

EFFECTIVE MATHS

Key Stage 2 calculation consolidation programme (+ and -)

The KS2 calculation consolidation programme for addition and subtraction focuses on securing a deep understanding of effective processes for addition and subtraction.

It was written as many schools report that children in upper key stage 2 still use their fingers to perform calculations like $8 + 6$.

Lessons from the programme have been modelled in a range of schools, including schools with low attainment at end of KS2 and schools with very high attainment. These lessons have been taught from Year 3 to Year 5. A striking factor has been that, regardless of the school, all children were learning something new - even at the earliest stages of the programme: adding single digit numbers and subtracting a single digit number from 11-19.

The programme is conceived as a **whole class intervention/consolidation**. It deliberately takes children back to securing a deep understanding of how addition and subtraction work using a limited range of number. Once they are secure with the concepts - the training models how the understanding secured can be built on.

Stage 2 $17 - 9 =$		A core aim of the programme is to develop deep understanding of how addition and subtraction work.	
			Once children have this understanding - it is easy to transfer it contexts that may appear more complex.
$17 - 9 =$ $18 - 10 = 8$	$17 - 9 =$ 	[32] $2\frac{1}{2} - \frac{3}{4} =$ <small>Year 6 arithmetic paper 2019</small>	
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The lessons and support materials are available free to *Effective Maths* schools that have had training in the programme.

The training day consists of:

- demonstration lessons - observed by teachers;
- discussion with maths lead about the programme and support for TAs who will lead tutoring;
- staff meeting after school to discuss the demonstration lessons and explore the range of calculation strategies that support it.

Schools that do not currently use *Effective Maths* are able to access the programme. Training is essential - and there is an additional cost to access the lessons and support materials of £200 (or £300 with access to mathsquiz.net as well.)

CONTACT

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MORE ABOUT THE PROGRAMME

The programme focuses on children learning four core methods to explore calculations linked to the stages shown on the right.

For example, at stage 1, children learn methods as shown below.

Stage	Focus
1	Adding 2 single digit numbers (crossing the tens boundary eg $8 + 6$)
2	Subtracting a single digit number from a teen number (eg $15 - 6$)
3	Adding a two-digit number and a single digit number (eg $28 + 6$)
4	Subtracting a single digit number from a two-digit number (eg $28 - 9$)
5	Adding a two-digit number and tens
6	Subtracting tens from a two-digit number
7	Adding 2 two-digit numbers
8	Subtracting a two-digit number from a two-digit number
9	Adding a three-digit number and ones
10	Subtracting ones from a three-digit number
11	Adding a three-digit number and tens
12	Subtracting tens from a three-digit number
13	Adding a three-digit number and hundreds
14	Subtracting hundreds from a three-digit number

$7 + 8 =$

Children use concrete apparatus (two-sided counters and tens frames) to model each method.

They develop precise use of vocabulary to describe what they are doing and why they are doing it:

“I am partitioning the second addend into 3 and 5 because I need to make ten.”

They learn a name for each method:

- making the next ten
- partitioning
- relationships
- compensation

At each stage of the programme there are two parallel lessons. The first is definitely for the whole class. The second may be for the whole class or may be for a group.

Finally, at each stage, there is a quiz on mathsquiz.net which it is suggested is taken by all children.

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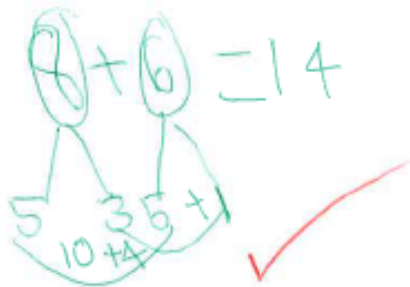
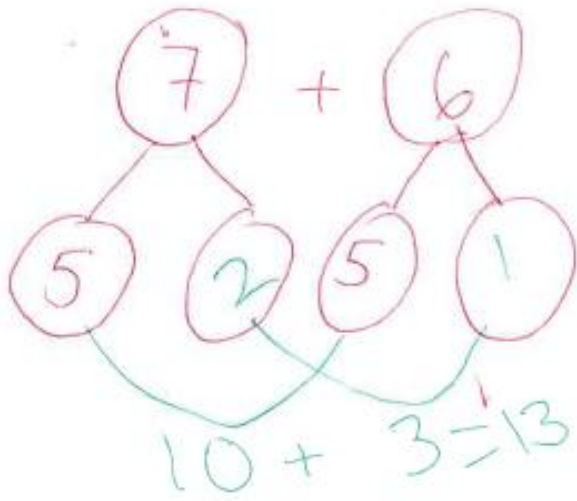
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As children work through the programme, they see the similarities and differences between methods.

