1AS–2 Read, write and interpret additive equations

Read, write and interpret equations containing addition (+), subtraction (−) and equals (=) symbols, and relate additive expressions and equations to real-life contexts.

1AS–2 Teaching guidance

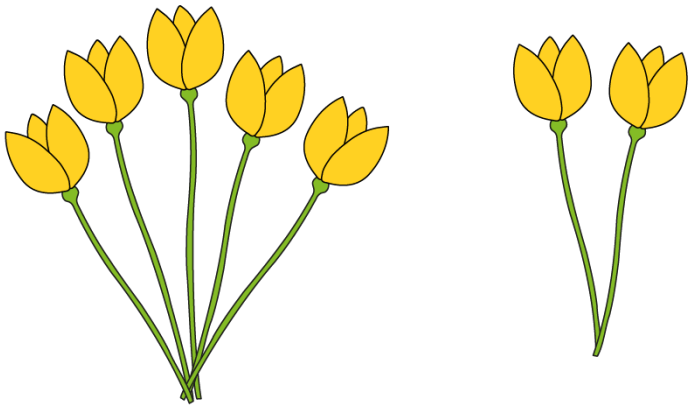
Pupils must learn to use the mathematical symbols $+$, $-$ and $=$. Expressions or equations involving these symbols should be introduced as a way to represent numerical situations and mathematical stories. An expression such as $3+5$ should not be interpreted as asking "What is $3+5$?" but, rather, as a way to represent the additive structures discussed below, either within a real-life context or within an abstract numerical situation. It is important that pupils do not think of the equals symbol as meaning 'and the answer is'. They should instead understand that the expressions on each side of an equals symbol have the same value. All examples used to teach this criterion should use quantities within 10, and be supported by manipulatives or images, to ensure that pupils are able to focus on the mathematical structures and to avoid the cognitive load of having to work out the solutions.

For each of the 4 additive structures described below (aggregation, partitioning, augmentation and reduction), pupils should learn to link expressions (for example, $5+2$ and $6-2$) to contexts before they learn to link equations (for example, $5+2=7$ and $6-2=4$) to contexts. For each case, pupils' understanding should be built up in steps:

1. Pupils should first learn to describe the context using precise language (see the language focus boxes below).
2. Pupils should then learn to write the associated expression or equation.
3. Pupils should then use precise language to describe what each number in the expression or equation represents.

Pupils need to be able to write and interpret expressions and equations to represent aggregation (combining 2 parts to make 1 whole) and partitioning (separating 1 whole into 2 parts).

How many flowers are there altogether?



5 + 2 = 7

Figure 26: addition as aggregation

Language focus

"There are 5 flowers in one bunch. There are 2 flowers in the other bunch. There are 7 flowers altogether."

"We can write this as 5 plus 2 is equal to 7."

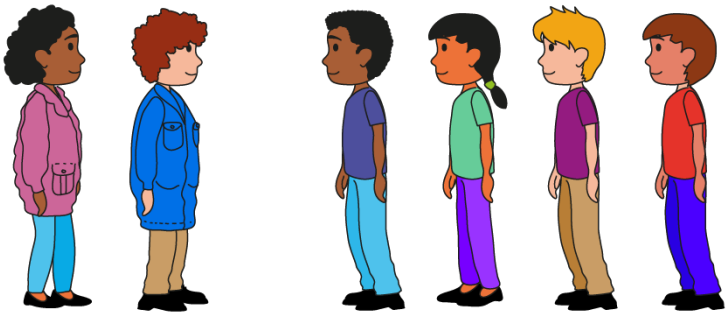
"The 5 represents the number of flowers in 1 bunch."

"The 2 represents the number of flowers in the other bunch."

"The 7 represents the total number of flowers."

Pupils must understand that, in partitioning situations, the subtraction symbol represents a splitting up or differentiating of the whole. The problem "There are 6 children altogether. 2 children are wearing coats. How many are not wearing coats?" is represented by $6-2=4$. Here, the subtraction symbol represents the separation of the 2 children wearing coats, and so, the number of children not wearing coats is exposed.

How many children are not wearing coats?



6 – 2 = 4

Figure 27: subtraction as partitioning

Language focus

"There are 6 children altogether. 2 children are wearing coats. 4 children are not wearing coats."

"We can write this as 6 minus 2 is equal to 4."

