CALCULATIONS

Pupils should be taught to:	As outcomes, Year 1 pupils should, for example:
Understand the operation of addition and the related vocabulary, and recognise that addition can be done in any order	Understand and use in practical contexts: *more, add, sum, total, altogether, equals, sign...* and read and write the plus (+) and equals (=) signs. Understand addition as: • combining sets to make a total; • steps along a number track (counting on). Begin to understand that adding zero leaves a number unchanged. Respond rapidly to oral questions phrased in a variety of ways, such as: • 3 add 1. • Add 2 to 4. • 6 plus 3. • What is the sum/total of 2 and 8? • How many are 3 and 5 altogether? • Which two/three numbers could make 9 altogether? • What must I add to 4 to make 10? • I think of a number. I add 3. The answer is 7. What is my number? Record simple mental additions in a number sentence using the + and = signs. Recognise the use of symbols such as ☐ or △ to stand for unknown numbers, and complete, for example: • with rapid recall, based on facts to 5: 2 + 3 = ☐ ☐ + △ = 4 • using counters or a number line, or 10p and 1p coins, then mental strategies, explaining method: 11 + 4 = ☐ △ + ☐ = 13 17 + 6 = ☐ Understand, for example, that: • 5 + 2 equals 2 + 5, but that 5 – 2 is not the same as 2 – 5; • 5 + 2 + 6 = (5 + 2) + 6 or 5 + (2 + 6); and use these properties when appropriate.

As outcomes, Year 2 pupils should, for example:	As outcomes, Year 3 pupils should, for example:
Understand, use and begin to read: *more, add, sum, total, altogether, equals, sign...* and read and write the plus (+) and equals (=) signs.	Use, read and begin to write: *more, add, sum, total, altogether, equals, sign...* and the plus (+) and equals (=) signs.
Continue to develop understanding of addition as: • combining sets to make a total; • counting on steps along a number line.	Continue to develop understanding of addition as counting on steps along a number line.
Understand that adding zero leaves a number unchanged.	
Begin to understand that addition reverses subtraction (addition is the inverse of subtraction).	Understand that addition reverses subtraction (addition is the inverse of subtraction).
See also using the relationship between addition and subtraction (page 35).	**See also using the relationship between addition and subtraction (page 35), and checking results (page 59).**
Respond rapidly to oral or written questions phrased in a variety of ways, such as: • 27 add 10. • Add 60 to 30. • 4 plus 18. • What is the sum/total of 18 and 4? • How many are 5 and 14 altogether? • Which two/three numbers could have a sum of 15? • What must I add to 14 to make 15? • I think of a number. I add 10. The answer is 30. What is my number?	Respond rapidly to oral or written questions phrased in a variety of ways, such as: • 94 add 10. • Add 60 to 14. • 70 plus 50. • What is the sum/total of 26 and 9? • How many are 11 and 35 altogether? • Which two/three numbers could have a total of 23? • What must I add to 4 to make 23? • I think of a number. I add 45. The answer is 90. What is my number?
Record mental additions in a number sentence using the + and = signs.	Record mental additions in a number sentence using the + and = signs.
Recognise the use of symbols such as ☐ or △ to stand for unknown numbers, and complete, for example: • with rapid recall, based on facts to 10: 4 + 5 = ☐ ☐ + △ = 9 • using 10p and 1p coins, or a number line or square, then mental strategies, explaining method: 61 + 14 = ☐ △ + ☐ = 50 36 + 50 = ☐	Recognise the use of symbols such as ☐ or △ to stand for unknown numbers, and complete, for example: • with rapid recall, based on facts to 20: 13 + 6 = ☐ ☐ + △ = 20 • using 10p and 1p coins, or a number line or square, then mental strategies, explaining method: 36 + 58 = ☐ △ + ☐ = 100 127 + 40 = ☐
Understand, for example, that: • 15 + 26 = 26 + 15, but that 15 – 6 is not the same as 6 – 15; • 15 + 2 + 7 = (15 + 2) + 7 or 15 + (2 + 7); and use these properties when appropriate.	Understand, for example, that: • 225 + 136 = 136 + 225, but that 645 – 236 is not the same as 236 – 645; • 115 + 432 + 347 = (115 + 432) + 347 or 115 + (432 + 347); and use these properties when appropriate.

Pupils should be taught to:	As outcomes, Year 1 pupils should, for example:
Understand that more than two numbers can be added together	*With the aid of apparatus* Add three numbers. For example, use rods or a number line to: • Explore three hops to 10 (or any other suitable number). Keep a record by completing, for example: 6 + 3 + □ = 10 • Choose three of the numbers from this set: 4, 5, 6, 9. Add them up. What different totals can you make? • Write 12 as the sum of three numbers. Do it in different ways. • A plum costs 5p. Find the cost of three plums, using coins if necessary. *Mentally* Add mentally three small numbers, within the range of 1 to about 12. Respond to oral questions, explaining the strategy used. For example: • Find the sum or total of: 3 + 1 + 4 2 + 2 + 2 6 + 3 + 2 • Choose three numbers from the set 1 to 5. Add them up. What different totals can you make? • Tell me three numbers that add up to 11. Are there any others? Record simple mental additions in a number sentence using the + and = signs: for example, 5 + 3 + 1 = 9.

As outcomes, Year 2 pupils should, for example:

With the aid of apparatus

Add three numbers.
For example, use rods, a number line or square to:

- Explore three hops to 100 (or any other suitable number) and keep a record by completing:
  32 + □ + △ = 100
- Find the missing number in:
  1 + □ + 5 = 35
- Choose three of these numbers: 14, 15, 16, 19.
  Add them up.
  What different totals can you make?
- Using coins if necessary, total a shopping bill such as:
  29p
  36p
  18p

Mentally

Add mentally three small numbers, within the range of 1 to about 20.

Respond to oral/written questions, explaining the strategy used. For example:
- Add 5, 2 and 13.
- 2 plus 19 plus 1.
- What is the sum/total of 3, 6 and 7?
- How many altogether are 7, 4 and 2?
- Tell me three numbers that add up to 20.
  Are there any others?

Record mental additions in a number sentence using the + and = signs.

Work mentally to complete written questions like:
2 + 7 + 4 = □ 1 + □ + 5 = 17
and explain method.

See also adding three numbers (page 33).

As outcomes, Year 3 pupils should, for example:

With the aid of apparatus

Add three numbers.
For example, use a number line or square to:

- Explore three hops to 500 (or any other suitable number) and keep a record by completing:
  120 + □ + △ = 500
- Find the missing number in:
  21 + □ + 63 = 150
- Find all the different totals you can make by using three of these five numbers:
  19, 63, 54, 106, 97.
- Using coins if necessary, total a shopping bill such as:
  £2.45
  £0.36
  £4.50

Mentally

Add mentally three or more small numbers, within the range of 1 to about 50.

Respond to oral/written questions, explaining the strategy used. For example:
- Add 15, 6, 15 and 1.
- 7 plus 5 plus 9.
- What is the sum/total of 13, 12 and 3?
- How many altogether are 11, 17 and 6?
- Tell me three numbers that add up to 30.
  Are there any others?

Record mental additions in a number sentence using the + and = signs.

Work mentally to complete written questions like:
16 + 5 + 3 + 7 = □ 14 + □ + 6 = 37
and explain method.

See also adding several numbers (page 33).

