RISING STARS

ON TRACK MATHS

KEY STAGE

2

Teacher's Guide and Activities

A targeted approach to mathematics intervention

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Strand: Number

DAY 1

Sub-strand: Counting in steps and multiples

TEACH

ACTIVITY 1: Counting up and down in multiples of 100 to and beyond the 1,000 barrier

- Lay out the cards from 100 to 1,200 on the table. Start by reciting from 0 to 1200 in hundreds with the children joining in. Make the numbers using Base 10 apparatus (or similar). Start at 200 and go up to 1,200 in hundreds. Next, start at 900 and go down to 0 in hundreds.

✓ **TIP:** Remove the support of the Base 10 apparatus as the children become more confident.

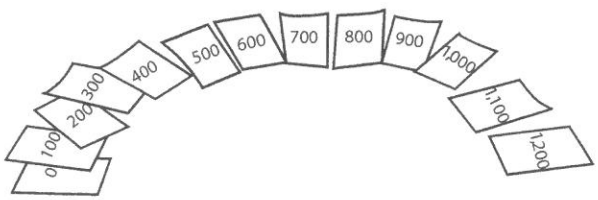
! **WATCH OUT:** The children may struggle when crossing the 1000 barrier. Model this as you would crossing the 100 barrier when counting in tens – give the children a practical representation of exchanging ten lots of 100 for one lot of 1,000. Continue to make the numbers using Base 10 apparatus (or similar).

- Now show the children the staircase made from books (see image below). This represents the number track and the children can physically count up and down.
- Each child chooses a counter and takes a turn to roll both the die. All counters start at zero on the staircase.
- When the children roll the die (e.g. to get three and six), they predict the number their counter will rest on (e.g. 900), then check by counting and moving a counter up the staircase the correct number of steps (e.g. nine), counting aloud. E.g. if a six and a five (total 11) are rolled, the counter ends up on 1100.

ACTIVITY 2: Fluency with numbers using a number arc

- The children work in pairs. Each child makes an arc with the number cards in order from 0 to 1,200.
- Ask Child 1 to close their eyes while Child 2 removes one of the cards. Child 1 then works out which card is missing and says the number.
- To extend the activity once the children are confident, Child 1 can write down the missing number.

! **WATCH OUT:** Watch for any errors – especially as you cross the 1,000 boundary to 1,100 and 1,200. If the children write 1,001 or 1,002, their understanding of place value is still insecure. Check that they are secure with writing 101, 111, 110, 120 and then explain the link with the thousands.



Number arc facing the child

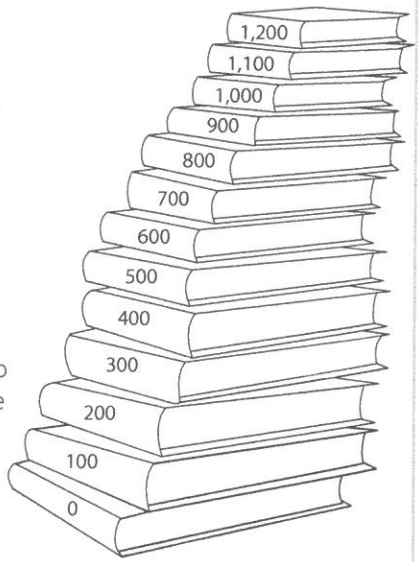
OBJECTIVE

- Find 10 or 100 more or less than a given number

Rising Stars Progression Framework: 3.1.a.1, 3.1.a.2

RESOURCES

- Activity 1: Numbers cards from 100 to 1,200 in hundreds; Base 10 apparatus or similar; books to make a staircase; counters; two die
- Activity 2: Number cards from 0 to 1200 in hundreds



Hundreds staircase up to 1200

Strand: Number

DAY 2

Sub-strand: Counting in steps and multiples

TEACH

ACTIVITY 1: Finding ten more and ten less using a 100 square

- Point to number 2 on the 100 square. Ask: *What number do we get if we add on* **ten more**? Put a ring around the 2 and the 12.

