

Mental Calculations: Number Bonds to 20

To calculate Number Bonds to 20 at Air Balloon, we use the Number Sense Maths Programme. This provides systematic and structured teaching programmes which develop confidence and flexibility with number and fluency in addition and subtraction facts. The Number Facts Fluency Programme teaches a defined set of addition and subtraction facts and a defined set of calculation strategies. The systematic and structured approach ensures children develop key visual pathways and learn important number relationships. This leads to a deep understanding of number and number relationships, and to fluency in addition and subtraction facts.

These strategies are taught within our Maths No Problem maths lessons, in addition to 15-minute fluency blasts. This guide shows how each strategy appears in the Maths No Problem and Number Sense schemes of work, highlighting their connections and how they progress through our CPA approach (concrete, pictorial and abstract). The bar model method, including the part-whole model, is used at each stage of the CPA approach. The process begins with pupils exploring problems via concrete objects. Pupils then progress to drawing pictorial diagrams, and then to abstract algorithms and notations (such as the + and symbols).



Addition Grid Facts

+	0	1	2	3	4	5	6	7	8	9	10
0	0+0	0+1	0+2	0+3	0+4	0+5	0+6	0+7	0+8	0+9	0+10
1	1+0	1+1	1+2	1+3	1+4	1+5	1+6	1+7	1+8	1+9	1+10
2	2+0	2+1	2+2	2+3	2+4	2+5	2+6	2+7	2+8	2+9	2+10
3	3+0	3+1	3+2	3+3	3+4	3+5	3+6	3+7	3+8	3+9	3+10
4	4+0	4+1	4+2	4+3	4+4	4+5	4+6	4+7	4+8	4+9	4+10
5	5+0	5+1	5+2	5+3	5+4	5+5	5+6	5+7	5+8	5+9	5+10
6	6+0	6+1	6+2	6+3	6+4	6+5	6+6	6+7	6+8	6+9	6+10
7	7+0	7+1	7+2	7+3	7+4	7+5	7+6	7+7	7+8	7+9	7+10
8	8+0	8+1	8+2	8+3	8+4	8+5	8+6	8+7	8+8	8+9	8+10
9	9+0	9+1	9+2	9+3	9+4	9+5	9+6	9+7	9+8	9+9	9+10
10	10+0	10+1	10+2	10+3	10+4	10+5	10+6	10+7	10+8	10+9	10+10

Subtraction Grid Facts

-	0	1	2	3	4	5	6	7	8	9	10
0	0-0										
1	1-0	1-1									
2	2-0	2-1	2-2								
3	3-0	3-1	3-2	3-3							
4	4-0	4-1	4-2	4-3	4-4						
5	5-0	5-1	5-2	5-3	5-4	5-5					
6	6-0	6-1	6-2	6-3	6-4	6-5	6-6				
7	7-0	7-1	7-2	7-3	7-4	7-5	7-6	7-7			
8	8-0	8-1	8-2	8-3	8-4	8-5	8-6	8-7	8-8		
9	9-0	9-1	9-2	9-3	9-4	9-5	9-6	9-7	9-8	9-9	
10	10-0	10-1	10-2	10-3	10-4	10-5	10-6	10-7	10-8	10-9	10-10
11		11-1	11-2	11-3	11-4	11-5	11-6	11-7	11-8	11-9	11-10
12			12-2	12-3	12-4	12-5	12-6	12-7	12-8	12-9	12-10
13				13-3	13-4	13-5	13-6	13-7	13-8	13-9	13-10
14					14-4	14-5	14-6	14-7	14-8	14-9	14-10
15						15-5	15-6	15-7	15-8	15-9	15-10
16							16-6	16-7	16-8	16-9	16-10
17								17-7	17-8	17-9	17-10
18									18-8	18-9	18-10
19										19-9	19-10
20											20-10

