

Key mathematical idea Addition – aggregation structure

Calculating

Using the language of addition

1a

Context

Aims

- To check children have language of addition and are able to show understanding with Numicon.
- To teach children how to use the word cards 'add' and 'and' as they use the spoken word.
- To add without counting.
- To begin to understand that addition can be done in any order.

Language

add, and, equals, altogether, number sentence, addition

Assessment

Record of Progress:
Calculating 4, 5, 6, 7

The Activities

Activity 1

Have ready: Numicon Shapes 1-10; two Spinners with 1-5 and 6-10 Overlays (Photocopy Master pg 116); Numeral Cards (Photocopy Master pg 115); words for addition (Photocopy Master pg 120).

Preparation

Children must be able to use the language of addition clearly, e.g. "I am putting 3 and 2 together to equal 5". (Revise Firm Foundations Kit addition activities.)

Step 1

- Choosing a Spinner, child spins one number and then selects some Shapes to make it.
- Say clearly what has been made, e.g. "3 and 2 equals 5"; "2 add 3 equals 5". Emphasise that the total of 5 can be seen without counting the holes.
- Using numeral and word cards, set out "3 add 2 equals 5" as each word is said.
- Read the 'number sentence' together. (Children should be familiar with both 'and' and 'add'. **Photo 1**)

Step 2

- Set out an addition with numeral and word cards. Ask child to read them and to find the appropriate Shapes.
- Children need to be secure in using the words and cards correctly before they move on to learning the addition symbol.

Extension

Mental arithmetic

Make additions on board using Numicon Shapes and/or numerals with word cards. Encourage children to say number sentence.

Independent practice

Working in pairs

Have ready: Feely Bag containing two of each Numicon Shapes 1-5; Numeral Cards (Photocopy Master pg 115); words for addition (Photocopy Master pg 120).

- Children take turns to take two Shapes from the Feely Bag and put out numeral and word cards to show the corresponding addition sentence.

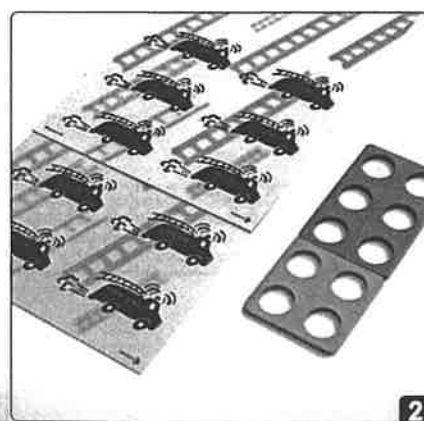
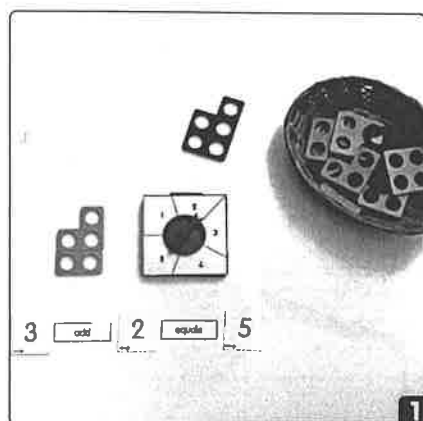
Using and applying

Have ready: Arithmetic Story Cards; Numicon Shapes.

- Compose a story based on one of the Arithmetic Story Cards and, whilst telling it to the children, model the arithmetic with Shapes. Children then compose their own stories. **Photo 2**

Key question

What special word do we use when we put two Shapes together? (Answer: add)



Introducing the '+' symbol

1b

Context

Aims

- To introduce symbol of addition.

Language

add, make, altogether, equals, additions, symbol, sign, action

Assessment

Record of Progress:
Calculating 8-14

The Activities

Activity 1

Preparation

Help children to understand the usefulness of signs and symbols around them, e.g. road signs, exit signs, by taking them on a 'maths and geography walk' around the local environment, to look for signs and symbols which give instructions, warn, direct, etc. Also refer to signals we make ourselves, like beckoning, waving and sign language.

