



Helping your children learn to calculate

Key Stage 1 (Yr 1 / 2)
September 2008

Calculation - An Introduction

The maths work your child is doing at school may look very different to the kind of 'sums' you remember. This is because children are encouraged to work mentally, where possible, using personal jottings to help support their thinking. Even when children are taught more formal written methods (often from Year 3 onwards), they are only encouraged to use these methods for calculations they cannot solve in their heads.

Discussing the efficiency and suitability of different strategies is an important part of maths lessons: as they get older, the children begin to get better at choosing the 'right tool for the job'. However, before they reach this stage, it's important that they have plenty of opportunity to experiment and play with different methods. Often, what is an effective tool for one child is too complicated or prone to error in the hands of another.

When faced with a calculation problem, encourage your child to ask...

- Can I do this in my head?
- Can I think of some equipment that might help me?
- Could I do this in my head with the help of drawings or jottings?
- Do I need to use a written method?

Also help your child to estimate first, and then check the answer. Encourage them to ask..

Does the answer seem sensible?

Addition methods

Children are taught to understand addition as combining two sets of things, or as counting on from a number. It is usually taught alongside subtraction to emphasise the relationship between the two operations.

$2+3=$

I've eaten 2 cakes and my friend has eaten 3.
How many cakes have we eaten altogether?



1

2

3

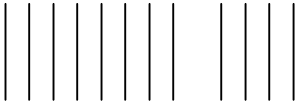
4

5

Children could combine 2 sets of objects or draw a picture to help them work this out.

$8+4=$

There are 8 children in the classroom. 4 more walk in. How many people are in the classroom now?

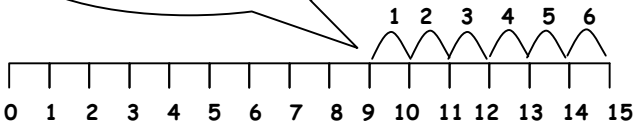


Children may use dots or tally marks to represent objects, because this is quicker.

$6+9=$

Bethany is 6 years old. Her brother is 9 years older. How old is her brother?

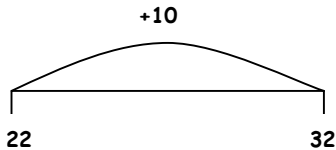
"9 in my head;
10,11,12,13,14,15"



Children are encouraged to put the larger number in their heads and count on, sometimes using fingers as support.

$22+10=$

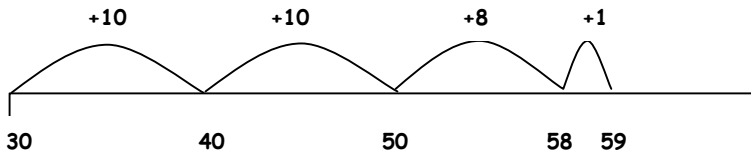
My sunflower is 22cm tall. It grows another 10cm. How tall is it now?



Drawing an empty number line helps children to record the steps they have taken in a calculation (start on 22, then add 10). This is much more efficient than counting on in ones.

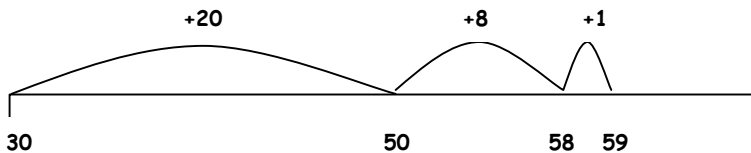
$31+28=$

Mr Jones and Mrs Smith's classes do P.E. together. How many children are there in total?



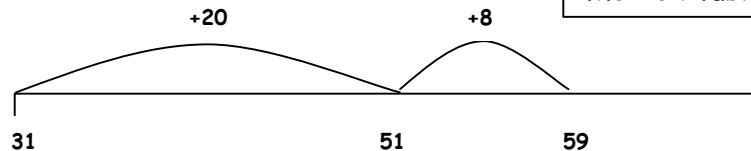
Children can add tens first, because this is easiest, and then ones afterwards.

OR



Children begin to add groups of ten, and not just ten at a time.

OR

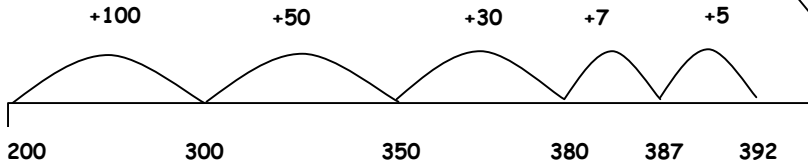


Children count on in from any number and not just numbers in the 10x table.