Calculation Strategies

One More, One Less

Two More, Two Less: Think Odds and Evens

Number 10 Fact Families

Five and A Bit

Know About Zero

0

Doubles and Near Doubles

Number Neighbours: Spot the Difference

7 Tree 9 Square

Ten and A Bit

Make 10 and Then

Adjusting

Swap It

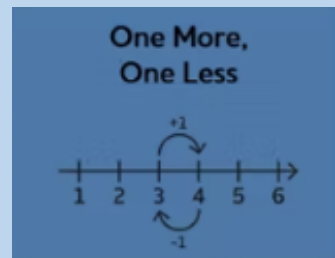
1 + 6

Mental Calculations: Number Bonds to 20

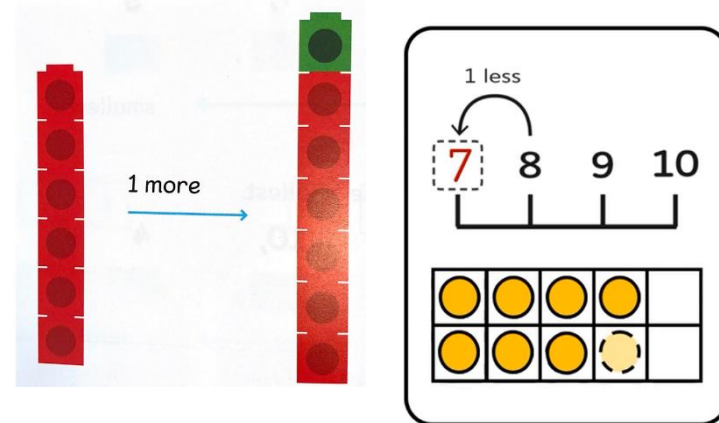
Represent, use and recall number bonds and related subtraction facts within 20.

Strategy

One more, One Less: When we add one, we get the next counting number. When we subtract one, we get the previous counting number.



Concrete Cubes, 10 frames and double sided counters are used alongside number lines and part-whole models.



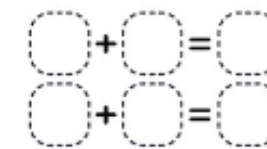
Pictorial Images, including picture stories, support children to solve and create number sentences. Images of 10 frames, cubes and number lines continue to be used.

This shows 4.

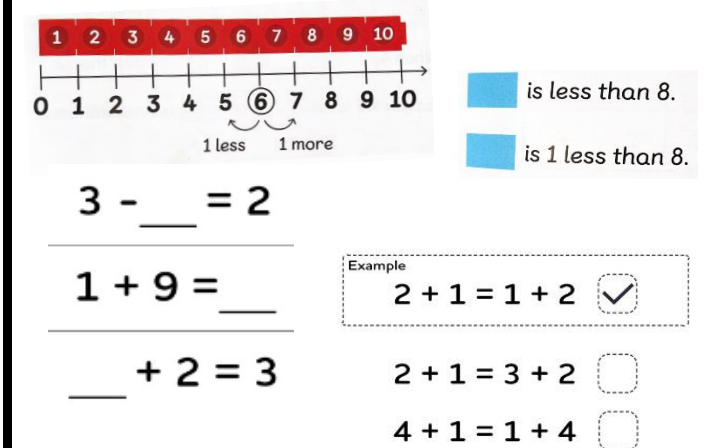


is 1 less than 4.