Step 1

- Ask children to think of an addition.
- Ask children to say their additions and write them, e.g. 5 add 4 equals 9, 3 add 4 equals 7, 2 add 6 equals 8, etc.

Step 2

Say: "Writing the additions like this is taking a long time. I know a special symbol that will help me write my maths more quickly." Show the children the + symbol.

Step 3

- Tell children there is an action to help them remember the + symbol. Show children how to do the action, whilst saying: "I'm putting them together, I'm adding".
- Ask children to repeat "we're putting them together, we're adding" as they make the action. **Photo 1**

Step 4

Repeat Step 1 writing '+' instead of 'and' or 'add'.

Extension

Mental arithmetic

Encourage children to use the action for addition when answering additions.



Independent practice

Working in pairs

Have ready: two Spinners each with Overlay 1-5 (Photocopy Master pg 116); Numicon Shapes; Numeral Cards (Photocopy Master pg 115); words for addition (Photocopy Master pg 120); paper.

- Children take turns to spin each Spinner, pick up corresponding Shapes, and add them together to find the total. Children can record the addition either by putting out cards or writing.

Using and applying

Have ready: Arithmetic Story Cards; Numicon Shapes.

Compose a story based on one of the Arithmetic Story Cards. Whilst telling it to the children, model the arithmetic with Numicon Shapes. Children then compose their own stories.

Key question

What symbol do we use to show 'add'?



5 add 4 equals 9
3 add 4 equals 7
2 add 6 equals 8

Preparation for understanding equivalence

2a

Context

Aims

- To prepare for an understanding of equivalence.

Language

greater than, smaller than, greatest, largest, heaviest, smallest, greater, lesser, larger, heavier, smaller, less, more, compare

Assessment

Because these activities are preparation for understanding equivalence, there is no specific statement on the Record of Progress.

The Activities

Activity 1

Using $<$ $>$ symbols with pictures

Have ready: $<$ $>$ symbols (Photocopy Master pg 120).

- Introduce the symbols $<$ and $>$ with pictures, e.g. a house $>$ a car; a flower $<$ a tree. **Photo 1**

Activity 2

Using $<$ $>$ with Shapes

Have ready: Feely Bag with Numicon Shapes 1-10; $<$ $>$ symbols (Photocopy Master pg 120).

Step 1

Take two Shapes from the Bag, ask children to say which Shape is greater, and then place the card showing $>$ between the Shapes. With children, say the number sentence, e.g. "9 is greater than 4".

Step 2

Take two other Shapes from the Bag, ask children which Shape is lesser and places the $<$ card between the Shapes. With children, say the number sentence, e.g. "5 is less than 8".

Step 3

Repeat with other Shapes using both $<$ and $>$. **Photo 2**

Activity 3

Compare Shapes

Have ready: Pan Balance; Numicon Shapes; $<$ $>$ symbols (Photocopy Master pg 120).

Step 1

- Introduce the Pan Balance.
- Take two Shapes and ask children which is the greater (larger, heavier).

Step 2

Put one Shape into each Pan and ask children what they can see. After discussion, put the symbol in place and ask children to say the number sentence. **Photo 3**

Extension

Activity 1 – Individual work

Children draw their own pictures using the symbols to show the $<$ $>$ comparison. **Photo 1**

Activity 2 – Individual work

Have ready: Numicon Shapes; $<$ $>$ symbols (Photocopy Master pg 120).

- Children either place a card showing $<$ or $>$ between two Shapes, or draw around Shapes writing the appropriate symbol between them.