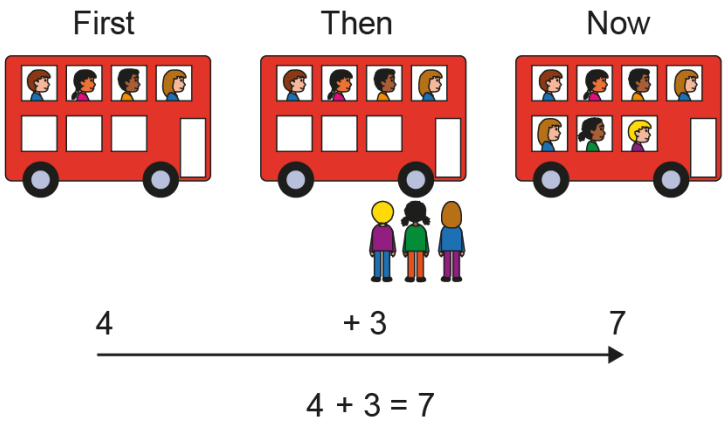
"The 6 represents the total number of children."

"The 2 represents the number of children that are wearing coats."

"The 4 represents the number of children that are not wearing coats."

Pupils must also be able to write and interpret expressions and equations to represent **augmentation** (increasing a quantity by adding more) and **reduction** (decreasing a quantity by taking some away). Note that 'take away' should only be used to describe the subtraction operation in reduction contexts.

How many children are on the bus now?



4 + 3 = 7

Figure 28: addition as augmentation

Language focus

“First 4 children were sitting on the bus. Then 3 more children got on the bus. Now 7 children are sitting on the bus.”

“We can write this as 4 plus 3 is equal to 7.”

“The 4 represents the number of children that were on the bus at the start.”

“The 3 represents the number of children that got on the bus.”

“The 7 represents the number of children that are on the bus now.”

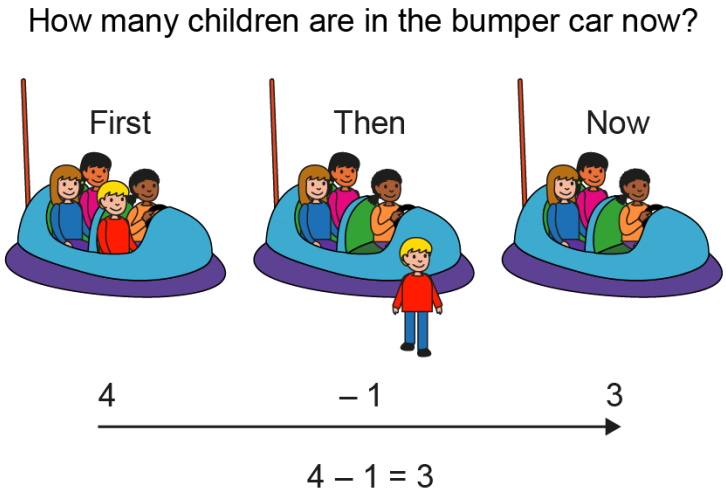


Figure 29: subtraction as reduction

Language focus

“First there were 4 children in the bumper car. Then 1 child got out. Now there are 3 children in the bumper car.”

“We can write this as 4 minus 1 is equal to 3.”

“The 4 represents the number of children that were in the car at the start.”

“The 1 represents the number of children that got out of the car.”

“The 3 represents the number of children that are in the car now.”

In the course of learning to read, write and interpret addition and subtractions equations, pupils should also learn that equations can be written in different ways, including:

- varying the position of the equals symbol (for example, $5-2=3$ and $3=5-2$)
- for addition, the addends can be written in either order and the sum remains the same (commutativity)

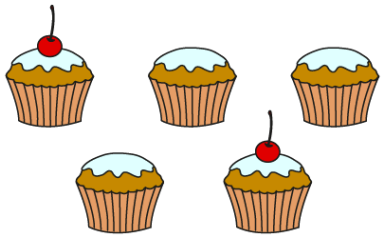


Figure 30: aggregation or partitioning context: 5 cakes altogether, 2 with cherries and 3 without

$2+3=5$

$5=2+3$

$3+2=5$

$5=3+2$

$5-3=2$

$2=5-3$

$5-2=3$

$3=5-2$

Pupils must also learn to relate addition and subtraction contexts and equations to mathematical diagrams such as bar models, number lines, tens frames with counters, and partitioning diagrams.

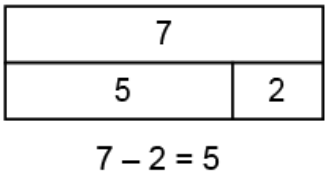


Figure 31: bar model and subtraction equation ($7-2=5$)

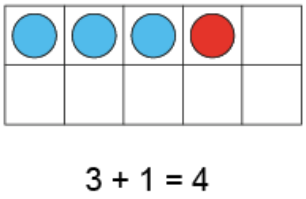


Figure 33: tens frame with counters and addition equation ($3+1=4$)