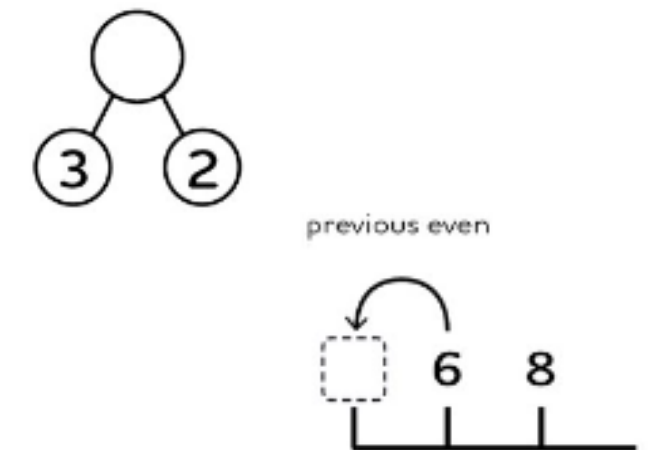
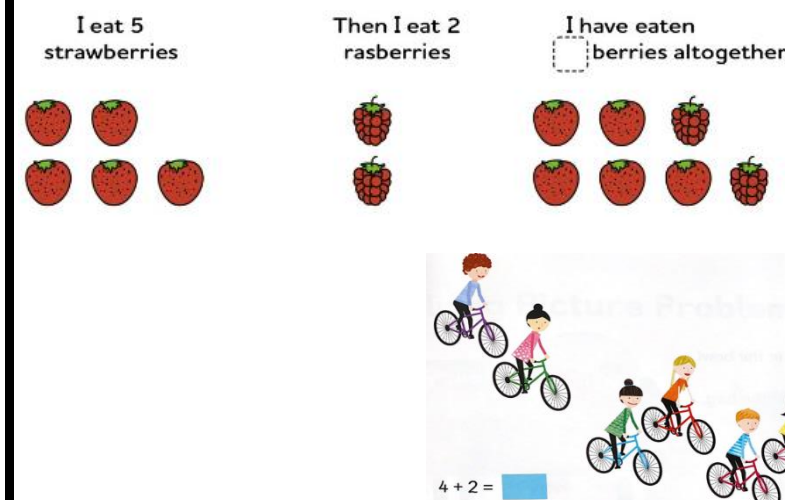
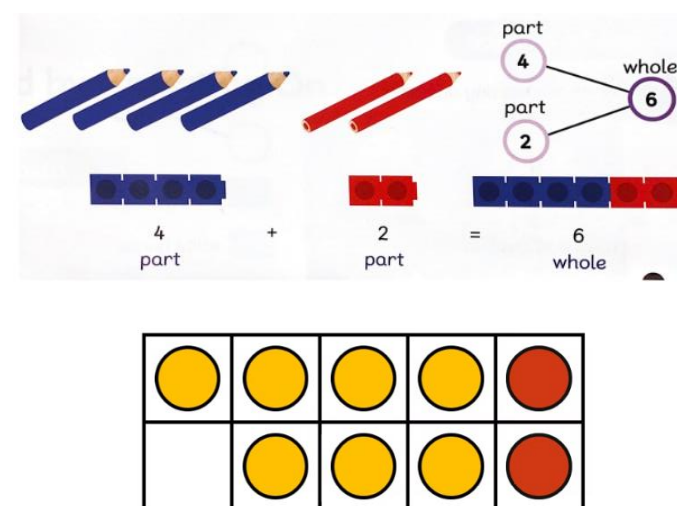
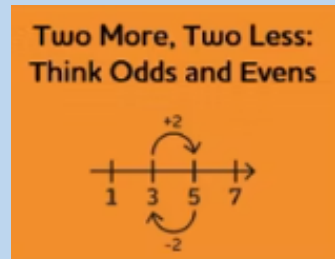
is 1 more than 4.



