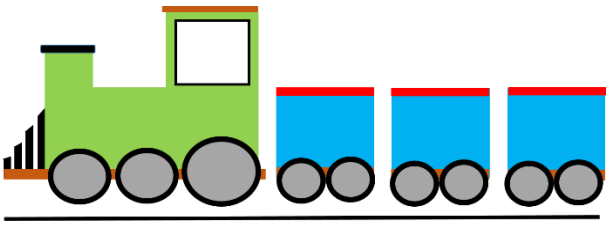


Beginning place value – the train game

Before children can develop an understanding of place value, they need to have a strong sense of number. Understanding number is more than simply being able to rote count, or recognise numerals.

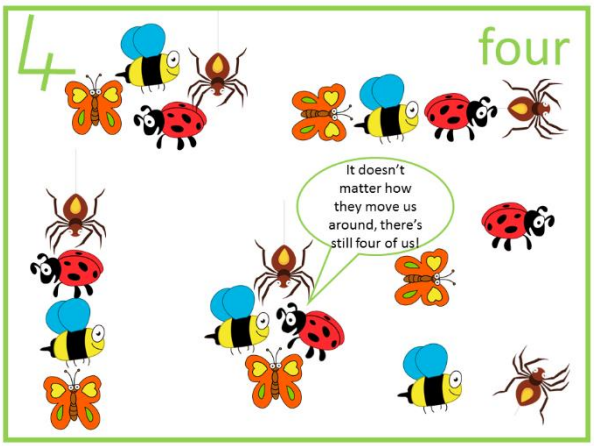
It all starts with understanding number.

Children require a lot of experiences, using concrete materials, in many different situations.

Firstly, they need to count with one-to-one correspondence.

Then they need to understand what a number is; for example, they need to understand the 'four-ness' of things. They need to know that there can be four of many different things, and that not all fours look the same; e.g. four houses, four elephants, four fish, four plates, four buttons, four children, or a collection made up of four different things (not all items in a group of four need be the same). Each of those groups of four looks very different from the other groups.

They also need to understand conservation of number: four items are always four items, no matter how they are arranged; whether in a circle, in a square, close together, far apart, or in a line.



The ability to subitise (recognise how many, without counting) small groups of objects is also important.

Two **readilearn** resources provide opportunities for practising subitisation with groups of up to six objects:

Busy Bees and Insects – Subitising 1 – 6 is suitable for display on the whiteboard.

Busy Bees and Insects Subitisation Cards are suitable for printing and using with the whole class or small groups.

Understanding grouping

In order to be successful with mathematics, children must develop a strong understanding of place value in our decimal number system. It is important that they have a lot of experience using concrete materials to ensure the concepts are understood.

I can do it!

I get this!

Rushing them through to abstract processes before they have developed a full understanding creates confusion. It sets them up for frustration, fear, failure, and a dislike of maths.

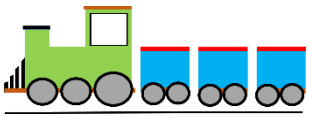
Avoid this by encouraging an ***"I can do it. I get this. Maths is fun"*** attitude.

Understanding place value, also requires an understanding of grouping.

In our decimal system we organise items in groups of ten. It is beneficial for children to develop an understanding of grouping before they are expected to understand place value.

Playing games using smaller numbers is effective in introducing the idea of grouping. That way, when the base ten is introduced, children already understand the concept and it is only a small step to understand grouping in tens, and place value.

Maths is fun!



I call this game **the train game**.

Game basics:

Play with the whole class or small group. All involved play at the same time.

Play daily over successive days until children fully understand the concept. Rushing won't achieve a better result in the long term. A solid foundation on which to build further understanding is important.

Children use objects to make groups of a "special" number; e.g. four.

Use interlocking blocks first. Later introduce popsticks with rubber bands for bundling.

Introduce the special number and scenario; for example, "Today we are going to make trains. Each train must have four carriages."

Signal the children to take a block (e.g. carriage) by tapping a tambour, triangle, or clapping your hands.

Children say how many they have each time; for example, zero trains and one carriage.

The game finishes when the maximum number is reached. (With base ten, nine is the maximum that can be kept in each place e.g. nine ones, nine tens, nine hundreds. If there are ten, they are moved to the next place. In this game there is no next place. If the special number is four, the game stops when they have three trains and three carriages. There is no need to explain this to the children; simply finish the game there.)

Playing the train game

What you need:

A large number of interlocking cubes

Something to make a noise; e.g. a tambour, a triangle, a pair of hands

Get ready to play:

Sit the children in a circle on the floor. Place the interlocking cubes in the middle of the circle, in easy reach of all children. Write the special number on the board or chart.

Explain the game

For example:

"Today we are going to play the train game. We are going to make trains. All the trains we make will have four carriages. (Point to the number.) *Four is our special number, but we are not going to call it four today. We are going to call it "train" because our trains will all have four carriages.*

We are going to collect carriages one at a time and put them in our sheds. You will know when to collect a carriage because I will clap my hands.

Each time I clap my hands you are to collect one carriage. Only separate carriages can be kept in the shed. As soon as you have four carriages, you must put them together to make a train, and then put them outside the shed. Ready? How many trains do you have now? (none, zero) *How many carriages do you have now?* (none, zero). *How many altogether?* (zero trains and zero carriages). *Okay. Let's begin."*

Clap your hands. Children take one block (carriage) each and put it in front of them in their (pretend) sheds.

Ask, "*How many trains do you have now?* (none, zero) *How many carriages?* (one) *How many altogether?* (zero trains and one carriage)."