✓ **TIP:** The children may identify the answer 12 without counting, but may not have noticed the pattern yet. Encourage them to check the answer by counting.

- Now ask: *What number do we get if we add on ten more? Can anyone show the pattern we are starting to get?* Encourage use of Base 10, for example, as well as the 100 square to find the answer. Then put a ring around 32.
- Ask again: *What number do we get if we add on ten more?* (42)
- Now ask: *What do you notice?* Elicit that adding on ten more alters the number in the tens column while leaving the ones the same. Make sure they can see that the answers are in the same column on the 100 square.
- Now start with another number, but this time ask the children to find **ten less**. Say: *Let's see if we can find the number that is ten less than 56.*
- Continue with other numbers, e.g. *What is ten more than 38? What is ten less than 70?* Each time ask a child to explain how they worked out the answer. This gives an insight into their thinking, an opportunity to clarify or suggest alternative strategies and an opportunity for the children to explain to their peers.

ACTIVITY 2: Using ten more and ten less to understand the patterns of bigger numbers

! **WATCH OUT:** Some questions on Worksheet 1 involve crossing the hundreds barrier. To support children with these questions, model using the next example.

- Ask: *Find the number that is ten more than 90.* (100) *Find the number that is ten more than 95.* (105) Use the apparatus for both examples to demonstrate that the numbers reach and exceed 100.
- Now ask: *Find a number that is ten more than 96.* Can they work it out in their heads? This checks if the children can apply the pattern of **ten more** or **ten less** to numbers that go through the 100 barrier.
- Hand out Worksheet 1. Explain that they are going to work out the missing numbers in the patterns. All the patterns are based on adding on ten more or subtracting ten.
- Finish by going through some of the questions. Ask: *How did you work out the missing numbers? Did you use the pattern or apparatus, or counting on and back?*

OBJECTIVE

- Find 10 or 100 more or less than a given number

Rising Stars Progression Framework: 3.1.a.1, 3.1.a.2

RESOURCES

- Activity 1: A 100 square for each child; large 100 square for the adult; Base 10 apparatus or similar for counting in tens
- Activity 2: Worksheet 1; Base 10 apparatus or similar; 100 squares

Worksheet 1

Name _____ Date _____

Finding 10 more and 10 less

Fill in the missing numbers by finding **10 more**.

1. 2, 12, ☐, 32, 42, ☐, ☐, 72, ☐, ☐

2. 10, ☐, ☐, 40, 50, ☐, ☐, 80, ☐, 100

3. 67, ☐, 87, 97, ☐, 117, 127, ☐, ☐, 157

4. 234, ☐, 254, 264, ☐, 284

Fill in the missing numbers by finding **10 less**.

5. 108, ☐, 88, ☐, 68, ☐, ☐, 38, 28, ☐

6. 125, ☐, 105, ☐, ☐, 75, 65, ☐, ☐

7. 157, ☐, 137, ☐, 117, ☐, 97, 87, ☐, 67

8. 843, ☐, 823, ☐, 803, ☐, 783, 773, ☐, ☐

Strand: Number

DAY 3

Sub-strand: Counting in steps and multiples

TEACH

ACTIVITY: Finding 100 more or less than a given number using Base 10

- Give each child a set of place-value (arrow) cards. Explain how they work – each card represents a digit in the number and shows you its value.
- Make a quantity with the Base 10 (e.g. 453). Work with the children to count the quantity. Remind them how much each piece of Base 10 is worth.
- The children now make this number with their place-value (arrow) cards (they will need the cards for 400, 50, 3).
- Ask: *How would you find **100 more** than this number? How could you add 100 on?* The children may respond with counting up, making the 400 into a 500, or adding some Base 10. Ask them to discuss which is the quickest and easiest method. Clearly counting on is an inefficient method.
- The children then make the number they think is 100 more than 453 using their place-value (arrow) cards and show you.