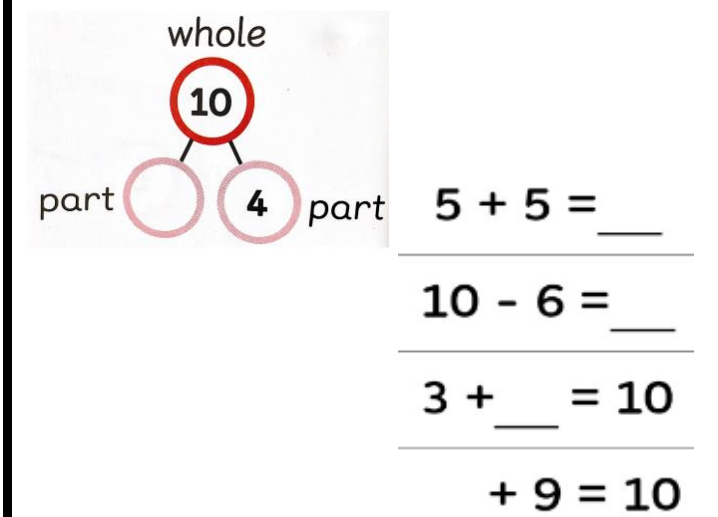
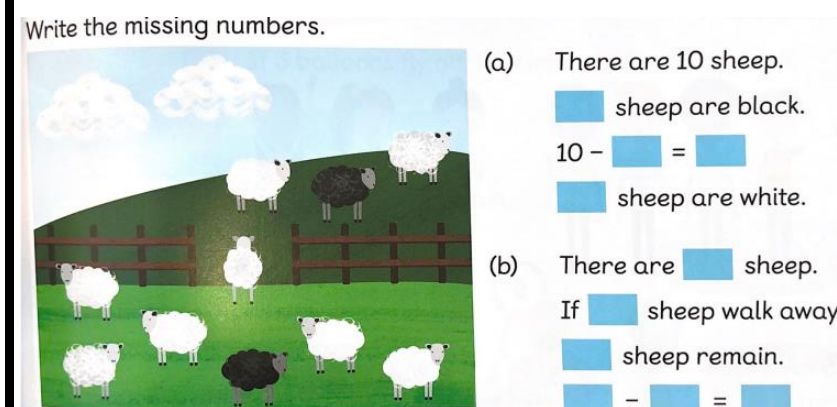
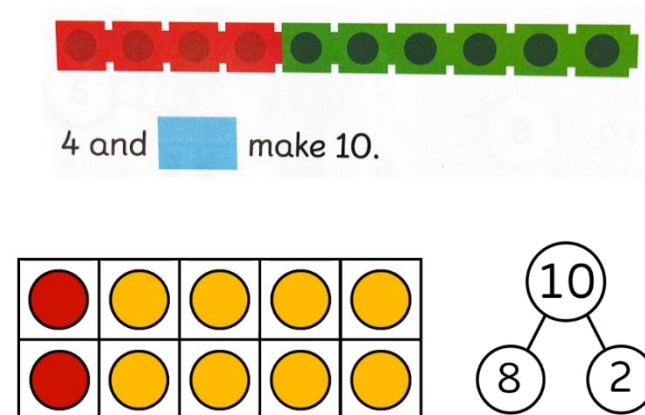
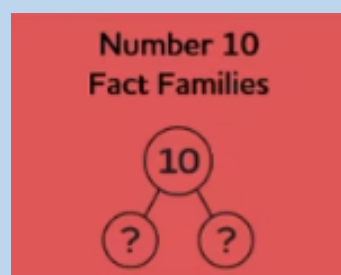
Abstract Children solve written calculations. This includes missing number problems and part-whole models.



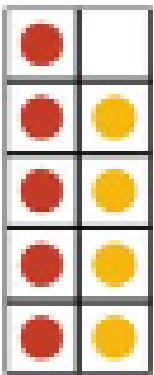
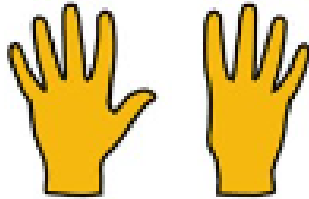
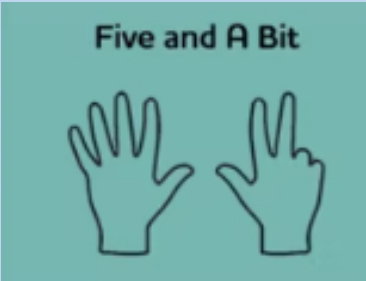
Two More, Two Less; Think Odds and Evens: If we add two to a number, we go from odd to next odd or even to next even. If we subtract two from a number, we go from odd to previous odd or even to previous even.



Number 10 Fact Families: Go beyond just recalling the pairs of numbers that add to 10. Make sure that we can also spot additions and subtractions which we can use number bonds to 10 to solve.



Five and a Bit: The numbers 6, 7, 8 and 9 are made up of 'five and a bit'. This can be shown on hands, and supports decomposition of these numbers into their five and a bit parts.



Make a family of addition and subtraction facts.



+

=

-

=

+

=

-

=

$$\triangle + 5 = 8$$

Make a family of addition and subtraction facts.

\triangle

+

5

=

8

8

-

\triangle

=

5

+

=

+

=

$$10 - 9 = \underline{\hspace{1cm}}$$

$$8 - \underline{\hspace{1cm}} = 5$$

Know about 0: When we add 0 to or subtract 0 from another number, the total remains the same/ If we subtract a number from itself, the difference is 0.