CALCULATIONS

Pupils should be taught to:	As outcomes, Year 1 pupils should, for example:
Understand the operation of subtraction and the related vocabulary	Understand and use in practical contexts: *take away, subtract, how many are left, how much less is ... than ..., difference between, how much more is ... than ..., how many more to make ...* and read and write the minus (–) sign. Understand subtraction as: • taking away; • finding the difference between; • 'how many more to make...' (complementary addition). Begin to understand that subtracting zero leaves a number unchanged. Respond rapidly to oral questions phrased in a variety of ways, such as: • 4 take away 2. • Take 2 from 7. • 7 subtract 3. • Subtract 2 from 11. • 8 less than 9. • What number must I take from 14 to leave 10? • What is the difference between 14 and 12? • How many more than 3 is 9? • How many less than 6 is 4? • 6 taken from a number leaves 3. What is the number? • Find pairs of numbers with a difference of 2. • I think of a number. I take away 3. My answer is 7. What is my number? Record simple mental subtractions in a number sentence using the – and = signs. Recognise the use of symbols such as □ or △ to stand for unknown numbers, and complete, for example: • with rapid mental recall, based on facts to 5: 5 – 3 = □ □ – 1 = 2 △ – □ = 3 • using rods, counters or cubes, 10p and 1p coins, or a number line, then mental strategies, explaining method: 15 – 8 = □ 21 – □ = 10 □ – △ = 9

As outcomes, Year 2 pupils should, for example:

Understand, use and begin to read:
take away, subtract, how many are left, how much less is ... than ..., difference between, how much more is ... than ..., how many more to make ...
and read and write the minus (–) sign.

Continue to develop understanding of subtraction as:
- taking away;
- finding the difference between;
- complementary addition.

Understand that:
- subtracting zero leaves a number unchanged;
- 4 – 2, for example, is different from 2 – 4.

Begin to understand the principle that subtraction reverses addition (subtraction is the inverse of addition).

See also using the relationship between addition and subtraction (page 35).

Respond rapidly to oral or written questions phrased in a variety of ways, such as:
- 7 take away 3.
- Take 30 from 70.
- 14 subtract 2.
- Subtract 30 from 70.
- 3 less than 7.
- What number must I take from 20 to leave 3?
- What is the difference between 10 and 18?
- How many more is 11 than 3?
- How many less is 7 than 18?
- 5 taken from a number is 11. What is the number?
- 8 added to a number is 18. What is the number?
- Find pairs of numbers: with a difference of 10...
  with a difference of 9...

Record mental subtractions in a number sentence using the – and = signs.

Recognise the use of symbols such as ☐ or △ to stand for unknown numbers, and complete, for example:
- with rapid mental recall, based on facts to 10:
  7 – 3 = ☐ ☐ – 6 = 2 ☐ – △ = 8
- using 10p and 1p coins, or a number line or square, then mental strategies, explaining method:
  25 – 8 = ☐ 25 – ☐ = 16 △ – ☐ = 16
  86 – 50 = ☐ ☐ – 40 = 28 ☐ – △ = 40

As outcomes, Year 3 pupils should, for example:

Use, read and begin to write:
take away, subtract, how many are left, how much less is ... than ..., difference between, how much more is ... than ..., how many more to make ...
and the minus (–) sign.

Continue to develop understanding of subtraction as:
- taking away;
- finding the difference between;
- complementary addition.

Understand that:
- 41 – 35, for example, is different from 35 – 41.

Understand the principle that subtraction reverses addition (subtraction is the inverse of addition).

See also using the relationship between addition and subtraction (page 35), and checking results (page 59).

Respond rapidly to oral or written questions phrased in a variety of ways, such as:
- 15 take away 8.
- Take 8 from 15.
- 63 subtract 40.
- Subtract 8 from 15. Subtract 40 from 95.
- 10 less than 43. 100 less than 437.
- What must I take from 14 to leave 6?
- What is the difference between 22 and 5?
- How many more than 4 is 49?
- How many less than 28 is 12?
- 20 taken from a number is 35. What is the number?
- 8 added to a number is 48. What is the number?
- Find pairs of numbers: with a difference of 30...
  with a difference of 29...

Record mental subtractions in a number sentence using the – and = signs.

Recognise the use of symbols such as ☐ or △ to stand for unknown numbers, and complete, for example:
- with rapid mental recall, based on facts to 20:
  17 – 9 = ☐ 13 – ☐ = 4 ☐ – △ = 11
- using 10p and 1p coins, or a number line or square, then mental strategies, explaining method:
  36 – 15 = ☐ ☐ – 15 = 19 △ – ☐ = 19
  178 – 56 = ☐ 20 – △ – ☐ = 5

Pupils should be taught to:	As outcomes, Year 1 pupils should, for example:
Know by heart addition and subtraction facts	Know by heart all **addition and subtraction facts for all numbers up to and including 5**. For example, recall rapidly all the pairs for 4: 0 + 4 = 4 4 + 0 = 4 1 + 3 = 4 3 + 1 = 4 2 + 2 = 4 4 – 0 = 4 4 – 4 = 0 4 – 1 = 3 4 – 3 = 1 4 – 2 = 2 Begin to know by heart number bonds for numbers up to 10, for both addition and subtraction. Understand and use in practical contexts: *double, halve, half...* • Know by heart **addition doubles** from 1 + 1 to at least 5 + 5, such as 4 + 4 = 8. • Begin to know doubles from 6 + 6 to 10 + 10, such as 7 + 7 = 14. Respond rapidly to oral questions phrased in a variety of ways, such as: • Double 4. • Half of 6. • Two fives. • I roll double 3. What's my score? • How many toes are there on two feet? • How many socks in two pairs? Know by heart all **pairs of numbers that total 10**. For example, rapidly: • find pairs of cards with a total of 10; • say how many more counters are needed to make 10 altogether; • say how many steps must be taken to get from 4 to 10 on a number line, or from 10 back to 4; • put numbers in the boxes to make 10: □ + 4 = 10 □ + △ = 10

As outcomes, Year 2 pupils should, for example:

Know by heart all **addition and subtraction facts for all numbers up to and including 10**. For example, recall rapidly all the pairs for 7:

0 + 7 = 7	7 + 0 = 7
1 + 6 = 7	6 + 1 = 7
2 + 5 = 7	5 + 2 = 7
3 + 4 = 7	4 + 3 = 7
7 – 0 = 7	7 – 7 = 0
7 – 1 = 6	7 – 6 = 1
7 – 2 = 5	7 – 5 = 2
7 – 3 = 4	7 – 4 = 3

Derive quickly these **addition doubles**:
- doubles of numbers from 1 + 1 to 15 + 15, such as 13 + 13 = 26;
- doubles of multiples of 5 from 5 + 5 to 50 + 50, such as 45 + 45 = 90.

For more on doubles, see page 53.

Know by heart all **pairs of numbers that total 20**. For example, rapidly:
- find pairs of cards with a total of 20;
- say how many more counters or cubes are needed to make 20 altogether;
- say how many steps must be taken to get from 13 to 20 on a number line, or from 20 back to 13;
- put numbers in the boxes to make 20:
  □ + 4 = 20 □ + △ = 20

Know by heart all **pairs of multiples of 10 that total 100**. For example, rapidly:
- say how many steps must be taken to get from 40 to 100 on a number line, or from 100 back to 70;
- put numbers in the boxes to make 100:
  □ + 20 = 100 △ + □ = 100

As outcomes, Year 3 pupils should, for example:

Know by heart all **addition and subtraction facts for all numbers up to and including 20**. For example, recall rapidly all the pairs for 15:

… 11 + 4 = 15	4 + 11 = 15
10 + 5 = 15	5 + 10 = 15
9 + 6 = 15	6 + 9 = 15 …
… 15 – 4 = 11	15 – 11 = 4
15 – 5 = 10	15 – 10 = 5
15 – 6 = 9	15 – 9 = 6 …

Derive quickly these **addition doubles**:
- doubles of numbers from 1 + 1 to 20 + 20, such as 19 + 19 = 38;
- doubles of multiples of 5 from 5 + 5 to 100 + 100, such as 95 + 95 = 190.