✓ **TIP:** Get the children to display their answer before you talk them through how to work it out, so you can check their understanding of place value.

- Model adding another 100 square to 453 and count the new total (553).
- Explain that you have added 100 on and therefore the number that is in the 100 column of the number goes up one (400 to 500). The tens and ones will stay the same.
- Ask them to write 553 in the place-value grid provided (cut out from Worksheet 2), by putting one digit in each column.
- Now ask: *What would happen if we wanted to find the number that is **100 less** than our original number of 453?* Encourage them to work out this number and display their answer using their place-value (arrow) cards.
- Show the children the change in quantity, using the Base 10 units to support them.
- The children then write this number in their place-value grid.
- Repeat the process with other numbers (e.g. ask the children to find 100 more and 100 less than 785, 324, 674, 846, etc.).

! **WATCH OUT:** The children may change the wrong numeral in the number. In this case you should refer to the work on place value from earlier years to support them in understanding the value of each digit.

OBJECTIVE

- Find 10 or 100 more or less than a given number

Rising Stars Progression Framework: 3.1.a.1, 3.1.a.2

RESOURCES

- Base 10 units, tens sticks and 100 squares, place-value (arrow) cards; a place-value grid, one per child (cut out from Worksheet 2)

Worksheet 2

Photocopy and cut up.

Place-value grids

Place value

Thousands 1,000	Hundreds 100	Tens 10	Ones 1

Place value

Thousands 1,000	Hundreds 100	Tens 10	Ones 1

Strand: Number

DAY 4

Sub-strand: Counting in steps and multiples

ASSESS

ASSESSMENT ACTIVITY

- The purpose of the assessment is to check what each child can do independently, carefully noting down any difficulties and misconceptions. The adult will need to watch carefully what the children do, any strategies used and confidence levels.
- Give out Worksheet 3 and ask the children to fill in the missing numbers in the sequences.

WATCH OUT: The children may find the wrong answers in the sequences because they do not know which sequence they are using.

- Explain that both sets of questions require them to count **ten more or ten less** than 100 from a given number. Reassure them that it is what they have been learning during the week.
- Explain that the first questions are missing number questions. They will need to look at the numbers and see if they are getting larger or smaller. This will tell them whether they must count more or less. Next they should look where there are two or more numbers together. Are the numbers ten more or less or 100 more or less than each other? Once the children can see the pattern they can work out the missing numbers.
- The second set of questions are True or False questions. Explain that they need to look at the statement, e.g. 20 + 10 = 30. Is it true or false? They then write the answer in the True or False column.
- If there is time at the end, go through some of the questions with the children, discussing answers and strategies.

OBJECTIVE

- Find 10 or 100 more or less than a given number

Rising Stars Progression Framework: 3.1.a.1, 3.1.a.2

RESOURCES

- Worksheet 3; a pencil each

EVIDENCING SUCCESS

Meeting expectations:

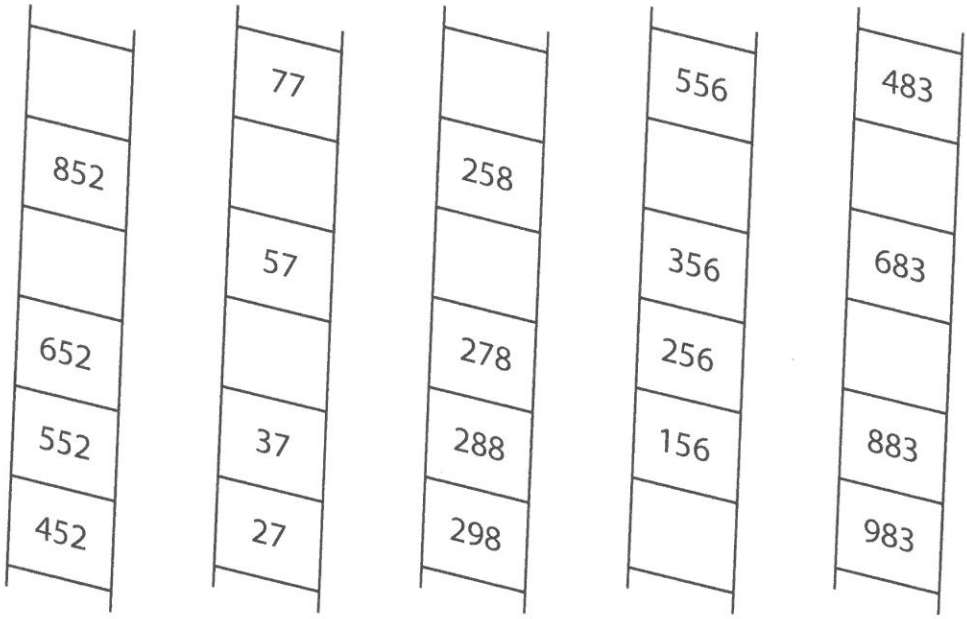
- The child can work out ten less than 258 or 100 more than 852.
- The child can confidently move through the 100 barrier.

