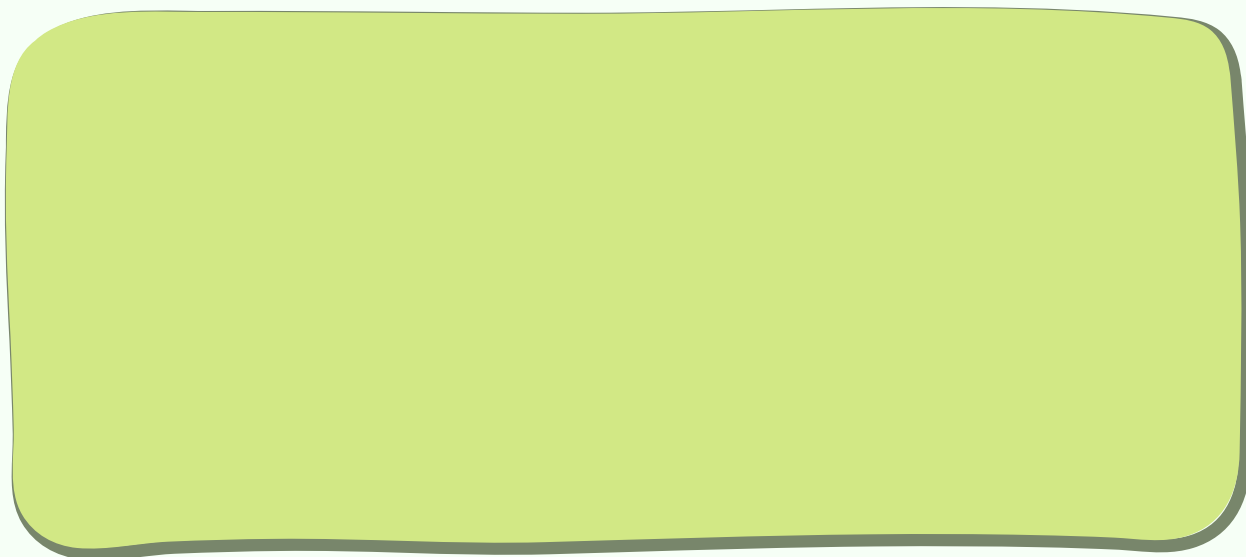
As your nature study grows, there are useful tools you may want to keep in a rucksack ready to take with you:

- binoculars
- magnifying glass (you can purchase small folding pocket ones)
- field guides
- sketching materials

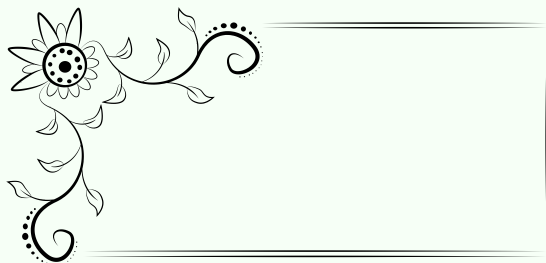




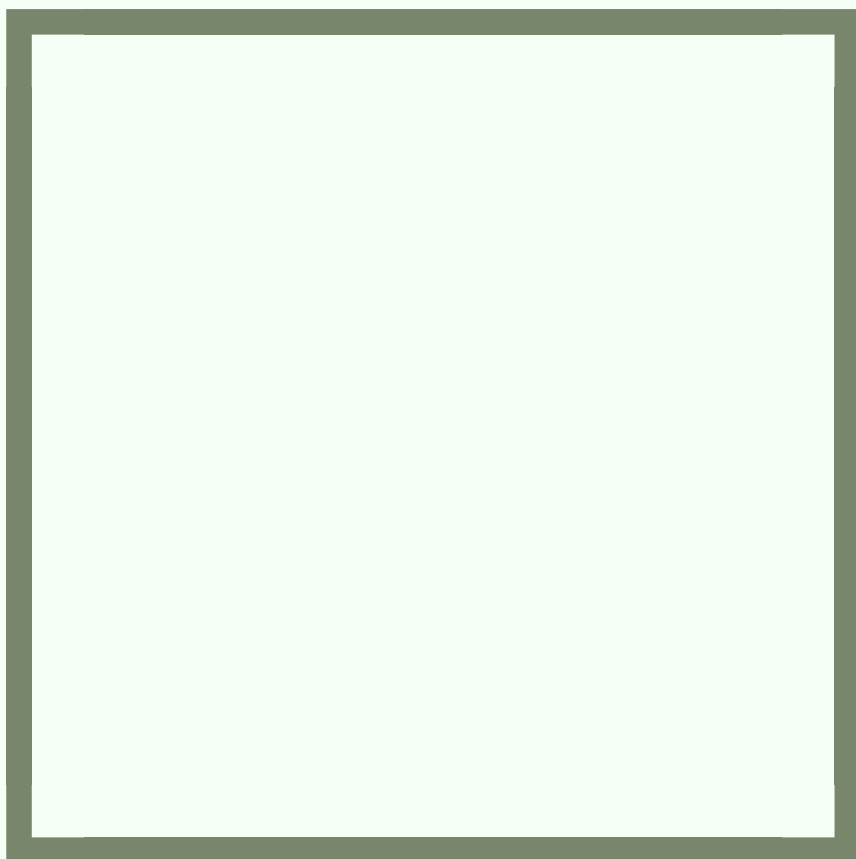
Date  
Weather:  
Observations:



Mood/Feelings



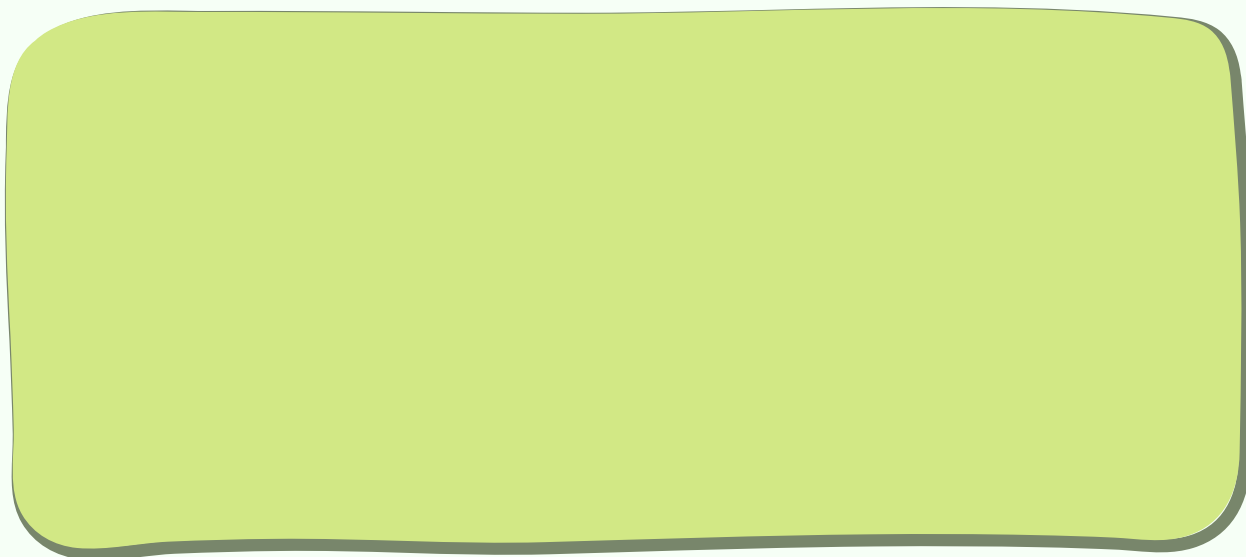
Sketch



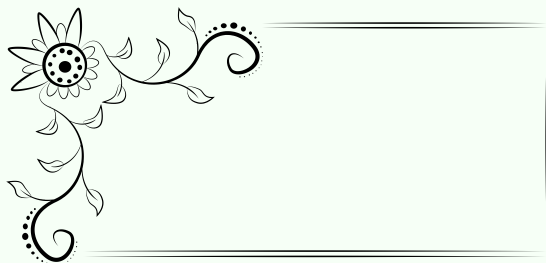
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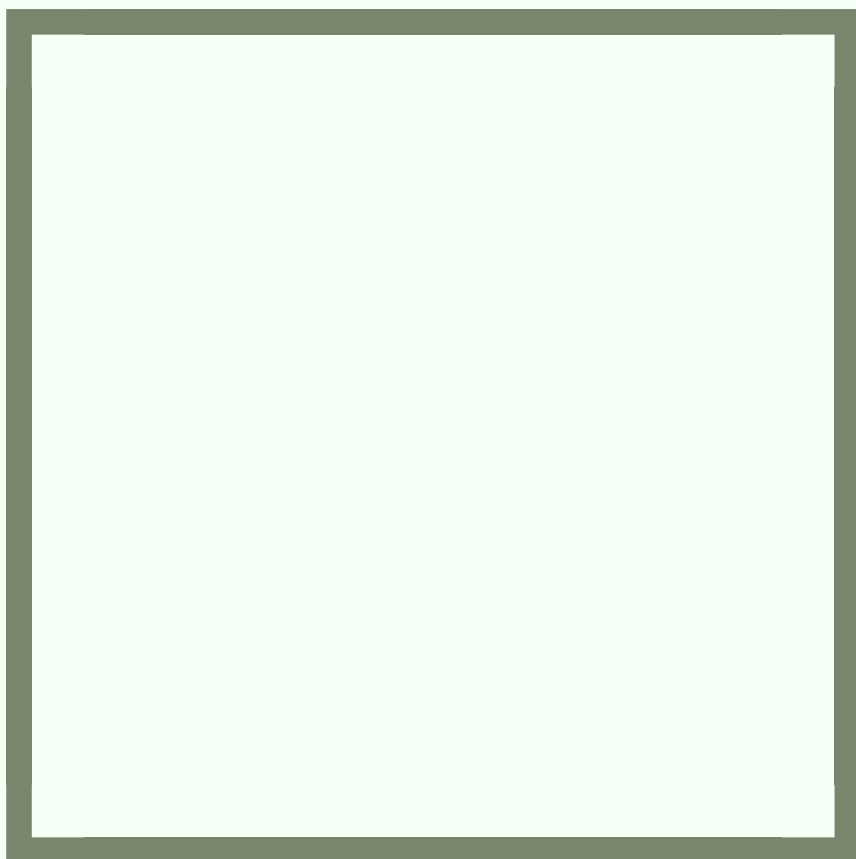
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Sketch





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