For more on doubles, see page 53.

Derive quickly all **pairs of multiples of 5 that total 100**. For example, rapidly:
- find pairs of cards such as 65 and 35;
- say how many steps must be taken to get from 65 to 100 on a number line, or from 100 back to 45;
- put numbers in the boxes to make 100:
  □ + 15 = 100 □ + △ = 100

Know by heart all **pairs of multiples of 100 that total 1000**. For example, rapidly:
- say how many steps must be taken to get from 400 to 1000 on a number line, or from 1000 back to 700;
- put numbers in the boxes to make 1000:
  □ + 200 = 1000 △ + □ = 1000

Pupils should be taught to:	As outcomes, Year 1 pupils should, for example:
Use knowledge that addition can be done in any order	For example, **put the larger number first** in order to count on: • arrange 4 + 7 as 7 + 4, and count on 4 from 7.
	Begin to **partition and recombine** by breaking units of 6, 7, 8 or 9 into '5 and a bit'. • For example, work out mentally that: 5 + 8 = 5 plus (5 and 3) = 5 + 5 + 3 = 10 + 3 = 13
Find a small difference by counting up	
Identify near doubles	For example, work out mentally that: • 5 + 6 = 11 and explain that it is double 5 plus 1, or double 6 minus 1.

As outcomes, Year 2 pupils should, for example:

For example, **put the larger number first** in order to count on:
- arrange 5 + 36 as 36 + 5, and count on in ones from 36;
- arrange 30 + 60 as 60 + 30, and count on in tens from 60.

Add three numbers by using strategies such as:
- look for pairs that make 10 and do these first;
- start with the largest number.

Work out mentally questions like:
2 + 7 + 4 = □ 1 + □ + 5 = 17

Partition and recombine. For example:
- Break units of 6, 7, 8 or 9 into '5 and a bit'.
  For example, work out mentally and explain that:
  9 + 8 = (5 + 4) plus (5 + 3)
  = 5 + 5 + 4 + 3
  = 10 + 7
  = 17

- Partition into tens and units.
  For example, work out mentally and explain that:
  12 + 23 = (10 + 2) plus (20 + 3)
  = (10 + 20) + (2 + 3)
  = 30 + 5
  = 35
  or
  12 + 23 = 12 + 20 + 3
  = 32 + 3
  = 35

Recognise that when two numbers are close together, it is easier to find a difference by counting up, not counting back.
For example, work out mentally that:
- 82 – 79 = 3 and explain that counting up from 79 to 82 gives 3.

For example, work out mentally that:
- 6 + 7 = 13 and explain that it is double 6 plus 1, or double 7 minus 1;
- 40 + 39 = 79 explaining that it is double 40 take away 1.

As outcomes, Year 3 pupils should, for example:

For example, **put the larger number first** in order to count on:
- calculate 8 + 127 by counting on in ones from 127;
- calculate 40 + 53 by counting on in tens from 53.

Add several numbers by using strategies such as:
- look for pairs that make 10 and do these first;
- start with the largest number;
- look for pairs that make 9 or 11, and add these to the total by adding 10 and then adjusting by 1

Work out mentally questions like:
16 + 5 + 3 + 7 = □ 14 + □ + 6 = 37

Partition and recombine. For example:
- Continue to break 6, 7, 8 or 9 into '5 and a bit'.
  For example, work out mentally and explain that:
  55 +16 = 55 plus (15 + 1)
  = 55 + 15 + 1
  = 70 + 1
  = 71

- Partition into tens and units.
  For example, work out mentally and explain that:
  36 + 53 = (30 + 6) plus (50 + 3)
  = (30 + 50) + (6 + 3)
  = 80 + 9
  = 89
  or
  36 + 53 = 36 + 50 + 3
  = 86 + 3
  = 89

See also using jottings (pages 43 and 45).

Recognise that when two numbers are close together, it is easier to find a difference by counting up, not counting back.
For example, work out mentally that:
- 504 – 498 = 6 and explain that counting up from 498 to 504 gives 6.

For example, work out mentally that:
- 36 + 35 = 71 explaining that it is double 35 plus 1;
- 60 + 70 = 130 explaining that it is two 60s plus 10, or two 70s minus 10;
- 18 + 16 = 34 explaining that it is double 20, minus 2, minus 4.

CALCULATIONS

Pupils should be taught to:	As outcomes, Year 1 pupils should, for example:
Add or subtract 9, 19, 29… or 11, 21, 31… by adding or subtracting 10, 20, 30… and adjusting by 1	Add 9 to single-digit numbers by adding 10 then subtracting 1. For example: 6 + 9 = 6 + 10 – 1.
Use patterns of similar calculations	Develop and recognise a pattern such as: 7 + 0 = 7 10 – 0 = 10 6 + 1 = 7 10 – 1 = 9 5 + 2 = 7 10 – 2 = 8 … … and so deduce that: 3 + 4 = 7 10 – 6 = 4
Use the relationship between addition and subtraction	

As outcomes, Year 2 pupils should, for example:

Mentally add or subtract 11 or 21, or 9 or 19, to/from any two-digit number. For example:

- 58 + 21 = 79 because it is the same as 58 + 20 + 1;
- 70 – 11 = 59 because it is the same as 70 – 10 – 1;
- 24 – 9 = 15 because it is the same as 24 – 10 + 1;
- 35 + 19 = 54 because it is the same as 35 + 20 – 1.

Develop and recognise a pattern such as:

3 + 5 = 8	4 – 3 = 1
13 + 5 = 18	14 – 3 = 11
23 + 5 = 28	24 – 3 = 21
…	…

and so deduce that:

63 + 5 = 68	54 – 3 = 51

Recognise and use the pattern in, for example:

4 + 3 = 7
40 + 30 = 70
400 + 300 = 700

Say or write the subtraction fact corresponding to a given addition fact, and vice versa. For example:

15 + 4 = 19 implies that 19 – 4 = 15
4 + 15 = 19 implies that 19 – 15 = 4
and vice versa.

Without apparatus, answer oral questions like:

- You know that 12 + 4 = 16.
  What is 4 + 12, or 16 – 12, or 16 – 4?
- You know that 17 – 3 = 14.
  What is 17 – 14, or 3 + 14, or 14 + 3?

Given three numbers, say or write four different sentences relating these numbers. For example:

- Given 2, 7 and 9, say or write:

7 plus 2 equals 9	7 + 2 = 9
2 plus 7 equals 9	2 + 7 = 9
9 minus 2 equals 7	9 – 2 = 7
9 minus 7 equals 2	9 – 7 = 2

As outcomes, Year 3 pupils should, for example:

Mentally add or subtract 9 or 11 to/from any three-digit number. For example:

- 284 – 9 = 275 because it is the same as 284 – 10 + 1;
- 543 + 11 = 554 because it is the same as 543 + 10 + 1.

Mentally add or subtract 9, 19, 29… or 11, 21, 31… to/from any two-digit number without crossing 100. For example:

- 63 + 29 = 92 because it is the same as 63 + 30 – 1;
- 78 – 49 = 29 because it is the same as 78 – 50 + 1.

Develop and recognise a pattern such as:

14 + 3 = 17	68 – 5 = 63
14 + 13 = 27	68 – 15 = 53
14 + 23 = 37	68 – 25 = 43
…	…

and so deduce that:

14 + 83 = 97	68 – 45 = 23

Recognise and use the pattern in, for example:

4 + 8 = 12
40 + 80 = 120
400 + 800 = 1200

Recognise and use the pattern in an addition table.