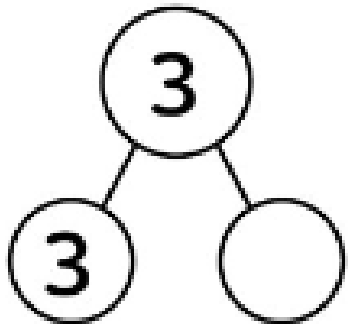
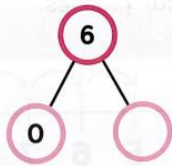
$5 + 0 = \square$

There are oranges altogether.



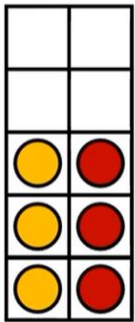
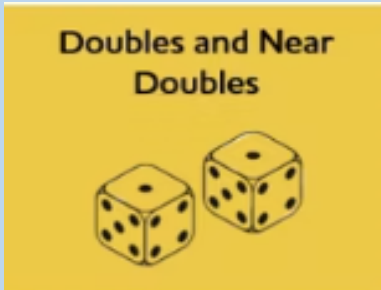
$6 - 0 = \square$

pelicans are still on the rail.

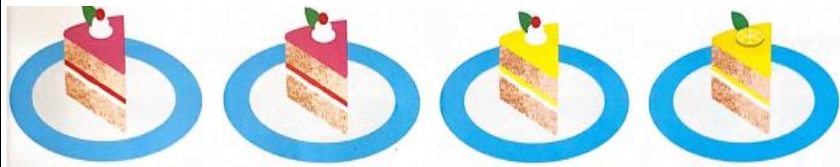


$$3 - 3 = \underline{\hspace{1cm}}$$

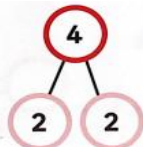
Doubles and Near Doubles: Memorise doubles of numbers to 10, using a visual approach. Then use these known double facts to calculate near doubles and hidden doubles.



Double 3 is 6



There are 4 slices of cake.
2 slices are pink.
2 slices are yellow.



$$2 - 1 = \underline{\hspace{1cm}}$$

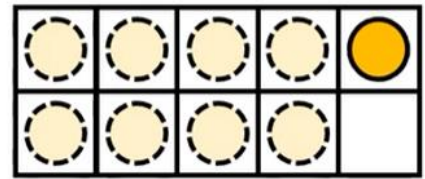
$$6 - 3 = \underline{\hspace{1cm}}$$

$$\underline{\hspace{1cm}} = 4 + 4$$

Number neighbours; Spot the Difference: Adjacent numbers have a difference of 1. Adjacent numbers have a difference of 2.

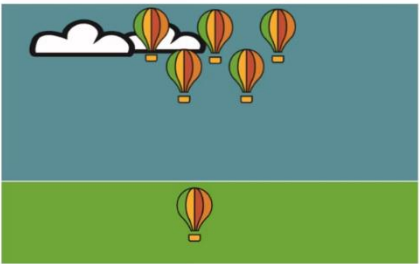


Next door number neighbours



$9 - 8$

There are 6 hot air balloons.
5 hot air balloons take off.
How many are still on the ground?



$6 - 5 = 1$

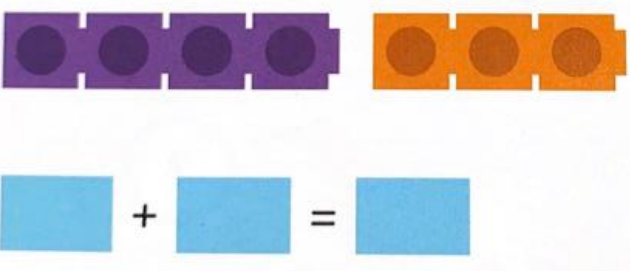
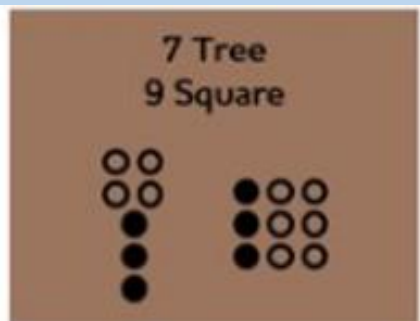
1 hot air balloon is still on the ground.