Repeat, each time asking children to tell how many trains and carriages they have. This is important, even when there are zero trains or zero carriages. Always ask for the number of trains first, just as you would for tens.

When they have four carriages remind them that they must quickly connect them together to make a train, and put it outside the shed.

Continue until there are three trains and three carriages.

Explain that the game is finished for today and ask the children to take the trains apart and put all the blocks away.

Other game scenarios

While I call it “the train game” for convenience, different stories can be told to maintain interest during successive days; for example:

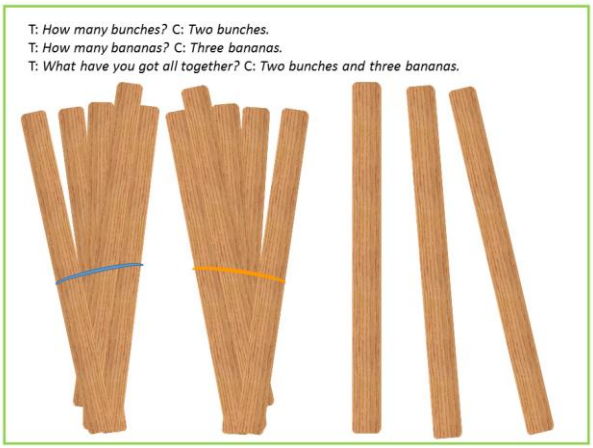
- Today we are going to build towers. Each tower must be six blocks high. The blocks cannot be put together until you have six blocks. As soon as you have six blocks, put them together to build a tower.
- Today we are going to make kebabs. Each kebab must have five meatballs. The meatballs cannot be put together to make a kebab until you have five. As soon as you have five meatballs, put them together to make a kebab.

When the children have developed the concept of putting blocks together, introduce the idea of bundling using popsticks and rubber bands.

The popsticks could represent; for example:

- balloons tied into bunches,
- fingers on hands,
- bananas in bunches, or
- flowers in vases.

The children may have suggestions for other scenarios.



Keep the learning going

Break up the trains

When the children have the idea of building or bundling into groups, introduce them to taking away.

After they have built their six trains and six carriages (e.g. for special number seven) explain that all the carriages need to be returned to the factory (centre) for servicing. They need to be returned from the shed one at a time.

This time when you clap your hands, they are to take one carriage from the shed and return it to the centre.

When they have only trains and no individual carriages, ask for suggestions of what they could do to put one carriage back. Through questioning, help the children to realise that:

- they can’t take just one block off a train because a train must have seven carriages
- they will have to take the train apart (break it up), put it in the shed, and then put one back.

Continue until there are no trains or carriages. Each time, ask the children to tell you how many trains and carriages they have; e.g., five trains and six carriages.

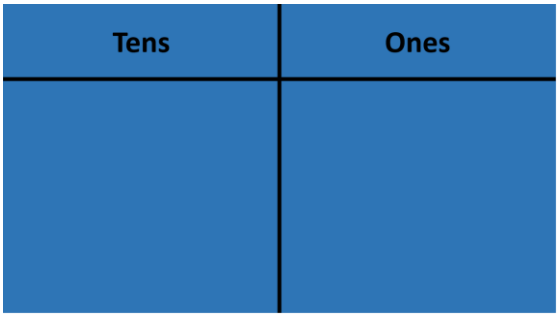
By practising building and breaking up, they are learning the process of adding and subtracting across the tens, as well as the concept of place value.

Introducing tens

When the children are playing the game competently, introduce the "special" number ten, playing the game as before.

Play the game with ten for a few days using different scenarios.

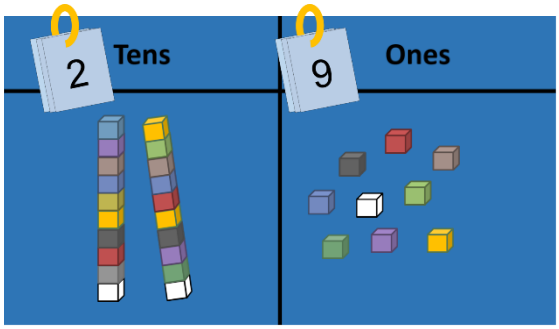
Then begin using the terms "tens and ones".



Give the children a tens and ones board.

(Make your own or print copies of the free **readilearn** *Tens and ones board*.)

Explain to the children that the loose ones must go on the ones side, and as soon as they are put together to make a tower of ten, they must go on the tens side. At every addition (or subtraction) ensure children say how many they have; e.g. five tens and six ones.



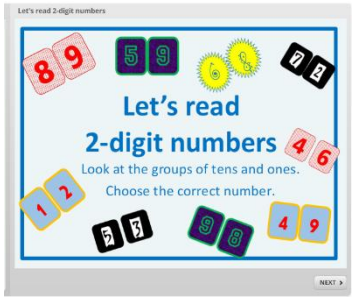
Introduce use of number cards 0 – 9 (also available as a free printable **readilearn** resource)**.** Each child requires two sets of cards from 0 –9.

As they add (or subtract) each block and tell how many they have, they turn over the cards to show the number; for example, two tens and nine ones. (There's no need to say the number name twenty-nine at this stage. Use the number names when children notice for themselves.)

Follow-up resources

When the children have developed a good understanding of bundling and breaking up, they should have a good understanding of place value with 2-digit numbers.

They will be able to play games such as *Race to 99* in maths groups.



You could also use the readilearn interactive resource *Let's read 2-digit numbers* for whole class or small group discussion and practice.