$157+235=$

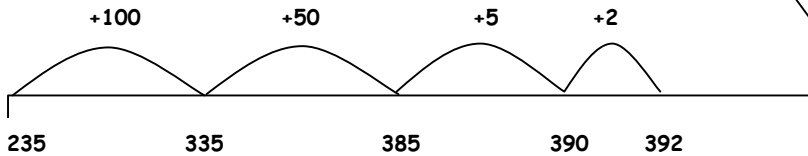
(Put larger number first: $235+157$)

Adding hundreds, tens and then ones together.



OR

It's helpful to start from one number and then add on in useful chunks.



1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Hundred squares can also be used to help children to develop an understanding of addition. A movement to the right on the hundred square adds 1, while a movement down a row adds 10.

When adding, say, 22 ($20 + 2$), children may move their finger down 2 rows and then across 2 spaces to the right to find the answer.

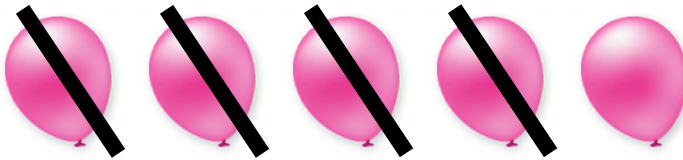
Subtraction methods

Children are taught to understand subtraction as 'taking away', counting back, and finding the difference (counting up).

$5-4=$

I had five balloons. Four burst.
How many did I have left?

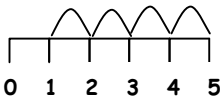
Manipulating objects or drawing a picture helps children to visualise the problem.



(Take away)

There were 5 birds on the wall.
4 flew away. How many were left?

The children are encouraged to count back 4, perhaps using fingers to keep track.

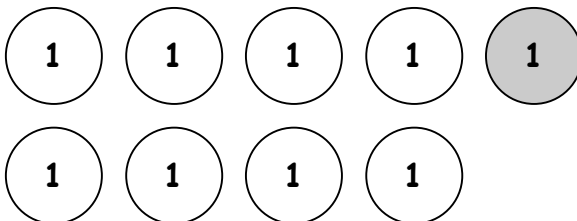


"5 in my head; 4, 3, 2, 1."

(Counting back)

A teddy bear costs £5 and a toy car costs £4. How much more does the bear cost?

The children find the difference between the two rows.



(Finding the difference)

$7-3=$

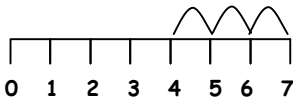
Mum baked 7 biscuits. I ate 3.
How many were left?



Using dots, tally marks or number lines is quicker than drawing a detailed picture.

(‘Take away’)

OR

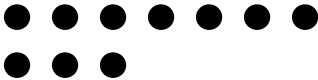


“7 in my head; 6, 5, 4.”

(Counting back)

OR

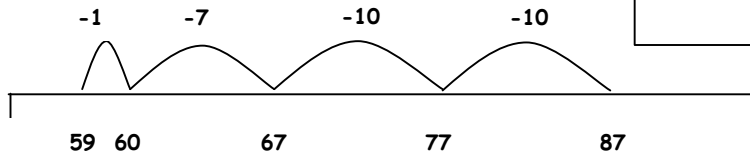
Jess has 7 coloured pencils and Tim has 3. How many more does Tim have?



(Finding the difference)

$87-28=$

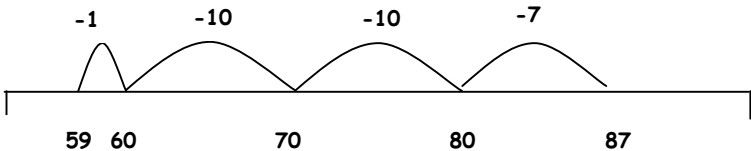
28kg of the 84kg of animal food is sold. How much is left?



When calculating $67-8$, the children may do $67-7-1$ instead, like many adults.

Others may find that it makes more sense to subtract 7 at the beginning, because they can count back easier from a 'friendly' number in the 10x table.

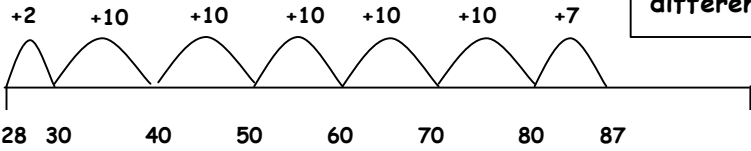
OR



OR

"The difference is 59. That must be the answer."

Building on their earlier work, children may begin to count on from the smaller number to find the difference.



1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

As with addition, a hundred square might be used to support the calculation process.

A movement to the left is the same as subtracting 1, while a movement up a row is the same as subtracting 10.

hp
Subtracting 31 can be carried out by going up 3 rows, and 1 square to the left.