$4 - 2 = \underline{\hspace{1cm}}$

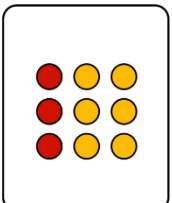
$9 - 8 = \underline{\hspace{1cm}}$

$\underline{\hspace{1cm}} = 5 - 3$

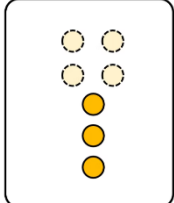
7 Tree and 9 Square: Use these visual images to remember addition and subtractions fact families that children can find tricky.



$3 + 6 = 9$



$7 - 4 = 3$



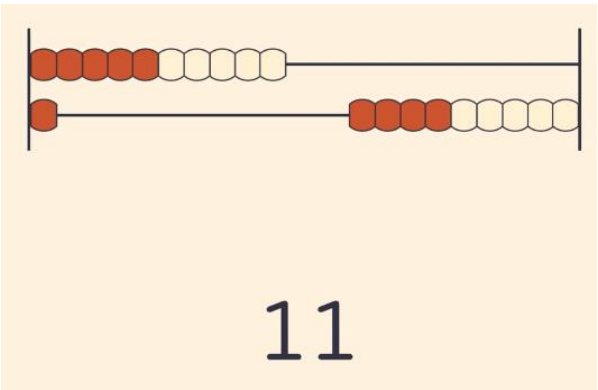
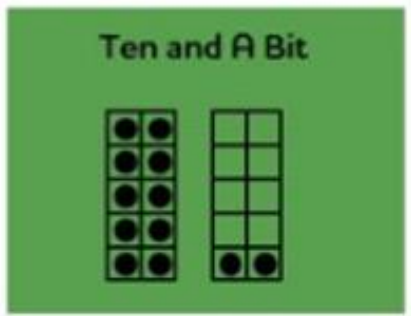
$3 + 4$

$3 + 6$

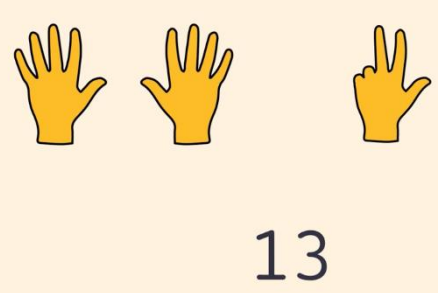
$4 + 3$

$6 + 3$

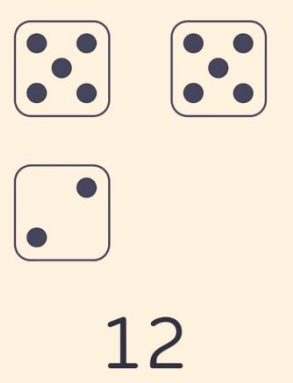
Ten and A Bit: The numbers 11-20 are made up of 'Ten and a Bit'. Recognising and understanding this structure enables addition and subtraction facts involving their constituent parts.