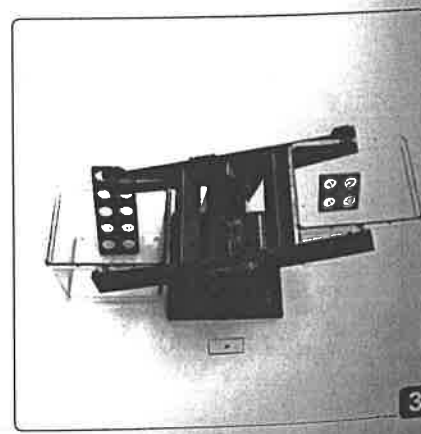
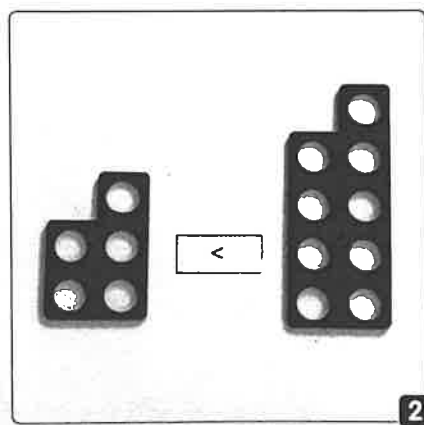
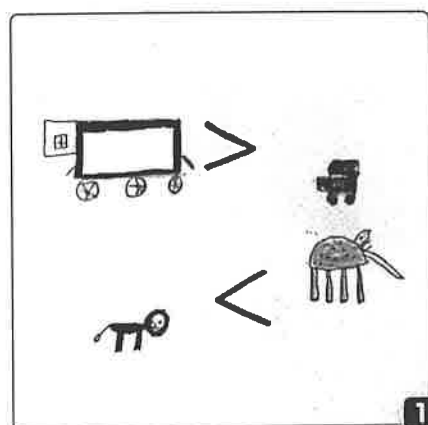
Activity 3 – Working in pairs

Have ready: Pan Balance; Numicon Shapes; $<$ $>$ cards (Photocopy Master pg 120).

- Each child chooses a Shape and puts it in one of the Pans. They then decide how to place the $<$ $>$ symbol.

Key questions

- Which symbol do we use to show that 7 is greater than 5?
- What can I say about these two Shapes (showing 7 and 5)?



Introducing the '=' symbol

2b

Context

Aims

- To introduce '=' as symbol of balance or equivalence.

Language

more, larger, bigger, greater, fewer, smaller, less, balances, equals, symbol, between

Assessment

Record of Progress:
Using Pattern 44, 45, 46

The Activities

Activity 1

Have ready: Pan Balance; two sets of Numicon Shapes 1-10; word card 'balances' (Photocopy Master pg 120).

Step 1

Take two identical Shapes, put them in the Pan Balance and ask: "What can I say about these two Shapes?" (Some children may suggest the word 'balances'.)

Step 2

Explain that the symbols < and > cannot now be used. Show children the card with the word 'balances'. **Photo 1**

Step 3

With children, experiment to find different combinations of Shapes which will balance. Explain that in mathematics the word 'equals' is used instead of 'balances'. Write a few examples showing both words, e.g. $5 + 4$ balances 9 , $3 + 4$ equals 7 , 8 balances $2 + 6$, etc. **Photo 2**

Extension

Individual work

Children practise Step 3.

Activity 2

- Say: "In maths we have a special symbol to use for 'balances' and 'equals'." Show children the written = symbol.
- Show children the action or sign for =

Photo 3

Mental arithmetic

Have ready: Numicon Shapes.

- Ask children for equivalent combinations of Shapes for each number to 10.

Independent practice

Working in pairs

Have ready: two Spinners with Overlays 1-5 (Photocopy Master pg 116).

- Children spin both Spinners, write down the two numbers and choose which symbol to write between them, e.g. $4 < 5$, $3 = 3$, etc.

Working in pairs

Have ready: Pan Balance; Numicon Shapes.

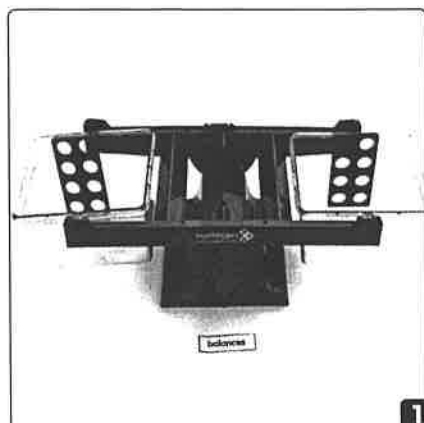
- Children find Shapes that balance, e.g. $2 + 3 = 5$; $10 = 3 + 7$, etc.