+	1	2	3	4
1	2	3	4	5
2	3	4	5	6
3	4	5	6	7
4	5	6	7	8

Say or write the subtraction fact corresponding to a given addition fact, and vice versa. For example:

56 + 27 = 83 implies that 83 – 27 = 56
27 + 56 = 83 implies that 83 – 56 = 27
and vice versa.

Without apparatus, answer oral questions like:

- You know that 32 + 14 = 46.
  What is 14 + 32, or 46 – 32, or 46 – 14?
- You know that 87 – 42 = 45.
  What is 87 – 45, or 42 + 45, or 45 + 42?

Given three or more numbers, say or write different sentences relating these numbers. For example:

- Given 5, 8 and 13, say or write:

8 plus 5 equals 13	8 + 5 = 13
5 plus 8 equals 13	5 + 8 = 13
13 minus 8 equals 5	13 – 8 = 5
13 minus 5 equals 8	13 – 5 = 8

- Using only the numbers 15, 17, 32, 34, 49, write as many different number sentences as you can.

See also checking results (page 59).

CALCULATIONS

Pupils should be taught to:	As outcomes, Year 1 pupils should, for example:
Use known number facts and place value to add or subtract a pair of numbers mentally	*Add or subtract a single digit to or from a single digit, without crossing 10* • Respond to oral questions like: 2 + 4 6 + 4 8 – 5 • Work mentally to complete written questions like: 2 + 3 = ☐ 2 + ☐ = 5 ☐ + 3 = 5 7 – 3 = ☐ 7 – ☐ = 4 ☐ – 3 = 4 *Add or subtract a single digit to or from a 'teens' number, without crossing 20 or 10* • Respond to oral questions like: 15 + 3 18 – 6 and explain method. • Work mentally to complete written questions like: 15 + 4 = ☐ 15 + ☐ = 19 ☐ + 4 = 19 17 – 5 = ☐ 17 – ☐ = 12 ☐ – 5 = 12 *Add or subtract a single digit to or from 10, then 20* • Respond to oral questions like: 10 + 3 10 – 4 20 + 6 20 – 4 • Work mentally to complete written questions like: 10 + 4 = ☐ 10 + ☐ = 14 ☐ + 4 = 14 10 – 4 = ☐ 6 + ☐ = 10 ☐ + 4 = 10 20 + 4 = ☐ 20 + ☐ = 24 ☐ + 4 = 24 20 – 4 = ☐ 16 + ☐ = 20 ☐ + 4 = 20 *Begin to add a 'teens' number to a 'teens' number, without crossing the tens boundary* • Respond to oral questions like: 14 + 11 12 + 13 and explain method. • Work mentally to complete written questions like: 15 + 12 = ☐ Use and apply these skills in a variety of contexts, in mathematics and other subjects.

As outcomes, Year 2 pupils should, for example:

Add or subtract a single digit to or from any two-digit number, without crossing the tens boundary

- Respond to oral questions like:
  36 + 3 98 – 6
  and explain method.
- Work mentally to complete written questions like:
  32 + 5 = ☐ 32 + ☐ = 37 ☐ + 5 = 37
  86 – 4 = ☐ 86 – ☐ = 82 ☐ – 4 = 82

Add a single digit to a multiple of 10 or 100

- Respond to oral questions like:
  30 + 6 200 + 4
  and explain method.
- Work mentally to complete written questions like:
  30 + 4 = ☐ 30 + ☐ = 34 ☐ + 4 = 34
  600 + 7 = ☐ 600 + ☐ = 607 ☐ + 7 = 607

Subtract a single digit from a multiple of 10

- Respond to oral questions like:
  30 – 3 100 – 5
  and explain method.
- Work mentally to complete written questions like:
  80 – 4 = ☐ 80 – ☐ = 76 ☐ – 4 = 76
  60 – 7 = ☐ 60 – ☐ = 53 ☐ – 7 = 53

Begin to add a two-digit number to a multiple of 10, without crossing 100

- Respond to oral questions like:
  30 + 28 50 + 16
  and explain method.
- Work mentally to complete written questions like:
  40 + 24 = ☐ 40 + ☐ = 64 ☐ + 24 = 64

Add/subtract a 'teens' number to/from a two-digit number, without crossing the tens boundary or 100

- Respond to oral questions like:
  45 + 13 68 – 17
  and explain method.
- Work mentally to complete written questions like:
  45 + 11 = ☐ 58 + ☐ = 70 ☐ + 13 = 43
  37 – 12 = ☐ 29 – ☐ = 18

Use and apply these skills in a variety of contexts, in mathematics and other subjects.

As outcomes, Year 3 pupils should, for example:

Add or subtract a single digit to or from any three-digit number, without crossing the tens boundary

- Respond to oral questions like:
  365 + 4 629 + 1 499 + 1
  675 – 3 768 – 5 919 – 8
  and explain method.
- Work mentally to complete written questions like:
  493 + 6 = ☐ 435 + ☐ = 439 ☐ + 4 = 567
  287 – 3 = ☐ 456 – ☐ = 450 ☐ – 7 = 391

Add a two-digit number to a multiple of 100

- Respond to oral questions like:
  200 + 64 400 + 18
  and explain method.
- Work mentally to complete written questions like:
  600 + 27 = ☐ 600 + ☐ = 627 ☐ + 27 = 627

Subtract a single digit from a multiple of 100

- Respond to oral questions like:
  800 – 6 400 – 4
  and explain method.
- Work mentally to complete written questions like:
  600 – 7 = ☐ 600 – ☐ = 593 ☐ + 7 = 600

Add a two-digit number to a multiple of 10, crossing 100

- Respond to oral questions like:
  80 + 24 60 + 66
  and explain method.
- Work mentally to complete written questions like:
  80 + 24 = ☐ 80 + ☐ = 104 ☐ + 24 = 104

Add or subtract a pair of two-digit numbers, without crossing the tens boundary or 100

- Respond to oral questions like:
  45 + 23 68 – 47
  and explain method.
- Work mentally to complete written questions like:
  45 + 31 = ☐ 45 + ☐ = 76 ☐ + 31 = 76
  97 – 25 = ☐ 97 – ☐ = 72 ☐ – 25 = 72

Use and apply these skills in a variety of contexts, in mathematics and other subjects.

Pupils should be taught to:	As outcomes, Year 1 pupils should, for example:
Use known number facts and place value to add or subtract a pair of numbers mentally (continued)	*Add 10 to a single-digit number and subtract 10 from a 'teens' number* • Respond to oral questions like: 5 + 10 14 – 10 • Work mentally to complete written questions like: 6 + 10 = ☐ 6 + ☐ = 16 ☐ + 10 = 16 19 – 10 = ☐ 19 – ☐ = 9 ☐ – 10 = 9
	Use and apply these skills in a variety of contexts, in mathematics and other subjects.