11



13



12

$10 + \underline{\hspace{1cm}} = 15$

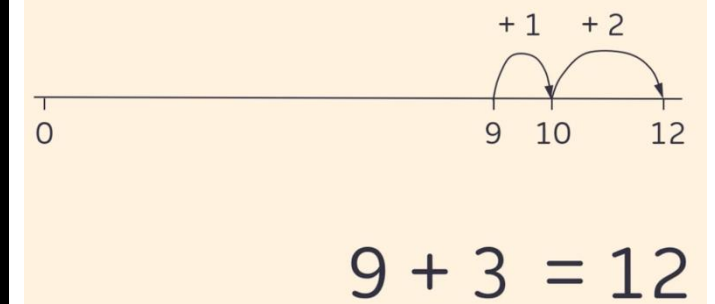
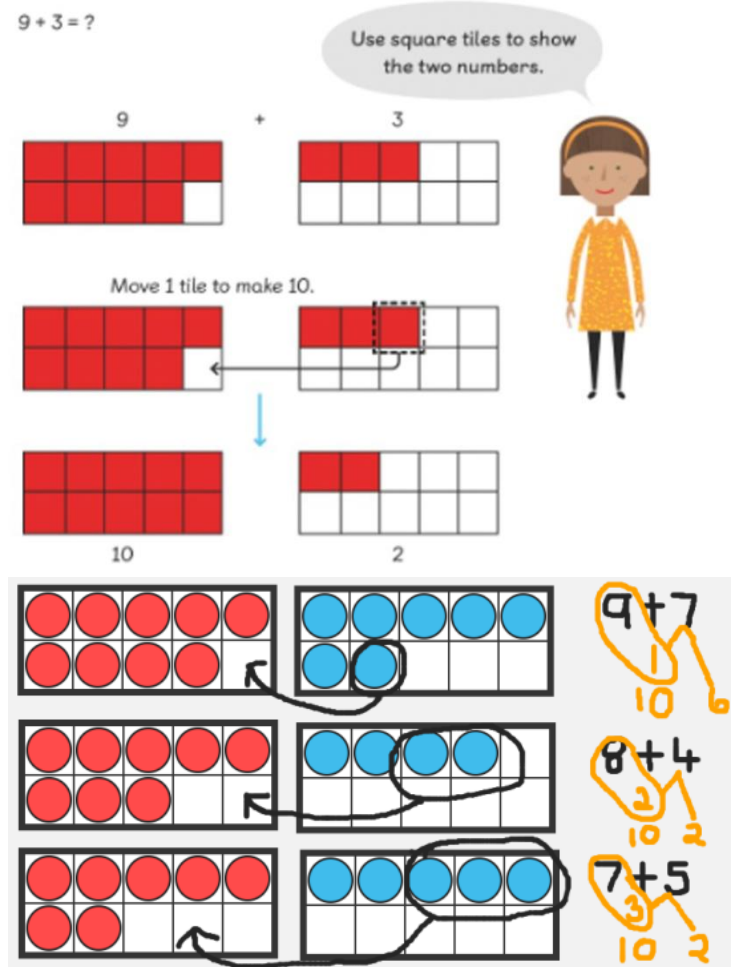
$10 + 6 = \underline{\hspace{1cm}}$

$17 - 7 = \underline{\hspace{1cm}}$


$6 + 10 = \underline{\hspace{1cm}}$

Make 10 and Then

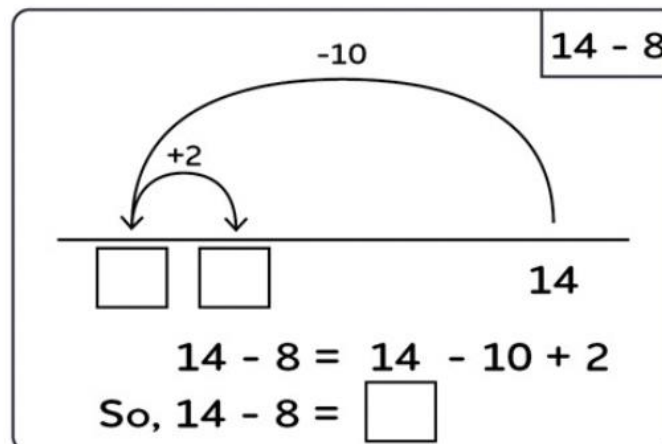
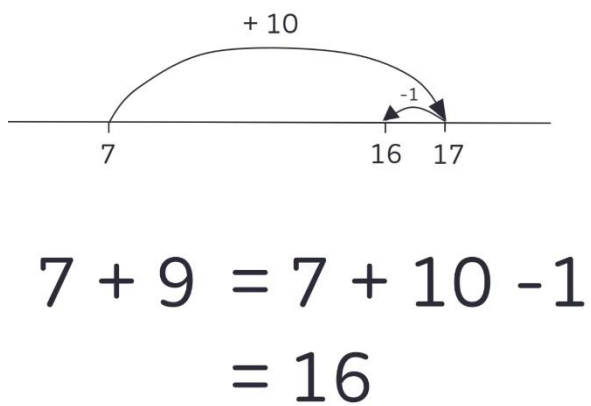
The diagram illustrates the strategy 'Make 10 and Then'. It shows two ten-frames. The first ten-frame has 9 black dots, with one empty space in the top-right corner. An arrow points from this empty space to the top-left corner of a second ten-frame. This second ten-frame contains 1 white dot in the top-left corner and 4 black dots in the bottom row, totaling 5 dots.



Adjusting



The diagram shows a horizontal line. Above the line is a large semicircle with the label $+10$ above its peak. Below the line, towards the right, is a smaller semicircle with the label -1 above its peak. This represents a positive adjustment of 10 and a negative adjustment of 1.