Using and applying

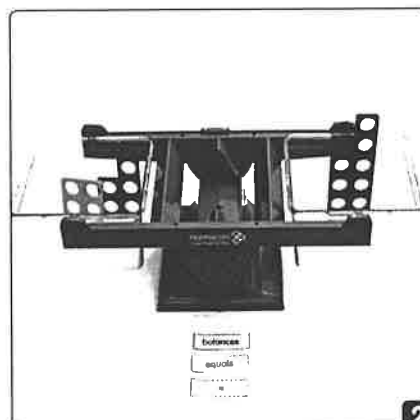
Use an Arithmetic Story Card and ask children to use the word 'equals' in an addition story for the number of objects on the Card.

Key question

What symbol do we use to show that two amounts are equal?



1



2



3

Introducing the '-' symbol

3a

Context

Aims

- To check children have language of subtraction and can show understanding with Numicon.
- To teach children how to use the word cards 'take away' and 'subtract' as they say them.
- To do subtraction without counting.
- To introduce the subtraction symbol.

Language

take away, subtract, minus, equals, leave

Assessment

Record of Progress: Calculating 16-28

The Activities

Activity 1

Have ready: Numicon Shapes; Numeral Cards (Photocopy Master pg 115); words for subtraction and = symbol card (Photocopy Master pg 120); Spinner with 1-5 Overlay (Photocopy Master pg 116).

Preparation

Children must be able to use the language of subtraction clearly, e.g. "5 take away 3 equals 2." (Revise Firm Foundations Kit subtraction activities.)

Step 1

- Take a Shape larger than 5 and spin a number, reminding children that to 'take away', part of the Shape needs to be hidden.
- Show the subtraction and say "I am subtracting, I am taking away" while hiding part of the Shape. **Photo 1**

Step 2

- Using the cards, set out the subtraction '8 take away 2 = 6' with children. Children read the subtraction.
- Set out the subtraction again using 'subtract' or 'minus'.
- Repeat the activity with different Shapes and different subtraction words. **Photo 2**

Step 3

Put out a subtraction using word cards. Children show it with Shapes.

Step 4

Write several subtractions and say: "There is a symbol for subtraction as well." Write the subtraction symbol. Show children the action by stretching out one arm horizontally, then, pretending to take something with outstretched hand, pull it straight back. **Photo 2 & 3**

Extension

Mental arithmetic

Encourage children to use the action for subtraction when answering subtractions.

Independent practice

Working in pairs

Have ready: Numicon Shapes 6-10; Spinner with 1-5 Overlay (Photocopy Master pg 116); paper.

- Children each choose a Shape and spin a number to take away.
- Children can record the subtraction either by putting out cards or writing.

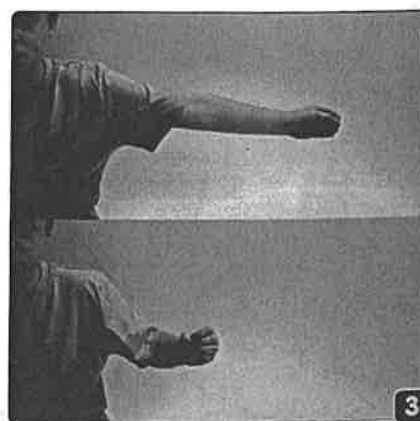
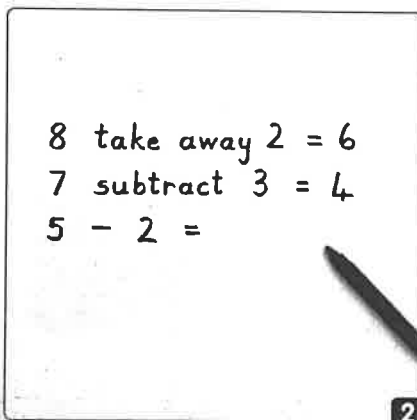
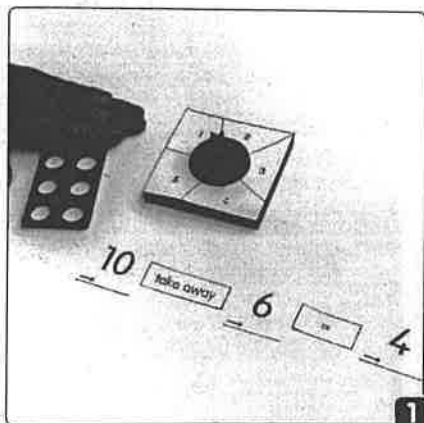
Using and applying