As outcomes, Year 2 pupils should, for example:

Add or subtract 10 to or from any two-digit number, without crossing 100

- Respond to oral questions like:
  26 + 10 48 – 10
  and explain method.
- Work mentally to complete written questions like:
  25 + 10 = ☐ 25 + ☐ = 35 ☐ + 10 = 35
  49 – 10 = ☐ 49 – ☐ = 39 ☐ – 10 = 39

Add or subtract a pair of multiples of 10, without crossing 100

- Respond to oral questions like:
  40 + 50 80 – 30
  and explain method.
- Work mentally to complete written questions like:
  20 + 40 = ☐ 20 + ☐ = 60 ☐ + 40 = 60
  70 – 30 = ☐ 70 – ☐ = 40 ☐ – 30 = 40

Find what must be added to a two-digit multiple of 10 to make 100

- Respond to oral questions like:
  What must be added to 30 to make 100?
  and explain method.
- Work mentally to complete written questions like:
  40 + ☐ = 100 70 + ☐ = 100

Add or subtract a multiple of 10 to or from a two-digit number, without crossing 100

- Respond to oral questions like:
  52 + 30 82 – 30
  and explain method.
- Work mentally to complete written questions like:
  52 + 30 = ☐ 52 + ☐ = 82 ☐ + 30 = 82
  76 – 40 = ☐ 76 – ☐ = 36 ☐ – 40 = 36

Add or subtract a pair of multiples of 100, without crossing 1000

- Respond to oral questions like:
  500 + 300 800 – 200
  and explain method.
- Work mentally to complete written questions like:
  200 + 400 = ☐ 200 + ☐ = 600
  700 – 300 = ☐ ☐ – 300 = 400

Use and apply these skills in a variety of contexts, in mathematics and other subjects.

As outcomes, Year 3 pupils should, for example:

Add or subtract 10 to or from any two- or three-digit number, including crossing the hundreds boundary

- Respond to oral questions like:
  96 + 10 231 + 10 408 – 10 456 – 10
  and explain method.
- Work mentally to complete written questions like:
  256 + 10 = ☐ 256 + ☐ = 266 ☐ + 10 = 266
  405 – 10 = ☐ 405 – ☐ = 395 ☐ – 10 = 395

Begin to add or subtract a pair of multiples of 10, crossing 100

- Respond to oral questions like:
  40 + 70 120 – 30
  and explain method.
- Work mentally to complete written questions like:
  90 + 40 = ☐ 90 + ☐ = 130 ☐ + 40 = 130
  110 – 30 = ☐ 110 – ☐ = 80 ☐ – 30 = 80

Find what must be added to a three-digit multiple of 10 to make the next higher multiple of 100

- Respond to oral questions like:
  What must be added to 730 to make 800?
  and explain method.
- Work mentally to complete written questions like:
  540 + ☐ = 600 260 + ☐ = 300

Add or subtract a multiple of 10 to or from a two-digit number, crossing 100

- Respond to oral questions like:
  52 + 60 112 – 30
  and explain method.
- Work mentally to complete written questions like:
  52 + 80 = ☐ 52 + ☐ = 132 ☐ + 80 = 132
  126 – 40 = ☐ 126 – ☐ = 86 ☐ – 40 = 86

Add or subtract a pair of multiples of 100, crossing 1000

- Respond to oral questions like:
  500 + 800 1200 – 300
  and explain method.
- Work mentally to complete written questions like:
  200 + 900 = ☐ 200 + ☐ = 1100
  1500 – 800 = ☐ ☐ – 800 = 700

Add or subtract 100 to or from any three-digit number, without crossing 1000

- Respond to oral questions like:
  342 + 100 809 – 100
  and explain method.
- Work mentally to complete written questions like:
  347 + 100 = ☐ 347 + ☐ = 447
  613 – 100 = ☐ ☐ – 100 = 513

Use and apply these skills in a variety of contexts, in mathematics and other subjects.

Pupils should be taught to:	As outcomes, Year 1 pupils should, for example:
Add or subtract a pair of numbers mentally (continued) by bridging through 10 or 100, or a multiple of 10 or 100, and adjusting	*Begin to add a pair of single-digit numbers, crossing 10* • Use two steps and cross 10 as a middle stage. For example, work out mentally that: 6 + 7 = 13 and explain that: 6 + 7 = 6 + 4 + 3 = 10 + 3 = 13 • Work mentally to complete written questions like: 9 + 4 = ☐ 9 + ☐ = 13 ☐ + 4 = 13 *Begin to add a single digit to a 'teens' number, crossing 20* • Use two steps and cross 20 as a middle stage. For example, work out mentally that: 18 + 5 = 23 and explain that: 18 + 5 = 18 + 2 + 3 = 20 + 3 = 23 Use and apply these skills in a variety of contexts, in mathematics and other subjects.

As outcomes, Year 2 pupils should, for example:

Add a pair of single-digit numbers, or subtract a single digit from a 'teens' number, crossing 10

- Use two steps and cross 10 as a middle stage.
  For example, work out mentally that:
  6 + 7 = 13 or 15 – 8 = 7
  and explain that:
  6 + 7 = 6 + 4 + 3 = 10 + 3 = 13
  15 – 8 = 15 – 5 – 3 = 10 – 3 = 7
- Work mentally to complete written questions like:
  7 + 8 = ☐ 7 + ☐ = 15 ☐ + 8 = 15
  17 – 9 = ☐ 17 – ☐ = 8 ☐ – 9 = 8

Add a single digit to a 'teens' number, or subtract a single digit from a 'twenties' number, crossing 20

- Use two steps and cross 20 as a middle stage.
  For example, work out mentally that:
  16 + 7 = 23
  and explain that:
  16 + 7 = 16 + 4 + 3 = 20 + 3 = 23
  or work out mentally that:
  22 – 7 = 15
  and explain that:
  22 – 7 = 22 – 2 – 5 = 20 – 5 = 15
- Work mentally to complete written questions like:
  15 + 8 = ☐ 15 + ☐ = 23 ☐ + 8 = 23
  23 – 6 = ☐ 23 – ☐ = 17 ☐ – 6 = 17

Find a small difference between a pair of numbers lying either side of 20, or another multiple of 10

- For example, work out mentally that:
  23 – 18 = 5
  by counting up from 18 to 20, then 20 to 23;
  or work out mentally that:
  102 – 97 = 5
  by counting up from 97 to 100, then 100 to 102.
- Work mentally to complete written questions like:
  22 – 17 = ☐ 19 + ☐ = 22
  103 – 96 = ☐ 95 + ☐ = 101
  64 – 58 = ☐ 87 + ☐ = 94

Use and apply these skills in a variety of contexts, in mathematics and other subjects.

As outcomes, Year 3 pupils should, for example:

Consolidate subtracting a single digit from a 'teens' number, crossing 10

- Use two steps and cross 10 as a middle stage.
  For example, work out mentally that:
  15 – 8 = 7
  and explain that:
  15 – 8 = 15 – 5 – 3 = 10 – 3 = 7
- Work mentally to complete written questions like:
  13 – 6 = ☐ 13 – ☐ = 7 ☐ – 6 = 7

Add or subtract a single digit to/from a two-digit number, crossing the tens boundary

- Use two steps, crossing a multiple of 10 as a middle stage. For example, work out mentally that:
  68 + 7 = 75
  and explain that:
  68 + 7 = 68 + 2 + 5 = 70 + 5 = 75
  or work out mentally that:
  62 – 7 = 55
  and explain that:
  62 – 7 = 62 – 2 – 5 = 60 – 5 = 55
- Work mentally to complete written questions like:
  45 + 8 = ☐ 45 + ☐ = 53 ☐ + 8 = 53
  93 – 6 = ☐ 93 – ☐ = 87 ☐ – 6 = 87

Find a small difference between a pair of numbers lying either side of a multiple of 100 from 100 to 1000

- For example, work out mentally that:
  605 – 596 = 9
  by counting up from 596 to 600, then 600 to 605;
  or work out mentally that:
  1008 – 995 = 13
  by counting up from 995 to 1000, then 1000 to 1008.
- Work mentally to complete written questions like:
  804 – 798 = ☐ 396 + ☐ = 405
  1003 – 992 = ☐ 988 + ☐ = 1001

Begin to add or subtract any pair of two-digit numbers

- For example, work out that 28 + 54 = 82
  and explain that 28 + 54 = 28 + 50 + 4 = 78 + 4 = 82;
  or work out that 61 – 23 = 38
  and explain that 61 – 23 = 61 – 20 – 3 = 41 – 3 = 38.
- Work mentally to complete written questions like:
  25 + 38 = ☐ 25 + ☐ = 63 ☐ + 38 = 63
  83 – 47 = ☐ 83 – ☐ = 36 ☐ – 47 = 36

See also using jottings (pages 43 and 45).