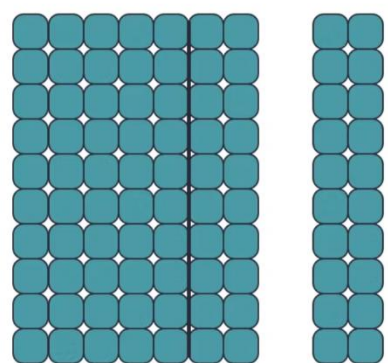
On the book shelf there were 5 books about detectives and 6 books about explorers. How many books were there on the shelf altogether?

Going beyond Number Bonds within 20...

Connections with multiples of 10 and 100:

Children can be taught to apply the addition and subtraction facts within 10 that they know, to add and subtract groups of 10.

For example, we know $2+6=8$ so 2 tens+6 tens=8 tens. $20+60=80$.



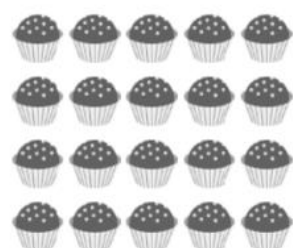
$$7 + 2 = 9$$

$$70 + 20$$

$$2 + 4 = \square$$



$$20 + 40 = \square$$



She has 3 baskets left after giving away 1 basket of apples.

She has 30 apples left after giving away 10 apples.

$$3 + 1 = 4$$

$$4 - 1 = 3$$

$$4 - 1 = 3$$

$$4 \text{ tens} - 1 \text{ ten} = 3 \text{ tens}$$
$$40 - 10 = 30$$

Guided Practice

Subtract.

(a) $5 - 2 = \square$

$$50 - 20 = \square$$

(b) $9 - 1 = \square$

$$90 - 10 = \square$$

Connections with larger numbers:

When adding 2-digit numbers and a 1-digit number, counting on and back can be taught to begin with using physical objects (concrete) and number lines (abstract).

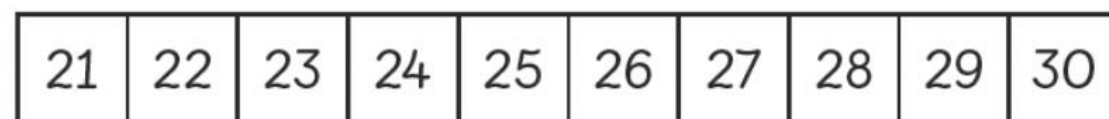
Once children are secure with addition and subtraction facts within 20, connections with larger numbers can be made. For example, 22 has been partitioned to 20 and 2 to indicate the 7 ones will be added to the 2 ones. Therefore, the '2 more 2 less' strategy can be used here to solve this calculation.

Let's Learn

Add 25 and 3.

Method 1

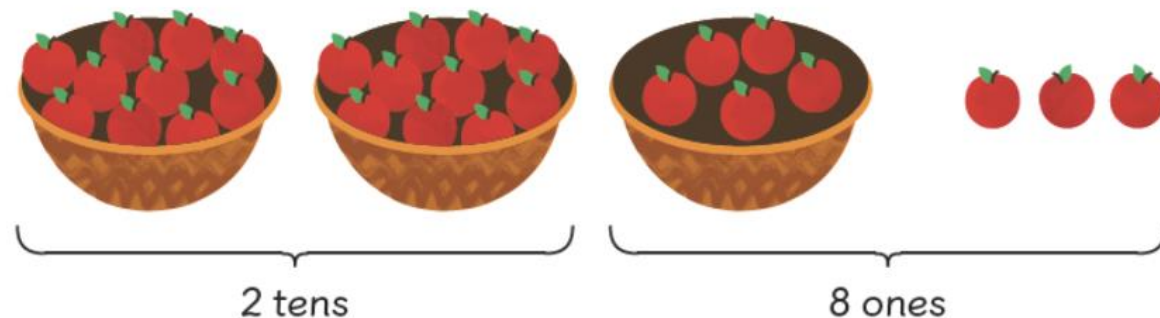
Count on from 25.



$$25 + 3 = 28$$

Method 2

Add ones.



$$25 + 3 = 28$$

22 and 7.