Have ready: Arithmetic Story Cards; Numeral Cards (Photocopy Master pg 115) and arithmetic symbols (Photocopy Master pg 120).

- Use the Arithmetic Story Cards for children to make up their own subtraction stories. Illustrate subtraction rhymes using Shapes, numerals and symbol cards.

Key question

What symbol do we use for take away, minus, subtract?



Key mathematical idea Subtraction – comparison and difference structure

Calculating

Subtraction – difference

7a

Context

Aims

- To understand the comparison and difference structure of subtraction.
- To know that the difference between consecutive numbers is 1 and between identical numbers is 0.

Language

take away zero, take nothing away, leaves, equals, none, odd, even, subtract, take away, difference between, minus

Assessment

Record of Progress:
Calculating 18-28

The Activities

Activity 1

Have ready: Numicon Shapes; word cards (Photocopy Master pg 120).

Step 1

- Take an 8-shape and a 2-shape and ask children what the difference is between them.
- Discuss children's answers (some children may first mention that the colours are different, others the size).

Step 2

- Put the 2-shape over the bottom of the 8-shape so children can see the difference in the 6-pattern.
- With children, say: "the difference between 8 and 2 is 6" and "the difference between 2 and 8 is 6".

Step 3

- Put out the subtraction with word cards: the difference between 8 and 2 = 6.
- With children, read the subtraction from the cards. **Photo 1**

Step 4

- Explain that there is a symbol for difference subtraction and put out the cards $8 - 2 = 6$. Ask children what they notice.
- Discuss children's answers and explain that when we write difference subtractions we use the same symbol as for take away subtractions. Remind children of the subtraction action.

Activity 2

Have ready: Numicon Shapes; word cards (Photocopy Master pg 120).

Step 1

- Put out a row of Shapes 1-10 (not in order), with a second set to hand.
- Point to the 8-shape and ask children to find the Shape which, when it is placed on top of the 8, will show a difference of 0.
- Show with word cards: $8 - 8 = 0$.
- Repeat with other shapes. **Photo 2**

Extension

Mental arithmetic

Ask children difference subtractions.

Independent practice

Working in pairs

Have ready: two of each Numicon Shape.

- Each child takes a Shape. Children compare their Shapes, say the difference and record the subtraction.

Working in pairs

Have ready: Feely Bag containing Shapes 1-9; Shapes 2-10 in order.

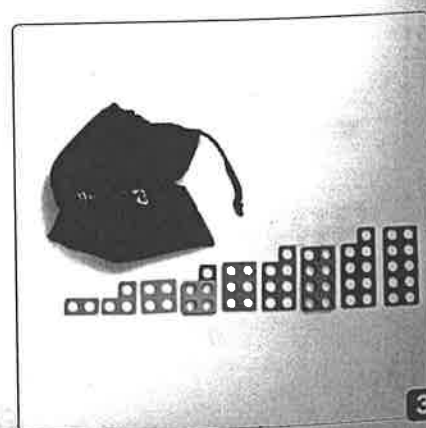
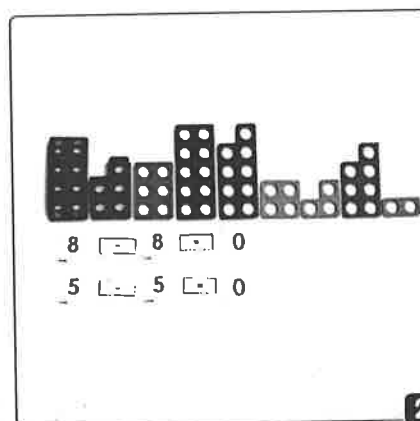
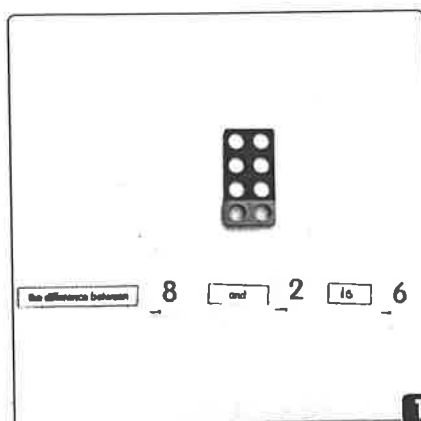
- Children take a Shape from the Bag and put it on top of the Shape to show a difference of 1. **Photo 3**