Multiplication methods

Children are taught to understand multiplication as repeated addition (i.e. '4 groups of 4') and scaling (i.e. '3 times bigger'). It can also describe an array (see explanation below).

$$2 \times 5 =$$

Each child has 2 eyes. How many eyes do 5 children have?



$$2 + 2 + 2 + 2 + 2 = 10$$

Like with addition and subtraction, children may draw pictures or use apparatus, like cubes, to help.

$$6 \times 3 =$$

Trading cards come in packs of 6. How many cards in 3 packs?

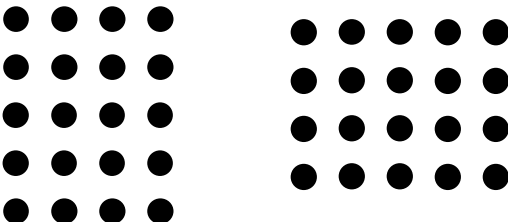


$$6 + 6 + 6 = 18$$

Children may use dots or tallies to help represent the problem.

$$4 \times 5 =$$

In P.E., the children got into 5 groups of 4. There were no children left over. How many children were there?

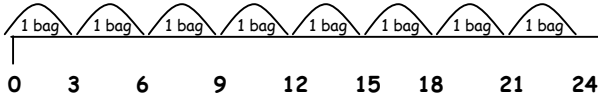


Arrays help children to see that 5×4 and 4×5 give the same answer, and to understand why.

$$3 \times 8 =$$

8 children celebrated a birthday party. Each child had 3 sweets in their goody bag. How many sweets did they have altogether?

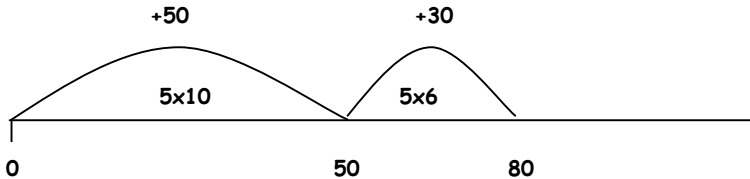
This shows a way of recording multiplication on an empty number line. Each bag of sweets is recorded as a jump of 3.



$$5 \times 16 =$$

We need 16 buckets of water to fill the paddling pool. Each bucket holds 5 litres of water. How many litres of water do we need to fill the paddling pool.

It would be inefficient to tackle a problem like this by taking small jumps. By splitting 5×16 into 5×10 and 5×6 , the problem becomes easier and manageable. Note that few children will be working at this stage by the end of Year 2.

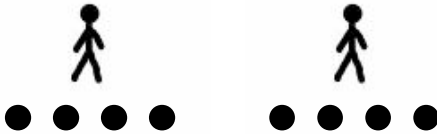


Division methods

Division is taught as sharing (10÷2 as '10 shared between 2') and as grouping (10÷2 as 'how many 2s in ten?').

$$8 \div 2 =$$

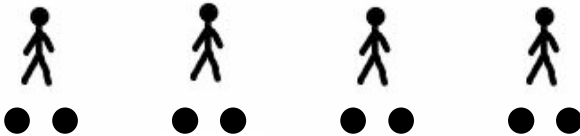
£8 is shared between 2 children.
How much do they each get?



Again, pictures can be so useful in developing understanding.

(sharing between 2)

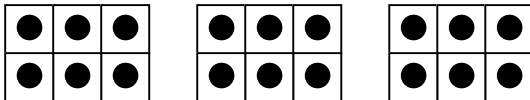
I have £8. How many children can have £2 each?



(grouping in 2s)

$$18 \div 6 =$$

A box holds 6 eggs. How many boxes can you fill with 18 eggs?



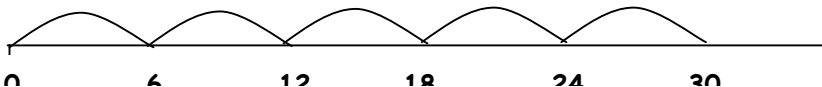
Each dot represents an egg. It makes sense to group them into 6s.

(grouping in 6s)

$$30 \div 6 =$$

How many 6s in 30?

Using the number line shows we need 5 jumps of 6 to make 30.

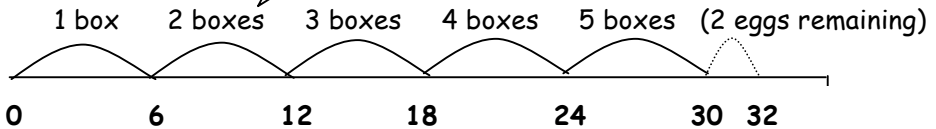


$32 \div 6 =$

There are 32 eggs. Each box holds 6 eggs. How many full boxes of eggs will there be?

Some children will begin to encounter remainders. They need to think whether to round down...

There will be 5 full boxes, and 2 eggs left over.

