### Pack 1: Addition key facts
- Session A) Addition and subtraction
- Session B) Using key facts within ten
- Session C) Using key facts within twenty
- Session D) Modelling problems

### Pack 2: Multiplication and division
- Session A) Describing equal groups
- Session B) Multiplication situations
- Session C) Arrays
- Session D) Times greater

### Pack 3: Numbers
- Session A) Counting and grouping
- Session B) Value of place
- Session C) Regrouping
- Session D) Build and adjust
Timing
Each session is 30 minutes
20 minute Talk Task and 10 minute independent activity

Session guidance
Get them talking and grow their language.

Get them to use equipment, manipulatives, models and images to show and explain.

Challenge them to think mathematically. Use the Prompts for Thinking listed below to help them to build up habits in the way they think about mathematical situations.

Reason it
Explain how you know. Focus on reasons rather than answers. What could you say, do, draw or write to help someone else understand?

Generate examples and non-examples
What are the important features? What features are not important (e.g. colour)?

True or false?
If true, give examples to support your answer. If false, give a counter example.

Find all possibilities
Have you found all the possible answers? How do you know? Did you work systematically?

What’s the same? What’s different?
Compare and contrast and look for connections. How many different answers can you give?

Always, sometimes or never true?
Give examples to show if the statement is always, sometimes or never true. How do you know?
**Pack q:** Addition key facts

**Session A:** Addition and subtraction

**Resources needed:** Cubes

The purpose of this session is to understand the relationship between addition and subtraction. As well as to understand that addition is commutative, it can be completed in either order. Get pupils showing with cubes, saying in words and writing calculations to demonstrate their understanding.

**Talk Task**

Use seven cubes to show and write addition and subtraction calculations. During this process draw out the relationship between addition and subtraction moving the cubes to show and writing calculations. For example, if I know $5 + 2 = 7$ then I know $7 - 5 = 2$ and $7 - 2 = 5$.

Challenge understanding of the equals symbols by discussing that you can record the ‘answer’ on the left e.g. $4 = 7 - 3$ or have an operation on both sides e.g. $3 + 4 = 2 + 5$.

Include discussions about examples that involve zero and explore examples with more than two parts as prompted by the images.

Draw attention to examples that show that addition can be completed in any order e.g. $3 + 4 = 4 + 3$

Discuss that the word *commutative* is used to describe this. Look at the models and ask pupils to talk about how each one shows addition is commutative. Ask them to use the word commutative in their explanation

*This model shows that addition is commutative because…*

Ask pupils to think about the facts that this is always true, for any addition calculation. The use of letters is a way to describe this. The letters can represent any number and you can talk about them in the same way as the other models.

*Why can’t you move the numbers in a subtraction calculation in the same way?* Ask pupils to give examples to support their explanation of this.

**Activity**

The activity sheet has models for pupils to interpret and describe with calculations. The true or false task challenges the idea that the numbers in a calculation can be moved around to any position.

**Video guidance to follow**
Pack 1 Session A

**Activity:** Addition and subtraction

1) Complete the calculations that each model can represent

<table>
<thead>
<tr>
<th>Model 1</th>
<th>Calculations</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Model 1" /></td>
<td>11 + 43 = 20, 9 + 11 = 100, 20 − 43 = 11</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model 2</th>
<th>Calculations</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image2.png" alt="Model 2" /></td>
<td>3 + 4 + 3 = 10, 10 − 3 − 4 = 3, 3 + 3 + 4 = 10, 10 − 4 − 3 = 3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model 3</th>
<th>Calculations</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image3.png" alt="Model 3" /></td>
<td>12 + 8 = 20, 20 − 8 = 12, 8 + 12 = 20, 20 − 12 = 8</td>
</tr>
</tbody>
</table>

2) Can you move the numbers around to any position? Circle the calculations that are true.

- 3 + 4 = 7
- 4 + 3 = 7
- 7 + 3 = 4
- 3 + 7 = 4
- 4 + 7 = 3
- 7 + 4 = 3
- 3 − 4 = 7
- 4 − 3 = 7
- 7 − 3 = 4
- 3 − 7 = 4
- 4 − 7 = 3
- 7 − 4 = 3
### Pack 1: Addition key facts

### Session B: Key facts to 10

**Resources needed:** Dienes ones, tens and hundreds

The purpose of this session is to explore key addition facts for all numbers up to 10 and how these can be used. The relationship between addition and subtraction should be a focus as well as extending to use with larger numbers.