Using and applying

Make up comparison and difference stories. Ask children to compose their own.

Key question

Can you give me two numbers where the difference is 1?



Addition and subtraction facts of 10

7b

Context

Aims

- To reinforce knowledge of facts of 10, so children have immediate recall of these facts.

Language

more, add, plus, sum, subtract, total, addition, subtraction, 'how many more to make?'

Assessment

Record of Progress:
Calculating 14, 15, 29

The Activities

Activity 1

Have ready: Numicon Shapes.

Step 1

- Ask children to set out the pairs of Shapes that make 10 (in any order).
- Looking at each pair of Shapes in turn, say the additions together.

Photo 1

Step 2

Move away the top set of Shapes, leaving the other set in a row on the table. **Photo 2**

Step 3

- Point to the first Shape and ask: "What do we add to this shape to equal 10?"
- Continue until all the pairs of Shapes that equal 10 are completed. **Photo 3**

Activity 2

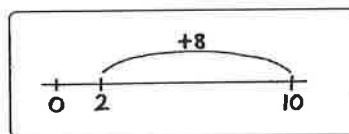
Have ready: Numicon Shapes; empty number line.

Step 1

Hold up a 2-shape and ask children where to mark 2 on an empty number line.

Step 2

- Ask children: "2 and 'what' equal 10?"
- Mark the jump from 2 to 10 and ask children how big the jump is.
- Write +8 above the 'jump'.



Note: consolidate children's knowledge of addition and subtraction facts of all numbers to 10 by repeating these activities with each number.

Extension

Mental arithmetic

Ask the children to answer mental arithmetic problems that use addition facts of 10.

Independent practice

Game for two players

Have ready: Numicon Shapes; Feely Bag.

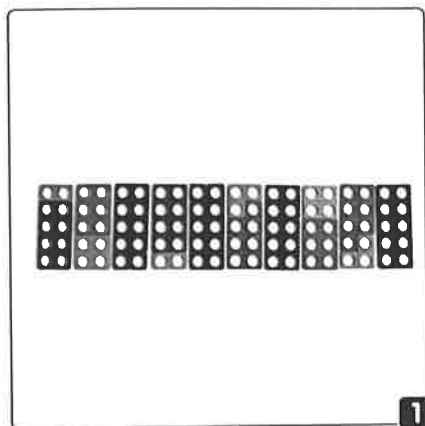
- Player 1 chooses two Shapes that equal 10 and puts them in the Bag, then gives the other player one of the Shapes.
- Player 2 says what the remaining Shape in the Bag is.
- Player 1 reveals the Shape from the Bag.
- Both players put their Shapes together to show 10.

Using and applying

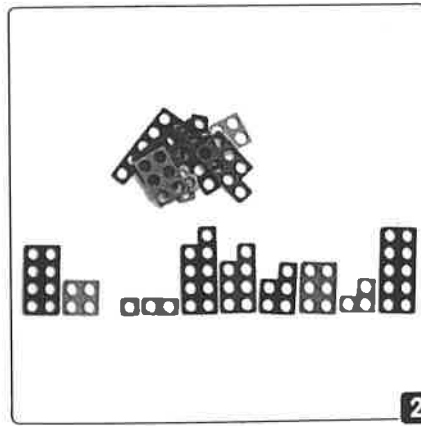
Use the Arithmetic Story Cards for children to make up an 'addition or subtraction story' using a fact of 10.