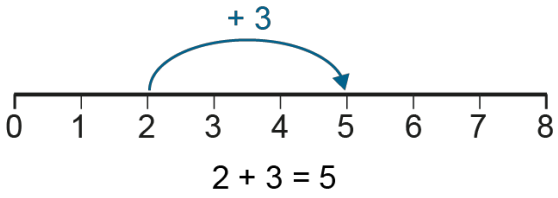


Figure 32: number line and addition equation ($2+3=5$)

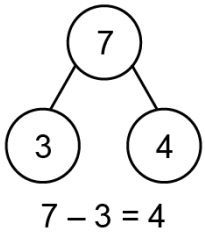


Figure 34: cherry partitioning model and subtraction equation ($7-3=4$)

Making connections

Once pupils have completed this criterion, they should represent the composition and partitioning of numbers to 10 (1AS–1) using addition and subtraction equations.

This criterion and **1AS–1** provide the conceptual prerequisites for pupils to develop fluency in addition and subtraction within 10 (1NF–1).

1AS–2 Example assessment questions

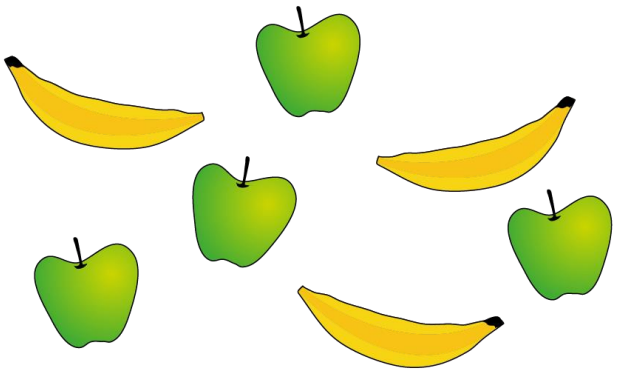
1. Write an equation to represent this story.

   First I had 6 balloons. Then 2 floated away. Now I have 4 balloons.

2. Write an equation to represent this story.

   There are 2 apples. There are 3 oranges. Altogether there are 5 pieces of fruit.

3. Which equation matches the picture? Can you explain your choice?



3 + 3 = 6 8 = 4 + 3 4 = 3 + 1 4 + 3 = 7

4. Holly looks at this picture. She writes $4-1=3$. Explain how Holly's equation represents the picture.

5. Write an equation to represent this picture. Explain how your equation matches the picture.

Assessment guidance: For pupils to meet this criterion, they need to demonstrate mastery of the structures. Correct calculation of the solutions to calculations is not required (this is assessed in **1NF–1**).

Where a question requires pupils to explain their reasoning, this should be done verbally.

1G–1 Recognise common 2D and 3D shapes

Recognise common 2D and 3D shapes presented in different orientations, and know that rectangles, triangles, cuboids and pyramids are not always similar to one another.

1G–1 Teaching guidance

Pupils need a lot of experience in exploring and discussing common 2D and 3D shapes. In the process, they should learn to recognise and name, at a minimum:

- rectangles (including squares), circles, and triangles
- cuboids (including cubes), cylinders, spheres and pyramids

Pupils need to be able to recognise common shapes when they are presented in a variety of orientations and sizes and relative proportions, including large shapes outside the classroom (such as a rectangle marked on the playground or a circle on a netball court). Pupils should be able to describe, using informal language (for example, “long and thin”), the differences between non-similar examples of the same shapes, and recognise that these are still examples of the given shape.

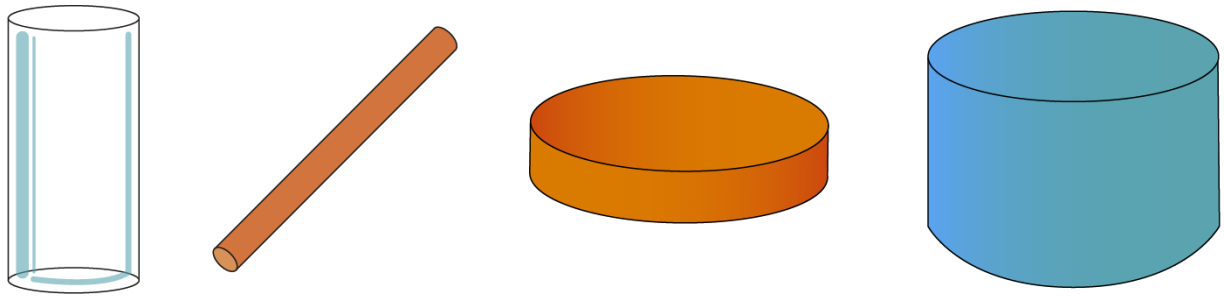


Figure 35: non-similar cylinders

Pupils should practise distinguishing a given named shape type from plausible distractors. These activities should involve exploring shapes (for example, shapes cut from card) rather than only looking at pictures.