Use and apply these skills in a variety of contexts, in mathematics and other subjects.

CALCULATIONS

Pupils should be taught to:	As outcomes, Year 1 pupils should, for example:
Develop pencil and paper methods for additions that cannot, at this stage, be done mentally	

As outcomes, Year 2 pupils should, for example:

As outcomes, Year 3 pupils should, for example:

Use informal pencil and paper methods (jottings) to support, record and explain partial mental methods, building on existing mental strategies. Discuss and compare methods and explain orally how they work.

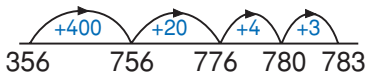
TU + TU, developing to HTU + TU or HTU + HTU

Do this first not crossing the tens or hundreds boundary, then crossing either the tens or the hundreds boundary. For example:

A: counting on in multiples of 100, 10 or 1

86 + 57 = 86 + 50 + 7 = 136 + 7 = 143

356 + 427 = 356 + (400 + 20 + 7)
= 756 + 20 + 7
= 776 + 7
= 783



Begin to record calculations in preparation for an efficient standard method. Know that units line up under units, tens under tens, and so on.

B: adding the most (or least) significant digits first

67 + 24 = (60 + 20) + (7 + 4) = 80 + 11 = 91
or:
67 + 24 = (7 + 4) + (60 + 20) = 11 + 80 = 91

```
  67          83
+ 24        + 42
  80          120      ] add mentally from top
  11            5      ] or bottom
  91          125

  75          267
+ 48        + 85
  13          12       ] add mentally from top
 110          140      ] or bottom
 123          200      ]
              352
```

CALCULATIONS

Pupils should be taught to:	As outcomes, Year 1 pupils should, for example:
Develop pencil and paper methods for subtractions that cannot, at this stage, be done mentally	

As outcomes, Year 2 pupils should, for example:

As outcomes, Year 3 pupils should, for example:

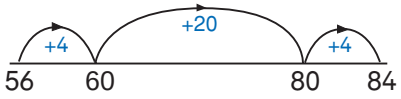
Use informal pencil and paper methods (jottings) to support, record and explain partial mental methods, building on existing mental strategies. Discuss and compare methods and explain orally how they work.

TU – TU, developing to HTU – TU or HTU – HTU

Do this first not crossing the tens or hundreds boundary, then crossing either the tens or the hundreds boundary. For example:

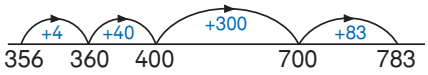
A: counting up from the smaller to the larger number (complementary addition)

84 – 56 56 + 4 + 20 + 4 = 84




```
56 ⟍  4
60 ⟍ 20
80 ⟍  4
84 ⟍
      28
```

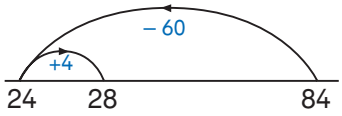
783 – 356




```
 783
-356
   4   to 360
  40   to 400
 300   to 700
  83   to 783
 427
```

B: compensation (take too much, add back)

84 – 56 = 84 – 60 + 4 = 24 + 4 = 28



783 – 356 = 783 – 400 + 44
= 383 + 44
= 427

```
 783
–356
 383   take 400
+44    add 44
 300
 120
   7
 427
```

For column recording, know that units line up under units, tens under tens, and so on.

C: decomposition

Begin to record calculations in preparation for an efficient standard method.

```
  81 = 80 + 1 = 70 + 11
– 57   50 + 7   50 +  7
                20 +  4 = 24
```

CALCULATIONS

Pupils should be taught to:	As outcomes, Year 1 pupils should, for example:
Understand the operation of multiplication and the associated vocabulary, and that multiplication can be carried out in any order	

As outcomes, Year 2 pupils should, for example:

Understand, use and begin to read:
double, times, multiply, multiplied by, multiple of... lots of, groups of... times as (big, long, wide...)
and read and write the × sign.

Understand multiplication as:

- **repeated addition**: for example,
  5 added together 3 times is 5 + 5 + 5, or 3 lots of 5, or 3 times 5, or 5 × 3 (or 3 × 5).

- **describing an array**: for example,

Begin to recognise from arranging arrays that multiplication can be done in any order:
for example, 4 lots of 2 and 2 lots of 4 are the same.

Understand and use the principle that doubling reverses halving (doubling is the inverse of halving). For example, knowing a double such as 11 × 2 = 22 implies that half of 22 is 11, or 22 ÷ 2 = 11.

Respond rapidly to oral or written questions such as:
- Two fives... Double 5...
- 6 times 2
- 5 multiplied by 2... Multiply 4 by 2

Record simple mental multiplications in a number sentence using the × and = signs.

Recognise the use of symbols such as □ or △ to stand for unknown numbers, and complete, for example:
- with rapid mental recall:
  6 × 2 = □ 9 × □ = 18 □ × 2 = 14
  6 × 10 = □ 2 × □ = 20 □ × 10 = 40
- using rods or diagrams (e.g. arrays or a number line), then mental strategies, explaining method:
  5 × 4 = □ 5 × □ = 15 □ × 4 = 8
  6 × 10 = □ □ × △ = 12

Begin to interpret situations as multiplication calculations, and explain reasoning. For example:
- How many wheels are there on 3 cars?
- Jo's box is 5 cm wide.
  Mary's box is twice as wide as Jo's box.
  How wide is Mary's box?

As outcomes, Year 3 pupils should, for example:

Use, read and begin to write:
double, times, multiply, multiplied by, product, multiple of... times as (big, long, wide...)
and read and write the × sign.

Understand multiplication **(see Year 2)** as:

- **repeated addition**;

- **describing an array**;

- **scaling** (a number of times as wide, tall...): e.g.
  Take the blue ribbon. Find the ribbon that is 4 times as long.
  Make a red tower 5 cubes high. Make a blue tower 3 times as high.

Understand that multiplication can be done in any order, for example, 5 × 8 = 8 × 5,
but that 16 ÷ 2 is not the same as 2 ÷ 16,
and use this property appropriately.

Understand the principle that multiplication reverses division (multiplication is the inverse of division).

See also using the relationship between multiplication and division (page 55), and checking results (page 59).

Respond rapidly to oral or written questions such as:
- Two tens... Double 2... 3 times 4...
- 9 multiplied by 2... Multiply 5 by 8...
- Is 20 a multiple of 5?

Record mental multiplications in a number sentence using the × and = signs.

Recognise the use of symbols such as □ or △ to stand for unknown numbers, and complete, for example:
- with rapid mental recall:
  5 × 2 = □ 10 × □ = 80 □ × 5 = 30
  4 × 4 = □ 3 × □ = 15 □ × 4 = 20
- using rods or diagrams (e.g. arrays or a number line), then mental strategies, explaining method:
  5 × 3 = □ 8 × □ = 40 □ × 9 = 45
  6 × 20 = □ □ × △ = 60

Interpret situations as multiplication calculations, and explain reasoning. For example:
- A baker puts 6 buns in each of 4 rows.
  How many buns does she bake?
- Sue has 10 stamps. Tim has 3 stamps for every one of Sue's. How many stamps has Tim?
- Alex has 4 stickers.
  Jo has 3 times as many stickers as Alex.
  How many stickers does Jo have?