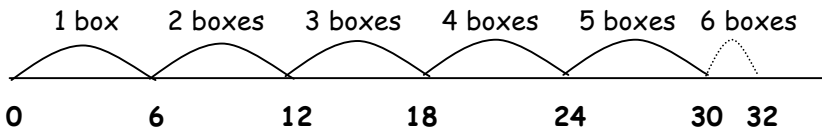


$32 \div 6 =$

There are 32 eggs. Each box holds 6 eggs. How many boxes are needed to hold all of the eggs?

...or round up, depending on the problem.

We'll need 6 boxes to hold all of the eggs, even though at least 1 is going to have space left.



10 useful maths equipment ideas

Dice, playing cards and dominoes - Many of the 'old fashioned' games, like snakes and ladders, ludo, '21' and dominoes can be great for calculation and number recognition.

Money - Money offers children a real context for adding and subtracting. A jar full of spare change can be a wonderful resource for helping your child to understand how numbers work.

Globes and maps - With help, older children can work out real life distances using the scale provided, i.e. 1cm = 5km. A great real life reason to multiply!

Measuring jugs with litres (l) and millilitres (ml) - How much more do we still need to add? If each of us has 100ml of juice, how much will we need to have in the jug to begin with?

A tape measure marked in centimetres (cm) - How much taller are you than your brother? How much have you grown since last year?

A stopwatch or timer - Great for comparison and accumulation of times.

Beadstrings - These can be bought, but also be made quite simply and inexpensively. 2 different coloured beads are typically used and grouped together in 10s. Beadstrings are particularly good at helping children to understand tens and units. For example, looking at the beadstring below, 12 can begin to be understood as one group of 10 and 2 extra units. ○○○○○○○○○○●●●●●●●●●●

Hundred squares - As already demonstrated above, these can be a useful aid to addition and subtraction. Ask your class teacher, and I'm sure they'd photocopy one for you.

Kitchen scales and measuring spoons - "So, that's 3 spoons full of honey. Each of these is 10ml, so how much do you think we put in?"

Lego and duplo (equally great in the bath!) - Every colour can be worth a different amount: "can we make a monster that's worth exactly 20 points?"

10 Everyday Maths Ideas

Count the scoops of ice cream for each member of the family.

Sort and match pairs of socks etc.

Read the numbers on houses that you pass on the way to school.

Do you spot any patterns, like odd and even?

Car number plate maths - add numbers on car number plates.

What's the highest / lowest total you can find?

Name score - Give each vowel a score (i.e. a=1, e=2, i=3, o=4, u=5).

Which person, football team or place name has the highest score?

Grocery times tables - practice by counting things that come in sets:

Two - socks, shoes, cherries.

Three - bars of soap, sandwiches in a pack.

Four - bread rolls, yogurts.

Five - slices of cold meat.

Six - Eggs, jam tarts, cans of cola.

Timetables - Help your child keep a weekly timetable of activities for the family.

Give pocket money - Counting and calculation suddenly becomes meaningful when your own money is involved.

D.I.Y. - Get your child familiar with a tape measure and involve in measuring, comparing and recording.

Cookery - Maths, maths, everywhere! Try scaling up a recipe for 2 into a recipe for 4. Great doubling practice!

Useful websites

www.recreationroad.com - Click on 'our favourite links' to find a whole host of maths sites.

www.coxhoe.durham.sch.uk/Curriculum/Numeracy.htm - A wonderful 'gateway' to other resources. Scroll down the page to see the full list of links available.

<http://nrich.maths.org/public/monthindex.php> - Some great challenges for mathematicians of all ages.

<http://www.transience.com.au/pearl3.html> - A hugely addictive game for adults and children alike, based on an ancient game called 'Nim'.

http://www.nabiscoworld.com/Games/game_large.aspx?gameid=10076 - The wonderfully strategic game 'Reversi', but played with Oreo® biscuits! This is a super version of the game for children, because it has 10 difficulty levels. You can click the '?' icon for full game rules.

<http://www.puzzles.com/products/RushHour/RushHourApp.htm> - A computerised version of the Binary Arts puzzle game, 'Rush Hour'®. Again, there are several levels of difficulty for adults and children to tackle.

"Like the crest of a peacock so is mathematics at the head of all knowledge."

- Anon

"Mathematics is not a careful march down a well-cleared highway, but a journey into a strange wilderness, where the explorers often get lost."

- W.S. Anglin

"I am interested in mathematics only as a creative art."

- Godfrey H. Hardy

Acknowledgements

The layout and organisation of this booklet was inspired by a resource called 'Helping your child with maths'. Unfortunately, the original source of this booklet is unknown at the time of writing.

Thanks to Di Wüest, our Maths Co-ordinator; a key contributor and 'editor-in-chief'; and the rest of the wonderful staff at Recreation Road Infant School for their continued support.

Michael Bunting

September 2008

© 2008 Recreation Road Infant School

www.recreationroad.com

Please distribute freely but acknowledge source, thanks.