Key questions

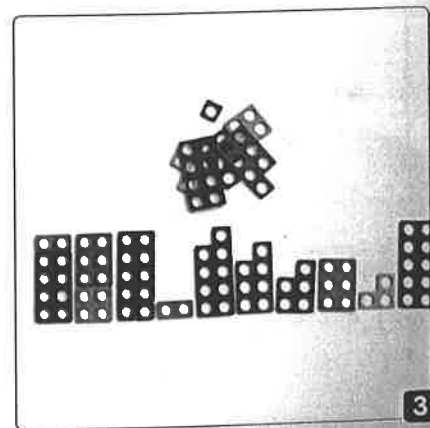
- Can you say all the pairs of numbers that total 10?
- Which subtractions from 10 do you know?



1



2



3

Relationship between addition and subtraction

8a

Context

Aims

- To show relationships between addition and subtraction.

Language

add, more, take away, equals, the difference between, on top of, beside, number sentence, inverse

Assessment

Record of Progress:

At the present time ideas relating specifically to inverse are not included in the Record of Progress. However success in these activities depends on understanding ideas introduced in the earlier activities on addition and subtraction and the 'doing and undoing' relationship between them.

The Activities

Activity 1

Have ready: Numicon Shapes; Numeral Cards (Photocopy Master pg 115); arithmetic symbols (Photocopy Master pg 120).

Step 1

Place a 5-shape on top of an 8-shape and ask children: "What is the difference between these two Shapes?" Set out cards to show the subtraction $8 - 5 = 3$. **Photo 1**

Step 2

Add on a 3-shape to the 5-shape and say: "5 add 3 equals 8". Move the Numeral Cards and place an addition symbol to show $5 + 3 = 8$. Move them again to show $3 + 5 = 8$. **Photo 2**

Step 3

Point to the 5- and 3-shape on top of the 8 and ask children: "What subtraction can you see if I take away the 3?" Remove the 3-shape and say "8 subtract 3 equals 5". Move the cards to show $8 - 3 = 5$. Repeat with other examples. **Photo 3**

Step 4

Extend children's understanding of inverse by using the words "I am putting Shapes together that I am adding" and "Now I am subtracting, I am taking the Shapes apart".

Extension

Mental arithmetic

Have ready: Numicon Shapes.

- Give children simple mental subtractions. When they have answered, ask them for the inverse addition facts (support with Numicon Shapes).

Independent practice

Working in pairs

Have ready: Number triples shown with Numicon Shapes, e.g. 9, 6, 3; 8, 6, 2; 10, 7, 3 etc.

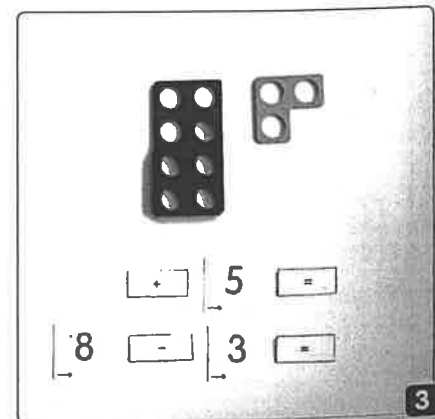
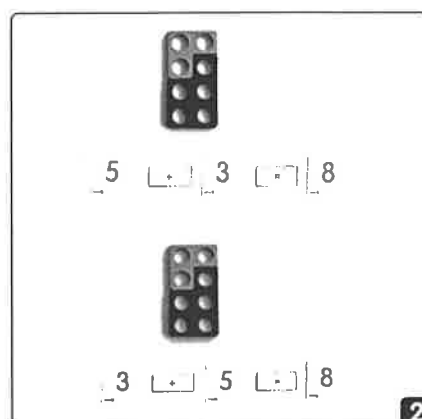
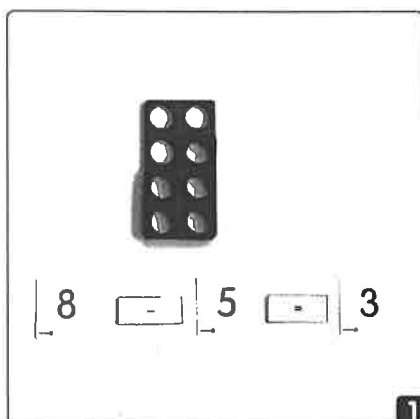
- Children choose a number triple, and use them to find out two additions and two subtractions. Record by setting out cards or writing. Some children may like to look for more.

