Addition and Subtraction

Selected National Curriculum Programme of Study Statements

Pupils should be taught to:

- solve problems with addition and subtraction:
  - using concrete objects and pictorial representations, including those involving numbers, quantities and measures
  - applying an increasing knowledge of mental and written methods
- recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100
- add and subtract numbers using concrete objects, pictorial representations, and mentally, including:
  - a 2-digit number and ones
  - a 2-digit number and tens
  - two 2-digit numbers
  - adding three 1-digit numbers
- show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot

The Big Ideas

Understanding that addition of two or more numbers can be done in any order is important to support children's fluency. When adding two numbers it can be more efficient to put the larger number first. For example, given $3 + 8$ it is easier to calculate $8 + 3$.

When adding three or more numbers it is helpful to look for pairs of numbers that are easy to add. For example, given $5 + 8 + 2$ it is easier to add $8 + 2$ first than to begin with $5 + 8$.

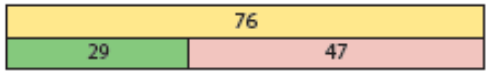
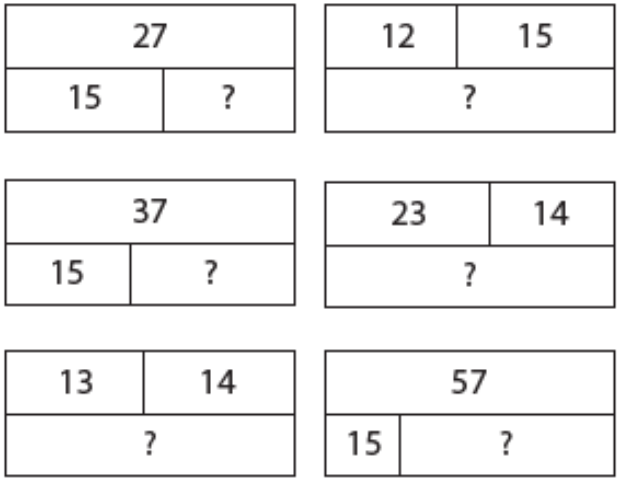
Understanding the importance of the equals sign meaning 'equivalent to' (i.e. that $6 + 4 = 10$, $10 = 6 + 4$ and $5 + 5 = 6 + 4$ are all valid uses of the equals sign) is crucial for later work in algebra. Empty box problems can support the development of this key idea. Correct use of the equals sign should be reinforced at all times. Altering where the equals sign is placed develops fluency and flexibility.

Mastery Check

Please note that the following columns provide indicative examples of the sorts of tasks and questions that provide evidence for mastery and mastery with greater depth of the selected programme of study statements. Pupils may be able to carry out certain procedures and answer questions like the ones outlined, but the teacher will need to check that pupils really understand the idea by asking questions such as 'Why?', 'What happens if …?', and checking that pupils can use the procedures or skills to solve a variety of problems.

Mastery	Mastery with Greater Depth
Fill in the missing numbers and explain what you notice. 23 + □ = 30 33 – □ = 30 43 + □ = 50 53 – 3 = □	Find different possibilities. □ + □ = 50 50 – □ = □
If each peg on the coat hanger has a value of 10, find three ways to partition the pegs to make the number sentences complete. □ + □ = □ □ + □ = □ □ + □ = □ What is the total of each addition sentence? Will the total always be the same? Explain your reasoning.	If each peg on the coat hanger has a value of 10, find three ways to partition the pegs to make the number sentences complete. □ + □ + □ = □ □ + □ + □ = □ □ + □ + □ = □ What is the total of each addition sentence? Will the total always be the same? Explain your reasoning.
Captain Conjecture says, 'An odd number + an odd number = an even number'. Is this sometimes, always or never true? Explain your reasoning. *Concrete resources might help pupils to explain their reasoning.* 	Captain Conjecture says, 'An odd number + an odd number + an odd number = an even number'. Is this sometimes, always or never true? Explain your reasoning. *Concrete resources might help pupils to explain their reasoning.*

Mastery	Mastery with Greater Depth
What do you notice about each set of calculations? What's the same and what's different about the three sets of calculations? 10 – 9 = 10 – 8 = 10 – 7 = 10 – 6 = 10 – 5 = 10 – 4 = 10 – 3 = 10 – 2 = 20 – 19 = 20 – 18 = 20 – 17 = 20 – 16 = 20 – 15 = 20 – 14 = 20 – 13 = 20 – 12 = 100 – 90 = 100 – 80 = 100 – 70 = 100 – 60 = 100 – 50 = 100 – 40 = 100 – 30 = 100 – 20 =	Complete the calculations. 30 + 40 + □ = 100 40 + □ + 20 = 100 36 + 44 + □ = 100 36 + 54 + □ = 100 47 + □ + 20 = 100 47 + □ + 30 = 100
What do I need to add to or subtract from each of these numbers to total 60? 40, 44, 66, 69, 76, 86, 99, 89, 79.	I think of a number and I add 2. The answer is 17. What was my number? I think of a number and I subtract 5. The answer is 24. What was my number?
Insert <, > or = to make these number sentences correct. 7 + 8 ◯ 8 + 7 3 + 6 ◯ 2 + 7 3 + 6 ◯ 4 + 7 4 + 7 ◯ 2 + 6	Insert numbers to make these number sentences correct. 13 – ___ < 6 13 – ___ < 6 13 – ___ < 6 13 – ___ < 6 13 – ___ < 6 13 – ___ < 6 13 – ___ < 6

Mastery	Mastery with Greater Depth
Pupils use a bar model to explore addition and subtraction facts and the relationship between them.  Using the bar model complete the four number sentences. □ + □ = □ + □ = □ − □ = □ − □ =	Fill in the missing numbers. What do you notice? 
Dan needs 80 g of sugar for his recipe. There are 45 g left in the bag. How much more does he need to get? The temperature was 26 degrees in the morning and 11 degrees colder in the evening. What was the temperature in the evening? A tub contains 24 coins. Saj takes 5 coins. Joss takes 10 coins. How many coins are left in the tub?	Together Jack and Sam have £12. Jack has £2 more than Sam. How much money does Sam have? *A bar model can be very helpful in solving these types of problems.* £12 – £2 = £10 £10 ÷ 2 = £5 Sam has £5