'Live' marking is used to ensure progress through the lesson.



Stage 1 $7 + 8 =$

1	1	1	
1	1	1	
1	1	1	
1	1	1	
1	1	1	

$7 + 8 = 15$

$7 + 8 = 15$

$8 + 7 =$

$9 + 6 =$

$10 + 5 = 15$

$7 + 8 =$

$10 + 8 = 18$

$18 - 3 = 15$

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Stage 2 $17 - 9 =$

1	1	1	
1	1	1	
1	1	1	
1	1	1	
1	1	1	

$17 - 9 = 8$

$17 - 9 = 8$

$17 - 9 =$

$18 - 10 = 8$

$17 - 9 =$

$17 - 10 = 7$

$7 + 1 = 8$

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Stage 3 $17 + 8 =$

1	1	1	
1	1	1	
1	1	1	
1	1	1	
1	1	1	

$17 + 8 = 25$

$17 + 8 =$

$16 + 9 =$

$15 + 10 = 25$

$17 + 8 =$

$17 + 10 = 27$

$27 - 2 = 25$

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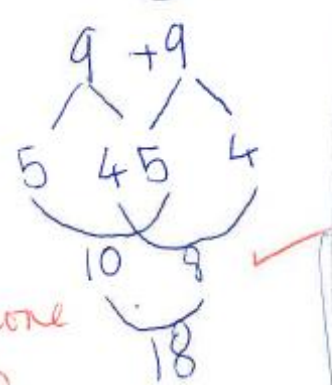
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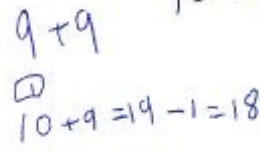
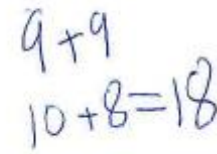
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Higher attaining children generally master all of the methods by the end of the lesson.



Any more ways?



Wow!

Stage 4

26 - 9 =

26 - 9 = 17

26 - 9 = 17

27 - 10 = 17

26 - 9 = 17

26 - 10 = 16

16 + 1 = 17

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Stage 5

28 + 70 = 98

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

28 + 70 = 98

28 + 70 = 98

20 + 8 = 28

70 + 0 = 70

90 + 8 = 98

28 + 70 = 98

30 + 70 = 100

100 - 2 = 98

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28 + 70 =

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REVISION

After stage 1 has been taught, the start of each new lesson is revision of previous learning - as children move through the programme they continually go back to each earlier stage.

SUMMARY

- The KS2 calculation programme is intended as a whole class intervention/consolidation
- It has two lessons at each stage
- There is an accompanying quiz on mathsquiz.net to provide additional consolidation
- The nature of the programme means it can be delivered in a variety of ways: all taught in a block; staggered over a term or more (with accompanying group and individual interventions)
- The programme can also be used to develop staff new to *Effective Maths* - lesson 1a can be modelled by someone experienced in delivering the programme - lesson 1b can then be taught by the new member of staff
- Resources needed include two-colour counters and base 10 blocks
- Revision is built in to the programme
- The programme is suitable for nearly all children in Key Stage 2

Starter

Revision

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BOTH PARTNERS

Find the missing numbers.

The image shows a grid-in style math problem. At the top, it says "BOTH PARTNERS" and "Find the missing numbers." Below this, there are two equations with missing numbers in boxes:

$$\square - 7 = \square$$
$$9 + \square = 8$$

Below these equations, there are two more equations with missing numbers in boxes:

$$\square - 9 = \square$$
$$\square + 9 = \square$$

Below these equations, there are two more equations with missing numbers in boxes:

$$8 + \square = \square$$
$$6 + \square = \square$$

At the bottom left, there is a red button labeled "START". At the bottom right, there is a red button labeled "EFFECTIVE MATHS".

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