CALCULATIONS

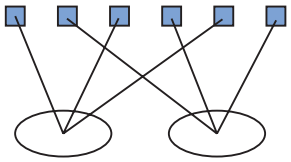
Pupils should be taught to:	As outcomes, Year 1 pupils should, for example:
Understand the operation of division and the associated vocabulary	

As outcomes, Year 2 pupils should, for example:

Understand, use and begin to read:
one each, two each... share, halve, divide, left over, divided by... equal groups of ...
and read and write the division sign ÷.

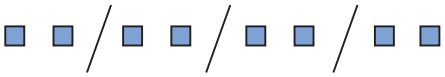
Understand the operation of division as:

- **sharing equally**: for example,
  6 sweets are shared equally between 2 people.
  How many sweets does each one get?



- **grouping**, or repeated subtraction: for example,
  There are 18 apples in a box. How many bags of 3 apples can be filled?
  Count from zero in tens, for example, to 60. How many tens did you count?

  Interpret 8 ÷ 2 as 'how many 2s make 8?'



Respond rapidly to oral or written questions phrased in a variety of ways, such as:
- Share 18 between 2.
- Divide 6 by 3.
- How many tens make 80?
- How many sticks of 4 cubes can you make from a stick of 20 cubes?
- How many £2 coins do you get for £20?
- How many 2 cm lengths can you cut from 10 cm of tape?

Record simple simple mental divisions in a number sentence using the ÷ and = signs.

Recognise the use of symbols such as □ or △ to stand for unknown numbers, and complete, for example:
- with rapid mental recall:
  6 ÷ 2 = □ 20 ÷ □ = 2 □ ÷ 10 = 3
- using counters (for sharing) or a number line (for repeated subtraction), then mental strategies, explaining method:
  16 ÷ 4 = □ 24 ÷ □ = 6 □ ÷ 3 = 8
  70 ÷ 10 = □

As outcomes, Year 3 pupils should, for example:

Use, read and begin to write:
share, halve, divide, divided by... equal groups of... the sign ÷, and understand that ½ means one divided into two equal parts.

Understand division **(see Year 2)** as:
- **grouping**, or repeated subtraction, including interpreting, for example, 35 ÷ 5 as 'how many 5s make 35?'
- **sharing**.

Know that dividing a whole number by 1 leaves the number unchanged: for example, 12 ÷ 1 = 12.

Understand that 16 ÷ 2 does not equal 2 ÷ 16.

Understand that division reverses multiplication (division is the inverse of multiplication).

Solve division calculations by using multiplication strategies. For example:
- Calculate 18 ÷ 3 by counting how many hops of 3 on a number line are needed to reach 18.
- Solve 20 ÷ 4 by interpreting this as 'How many fours make 20?'

Respond rapidly to oral or written questions phrased in a variety of ways, such as:
- Share 18 between 2.
- Divide 25 by 5.
- How many fives make 45?
- How many 5p coins do you get for 35p?
- How many lengths of 10 m can you cut from 80 m of rope?
- Is 35 a multiple of 5?

Record simple mental divisions in a number sentence using the ÷ and = signs.

Recognise the use of symbols such as □ or △ to stand for unknown numbers, and complete, for example:
- with rapid mental recall:
  16 ÷ 2 = □ 30 ÷ □ = 6 □ ÷ 5 = 7
- using counters (for sharing) or a number line (for repeated subtraction), then mental strategies, explaining method:
  16 ÷ 4 = □ 24 ÷ □ = 6 □ ÷ 3 = 8
  26 ÷ 2 = □ 24 ÷ □ = 12 □ ÷ 10 = 8

Interpret 'in every' situations as division calculations. For example:
- A baker bakes 24 buns.
  She puts 6 buns in every box.
  How many boxes of buns can she fill?
- William has made a pattern using 12 tiles.
  One tile in every four is red.
  How many tiles are red?

Pupils should be taught to:	As outcomes, Year 1 pupils should, for example:
Understand the idea of a remainder	
Make sensible decisions about rounding up or down after division in the context of a problem	

As outcomes, Year 2 pupils should, for example:

As outcomes, Year 3 pupils should, for example:

Use, read and begin to write:
left over, remainder...

Give a whole-number remainder when one number is divided by another. For example, work out that:
- 16 ÷ 3 is 5 remainder 1;
- 75 ÷ 10 is 7 remainder 5.

Respond to oral or written questions, such as finding how many are left or how much is left when you:
- share 18 between 5;
- divide 25 by 10;
- cut as many lengths of 10 cm as you can you from 81 cm of tape.

Work mentally to complete written questions like:
$46 = 10 \times 4 + \square$ $17 = 5 \times 3 + \square$

Make sensible decisions about rounding down or up after division, depending on the context of the problem.

For example, 46 ÷ 5 is 9 remainder 1, but whether the answer should be rounded up to 10 or rounded down to 9 depends on the context.

Examples of rounding down
I have £46. Tickets cost £5 each.
I can only buy 9 tickets.

I have 46 cakes. One box holds 5 cakes.
I could fill only 9 boxes of cakes.

Examples of rounding up
I have 46 cakes. One box holds 5 cakes.
I will need 10 boxes to hold all 46 cakes.

There are 46 children. A table seats 5.
10 tables are needed to seat all the children.

CALCULATIONS

Pupils should be taught to:	As outcomes, Year 1 pupils should, for example:
Know simple multiplication and division facts by heart	
Derive doubles and halves quickly	

As outcomes, Year 2 pupils should, for example:

Know by heart multiplication facts for:
- 2 up to 2×10
- 10 up to 10×10

and derive quickly the corresponding division facts.

Begin to know multiplication facts for:
- 5 up to 5×10

and derive the corresponding division facts.

For example, for multiplication and division by 2, know or derive quickly:

$1 \times 2 = 2$	$2 \div 2 = 1$
$2 \times 2 = 4$	$4 \div 2 = 2$
...	...
$9 \times 2 = 18$	$18 \div 2 = 9$
$10 \times 2 = 20$	$20 \div 2 = 10$

Respond rapidly to oral or written questions phrased in a variety of ways, such as:
- Six twos.
- 3 times 2.
- 5 multiplied by 2.
- Multiply 4 by 2.
- How many twos in 12?
- Divide 20 by 2.

Understand, use and begin to read:
double, twice, half, halve, whole, divide by 2, divide into 2...

Use known facts to derive quickly:
- doubles of numbers 1 to 15;
- doubles of 5, 10, 15... to 50;
- halves of even numbers to 20;
- halves of multiples of 10 up to 100.

For example, respond quickly to oral or written questions phrased in a variety of ways, such as:
- Double 8... Double 35...
- Half of 18... Half of 70...
- Twice 6... Twice 50...
- ½ of 12.
- Sarah spent half of her 60p pocket money. How much did she spend?
- Two ices cost 80p. What does one ice cost?

Complete written questions, for example:
- with rapid recall:

$8 + 8 = \square$	$7 + \square = 14$
$8 \times 2 = \square$	$14 \div \square = 7$

- using rods, cubes or a number line, then derive quickly:

$12 + 12 = \square$	half of 14
$35 \times 2 = \square$	$22 \div 2 = \square$
$\square \times 2 = 26$	$\square \div 2 = 11$

As outcomes, Year 3 pupils should, for example:

Know by heart multiplication facts for:
- 2 up to 2×10
- 5 up to 5×10
- 10 up to 10×10

and derive quickly the corresponding division facts.

Begin to know multiplication facts for:
- 3 up to 3×10
- 4 up to 4×10

and derive the corresponding division facts.