**Talk Task**
A grid is provided that shows addition facts for numbers up to 10. These are all facts that can be shown with your fingers. Ask pupils to talk to you about the grid: how to read it, if they can give more information, if there are any patterns they notice.

Choose some calculations and discuss the related subtraction facts using Dienes blocks to move and show the relationship to the addition fact.

Discuss the yellow boxes in the grid and what pupils notice about these. This should involve a discussion about the number ten: how to write it and why it has two digits. Use Dienes to show that ten ones is equal to one ten.

The rest of the session focuses on how to use key facts to calculate with larger numbers.

Create the images of Dienes tens and ones to explore how $5 + 3 = 8$ can be used to complete related facts. Record addition and subtraction facts for each row of Dienes blocks in the image.

The speech bubbles show how to use a know fact to find related facts where the parts are ten times or a hundred times greater. Use Dienes or draw images of Dienes to explore addition and subtraction facts. For example,

$$50 + 30 = 80 \quad 30 + 50 = 80 \quad 80 - 50 = 30 \quad 80 - 30 = 50$$

Saying the name of the place the digit is in helps make a clear link to the key fact e.g. *five tens add three tens is eight tens.*

Extend the activity by repeating similar experiences with other key facts.

### Activity
The activity sheet has addition and subtraction facts with missing numbers that show chains of related facts and then asks pupils to generate similar calculations.

The robot task connects addition and subtraction with movement on a number line.
Pack 1 Session B

Activity: Key facts to 10

1) Complete the calculation to show how a key fact can be used:

- $4 + 5 = 9$
- $5 + 4 = 9$
- $14 + 5 = 19$
- $50 + 40 = 90$
- $29 - 5 = 24$
- $90 - 40 = 50$
- $79 - 4 = 75$
- $90 - 50 = 40$

2) Write calculations that $6 + 2 = 8$ can be used to work out.

<table>
<thead>
<tr>
<th>Calculation</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>$16 + 2 = 18$</td>
<td>$96 + 2 = 98$</td>
</tr>
<tr>
<td>$6 + 32 = 38$</td>
<td>$6 + 72 = 78$</td>
</tr>
<tr>
<td>$80 - 20 = 60$</td>
<td>$60 + 20 = 80$</td>
</tr>
</tbody>
</table>

Answers

And many more

3) This robot has two different instructions. Use A and B to move the robot from position 5 to each of these numbers. Write a calculation to describe the movement. An example is given:

- **A**: Move east 5
- **B**: Move west 3

<table>
<thead>
<tr>
<th>Position</th>
<th>Movement</th>
<th>Calculation</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>A</td>
<td>$5 + 5 = 10$</td>
</tr>
<tr>
<td>9</td>
<td>A A B B</td>
<td>$5 + 5 + 5 - 3 - 3 = 9$</td>
</tr>
<tr>
<td>7</td>
<td>A B</td>
<td>$5 + 5 - 3 = 7$</td>
</tr>
<tr>
<td>6</td>
<td>A A B B</td>
<td>$5 + 5 + 5 - 3 - 3 - 3 = 9$</td>
</tr>
<tr>
<td>2</td>
<td>B</td>
<td>$5 - 3 = 2$</td>
</tr>
<tr>
<td>1</td>
<td>A B B B</td>
<td>$5 + 5 - 3 - 3 - 3 = 1$</td>
</tr>
</tbody>
</table>

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**Pack 1: Addition key facts**

**Session C: Key facts to 20**

**Resources needed:** Dienes ones, tens and hundreds

The purpose of this session is to explore key addition facts for all numbers up to 20 and how these can be used. The relationship between addition and subtraction should be a focus as well as extending to use with larger numbers.

**Talk Task**
The same grid as the previous session is provided but this time with more information. Ask pupils to discuss what has changed and repeat a similar discussion as before about more information they can give and any patterns that they notice.

Choose some calculations and discuss the related subtraction facts using Dienes blocks to move and show the relationship to the addition fact. The facts with a result greater than ten will involve regrouping and you should discuss the ‘Make 10’ strategy. For example, $7 + 5 = 7 + 3 + 2$. The 5 is partitioned, 7 and 3 make 10 and there are 2 more. Use Dienes to show the steps of this strategy, regrouping ten ones for one ten and exploring other examples.