Using and applying

Tell a subtraction story. Involve the children in retelling the inverse addition story.

Key question

Can the child explain, when trying to solve a subtraction, which addition fact can help? (e.g. $6 - 4 = 2$ because $2 + 4 = 6$ and $4 + 2 = 6$.)



Using facts of ten in three digit addition

9a

Context

Aims

- To use the facts of 10 to solve problems.
- To know that adding a single digit to 10 will equal a teen number.
- To understand more than two numbers can be added.

Language

recall, facts, add, more, plus, how many more to make, teens number, equals, pair, middle, centre, on, in, after

Assessment

Record of Progress:
Calculating 14, 15, 29

The Activities

Activity 1

Have ready: Numicon Shapes; Numeral Cards (Photocopy Master pg 115); Addition Frame (Photocopy Master pg 119).

Step 1

Ask children to recall all pairs of numbers that equal 10. Set out each pair with Shapes.

Step 2

With children, build a 'teen' number line. Point to each number in turn and ask children to say the addition they can see: $10 + 1$, $10 + 2$, etc. **Photo 1**

Step 3

Note: the Numeral Cards are designed to fit the Addition Frame so the teaching activity can be modelled with Numeral Cards or by writing numbers.

- Take the Addition Frame and write 4 in the first box.
- Ask children how many must be added to 4 to equal 10 and write 6 in the middle box.
- Write a 3 in the third box and ask children for the answer.
- Write 13 in the final box. **Photo 2**

Step 4

Repeat to make different teen numbers and using different addition facts of 10.

Extension

Mental arithmetic

Show children Numicon Shapes and ask them to say the numbers needed to equal 10.

Independent practice

Game for two players

Have ready: Numeral Cards 1-10 (Photocopy Master pg 115); Addition Frame (Photocopy Master pg 119); blank cards.

- Player 1 puts a Card in the first square on the Frame.
- Player 2 writes how many more to equal 10 on a blank card and places on the middle square.
- Player 1 places another Card in the third square.
- Player 2 writes the answer on another blank card and places on the Frame to complete the addition.

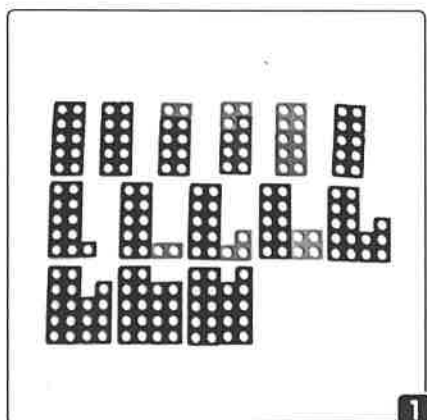
Using and applying

Ask children word problems which use teen numbers and fact of ten, e.g.

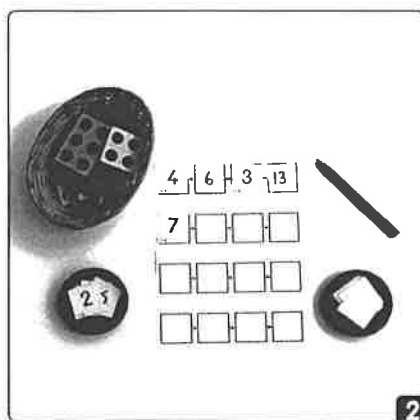
"There were 5 pencils in one pot, 5 in another, and 6 in another. How many pencils altogether?"

Key question

Can children find and use the facts of ten within an addition sum of three numbers?



1



2