For example, for multiplication and division by 10, know or derive quickly:

$1 \times 10 = 10$	$10 \div 10 = 1$
$2 \times 10 = 20$	$20 \div 10 = 2$
...	...
$9 \times 10 = 90$	$90 \div 10 = 9$
$10 \times 10 = 100$	$100 \div 10 = 10$

Respond quickly to oral or written questions phrased in a variety of ways, such as:
- Six fives.
- 3 times 5.
- 5 multiplied by 3.
- Multiply 4 by 5.
- How many fives in 35?
- Divide 30 by 5.

Use, read and begin to write:
double, twice, half, halve, whole, divide by 2, divide into 2...
and ½ as one half.

Use known facts to derive quickly:
- doubles of all numbers 1 to 20;
- doubles of 5, 15, 25... up to 100;
- doubles of 50, 100, 150, 200... up to 500;

and the corresponding halves.

For example, respond quickly to oral or written questions phrased in a variety of ways, such as:
- Double 19... Double 75... Double 350...
- Half of 36... Half of 150... Half of 700...
- ½ of 600... ½ of 34...
- Twice 85.
- Anil spent half of his £1.40 savings. How much did he spend?
- How many centimetres is half a metre?

Complete written questions, for example:
- derive quickly:

$60 + 60 = \square$	$80 + \square = 160$
$60 \times 2 = \square$	$160 \div \square = 80$

- using cubes or a number line, then derive quickly:

$42 + 42 = \square$	half of 68
$34 \times 2 = \square$	$42 \div 2 = \square$
$\square \times 2 = 86$	$\square \div 2 = 43$

Pupils should be taught to:	As outcomes, Year 1 pupils should, for example:
Shift the digits of a number one place to the left/right to multiply/divide by 10	
Use knowledge of doubles and halves to multiply or divide	
Say or write a division statement corresponding to a given multiplication statement	

As outcomes, Year 2 pupils should, for example:

As outcomes, Year 3 pupils should, for example:

Observe and describe the effect of multiplying and dividing by 10, using an abacus, an OHP calculator or multibase apparatus to develop patterns as on this grid:

1	2	3	4	5…	9
10	20	30	40	50…	90
100	200	300	400	500…	900

Use doubling, working mentally, and explaining reasoning. For example:

- work out the four times-table facts by doubling the two times-table facts;
- work out:
  $1 \times 25 = 25$, and deduce by doubling that:
  $2 \times 25 = 50$
  $4 \times 25 = 100$
  $8 \times 25 = 200$
  $16 \times 25 = 400$ and so on.

Explain how to find quarters by finding half of one half. For example, work out mentally that:

- one quarter of 28 is 7 (because one half of 28 is 14 and half again is 7);
- one quarter of 100 is 25 (because one half of 100 is 50 and half again is 25);
- one quarter of 600 is 150 (because one half of 600 is 300 and half again is 150);
- one quarter of 140 is 35 (because one half of 140 is 70 and half again is 35).

Say or write a division statement corresponding to a given multiplication statement. For example:

$7 \times 5 = 35$ implies that $35 \div 5 = 7$
$5 \times 7 = 35$ implies that $35 \div 7 = 5$

Given three numbers, such as 2, 5 and 10, say or write four different multiplication or division statements relating the numbers.

Without apparatus, answer oral questions like:

- You know that $4 \times 6 = 24$.
  What is 6×4, or $24 \div 6$, or $24 \div 4$?
- You know that $40 \div 5 = 8$.
  What is $40 \div 8$, or 5×8, or 8×5?

See also checking results (page 59).

CALCULATIONS

Pupils should be taught to:	As outcomes, Year 1 pupils should, for example:
Use knowledge of number facts and place value to multiply or divide mentally	

As outcomes, Year 2 pupils should, for example:

Multiply a single digit by 1 or 10
For example:
3×1 7×10
Work mentally to complete written questions like:
$7 \times 1 = \square$ $2 \times \square = 20$ $\square \times 10 = 50$

Divide a two-digit multiple of 10 by 1 or 10
For example:
$20 \div 1$ $80 \div 10$
Respond to oral questions like:
- How many tens in 60?
- Divide 30 by 1.

Work mentally to complete written questions like:
$6 \div 1 = \square$ $40 \div \square = 4$ $\square \div 10 = 6$

Begin to double any multiple of 5 up to 50
For example, double 40, double 15.
Work mentally to complete written questions like:
$20 \times 2 = \square$ $\square \times 2 = 60$
Explain how you did them.

Begin to halve any multiple of 10 to 100
For example, find half of 80, half of 30.
Work mentally to complete written questions like:
$40 \div 2 = \square$ $\square \div 2 = 15$
one half of 20
Explain how you did them.

Multiply a single digit up to 5 by 2, 3, 4, 5
Respond to oral questions like:
2×3 4×5
and explain method.
Work mentally to complete written questions like:
$7 \times 2 = \square$ $2 \times \square = 18$ $15 = 3 \times \square$

Use and apply these skills in a variety of contexts, in mathematics and other subjects.

As outcomes, Year 3 pupils should, for example:

Multiply a single digit by 1, 10 or 100
For example:
7×10 4×100
Work mentally to complete written questions like:
$6 \times 100 = \square$ $8 \times \square = 80$

Divide a three-digit multiple of 100 by 10 or 100
For example:
$800 \div 100$ $300 \div 10$
Respond to oral questions like:
- Find one hundredth of 400...
- Find one tenth of 60... of 500...

Work mentally to complete written questions like:
$\square \div 100 = 6$ $900 \div 10 = \square$ $600 \div \square = 60$

Double any multiple of 5 up to 50
For example, double 30, double 45.
Work mentally to complete written questions like:
$35 \times 2 = \square$ $\square \times 2 = 50$
Explain how you did them.

Halve any multiple of 10 to 100
For example, find half of 70, half of 90.
Work mentally to complete written questions like:
$50 \div 2 = \square$ $\square \div 2 = 35$
one half of 80 one half of 100
Explain how you did them.

Multiply a two-digit multiple of 10 up to 50 by 2, 3, 4, 5 or 10
Respond to oral questions like:
20×3 40×5 60×10
one third of 30 one fifth of 50
and explain method.
Work mentally to complete written questions like:
$70 \times 2 = \square$ $20 \times \square = 100$
$\square \times 10 = 500$ $30 = 3 \times \square$

Multiply a two-digit number by 2, 3, 4 or 5 without crossing the tens boundary
Respond to oral questions like:
23×2 11×5
and explain method.
Work mentally to complete written questions:
$32 \times 3 = \square$ $14 \times \square = 28$
$26 = 13 \times \square$

Use and apply these skills in a variety of contexts, in mathematics and other subjects.

CALCULATIONS

Pupils should be taught to:	As outcomes, Year 1 pupils should, for example:
Check with the inverse operation	
Repeat addition or multiplication in a different order	
Do an equivalent calculation	

As outcomes, Year 2 pupils should, for example:	As outcomes, Year 3 pupils should, for example:
	Check subtraction with addition.
	Check halving with doubling.
	Check division with multiplication.
For example, check: 11 + 19 with 19 + 11; 6 + 13 + 5 with 13 + 6 + 5.	For example, check: 12 + 59 with 59 + 12; 12 + 18 + 20 with 20 + 18 + 12; $2 \times 5 \times 10$ with $10 \times 5 \times 2$.
For example, check: 31 – 7 with 30 – 7 + 1 = 23 + 1 = 24, or with 31 – 10 + 3 = 21 + 3 = 24.	For example, check: 40 + 36 with 40 + 30 + 6, or with double 40 minus 4; 35×2 with 30×2 plus 5×2, or with two 40s minus two 5s.