The rest of the session focuses on how to use key facts to calculate with numbers ten times greater, with totals within 100.

Create the images of Dienes tens and ones to explore how $3 + 4 = 7$ can be used to complete related facts. Record addition and subtraction facts for each row of Dienes blocks in the image.

The speech bubbles show how to use a known fact to find related facts where the parts are ten times greater. Use Dienes or draw images of Dienes to explore addition and subtraction facts related to each. For example,

$$30 + 40 = 70 \quad 40 + 30 = 70 \quad 70 - 30 = 40 \quad 70 - 40 = 30$$

Saying the name of the place the digit is in helps make a clear link to the key fact e.g. *seven tens subtract three tens is equal to four tens.*

**Activity**
The activity sheet has addition and subtraction facts with missing numbers that show chains of related facts and then asks pupils to generate similar calculations. The ‘Sum four’ task is more open and has plenty of opportunity to explore calculations.

**Video guidance to follow**
Pack 1 Session C

Activity: Key facts to 20

1) Complete the calculation to show how a key fact can be used:

\[
\begin{align*}
4 + 7 &= 11 & 9 + 5 &= 14 \\
34 + 7 &= 41 & 5 + 9 &= 14 \\
41 - 7 &= 34 & 14 - 5 &= 9 \\
51 - 7 &= 44 & 14 - 9 &= 5
\end{align*}
\]

2) Write calculations that \(8 + 7 = 15\) can be used to work out.

\[
\begin{align*}
18 + 7 &= 25 & 28 + 7 &= 35 \\
45 - 7 &= 38 & 15 - 7 &= 8 \\
& & 15 - 8 &= 7
\end{align*}
\]

And many more

3) Sum three numbers.

Write different calculations you did calculations with 3 of the numbers added

Which is the largest? \(26\)  Which is the smallest? \(9\)

Write the odd numbers you can make:

Write the even numbers you can make:

What else can you say about the numbers you can get? Multiple of 3 or 5?
<table>
<thead>
<tr>
<th>Pack 1: Addition key facts</th>
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<tbody>
<tr>
<td><strong>Session D: Modelling problems</strong></td>
</tr>
<tr>
<td><strong>Resources needed:</strong> Resources for drawing or building bar models</td>
</tr>
</tbody>
</table>

The purpose of this session is to explore problems involving addition and subtraction. The focus is on how a slight difference in language can change the structure of the problem and that being able to draw a model helps understand this structure and decide what to do.

**Talk Task**
There are six word problems all with a similar situation of two children with marbles and there are four bar models. The two questions at the bottom of the sheet do not have a bar model draw for them. Cut up the problems and bar models and you can decide if you want to include the two problems without bar models to make it more challenging or if you want to keep them separate until the end.

Read the questions and discuss the similarities. Discuss which problem can be represented by which bar model and how you know.

There are two different types of bar models, one where two parts are put together and another where two bars are compared. Connect each problem to the chosen bar model by labelling the known information and deciding what to do to work out the answer.

The last two questions can then be used to draw a model that could represent them. Some useful questions to think about:

*What information do I know? How can I show what I know?*

*What information am I trying to find out?*

*How can I show the relationships between what I know and what I am trying to find out?*

**Activity**
The activity sheet provides similar experiences of engaging with addition and subtraction problems and building bar models to represent these.
Pack 1 Session D
Activity: Regrouping
1) Draw and label a bar model to represent each problem. Give an answer to each question.

Alicia has £6 more than Bobby. If Bobby had £10, how much do they have altogether?

Alicia and Bobby have £26.

Alicia has £6 more than Bobby. If Alicia had £10, how much do they have altogether?

Alicia and Bobby have £14.

Alicia has £6 more than Bobby. If they had £10 altogether, how much money does each person have?

Alicia has £8 and Bobby has £2.

2) Label the models to represent each problem and draw a model for the last question

a) Chloe is seven years younger than her sister. When she is 15, how old is her sister?

b) When her sister is 63, how old will she be?

c) How old will they both be when they have a combined age of 21?

3) Write a problem that each bar model could represent

a)  

A suitable problem that has two values with a difference of 7 and a total of 35

b)  

A suitable problem that has two values with a total of 42 where one value is 15