Worksheet 3

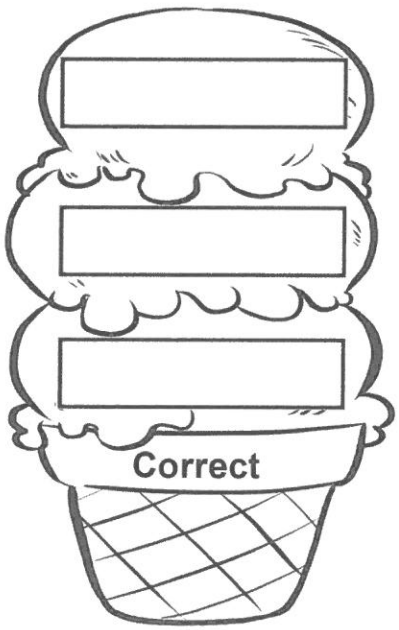
Name _____ Date _____

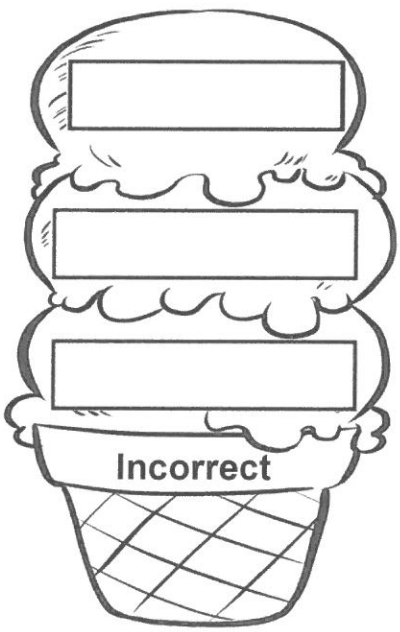
10 or 100 more or less

1. Find the missing numbers by going up and down the ladders.



2. Copy each calculation into one of the ice cream cones, to show whether it is correct or incorrect.





135 – 100 = 35

119 – 100 = 19

97 + 10 = 197

12 + 100 = 120

76 – 10 = 17

99 + 10 = 109

Strand: Number

DAY 1

Sub-strand: Counting in steps and multiples

TEACH

ACTIVITY 1: Counting in steps of 100

- Tell the children that, when they have a large quantity to count, it is more efficient to count in groups and multiples rather than one by one.
- Show them a Base 10 square. Explain that it represents 100: *There are 100 ones in this 100 square.*
- Say: *I would like to know how many ones I have in the hundreds I have here (in the pile of Base 10 squares). I could count each one individually but, as I know each square is a 100, I will just count in* ***hundreds****.*
- Model how to count the Base 10 ones in hundreds (e.g. 100, 200, 300, etc.) until you have counted all the squares.
- Give them different amounts of the 100 squares each and ask them to find out how many ones they have by counting in hundreds.
- The children should tell a partner how many ones they have.

ACTIVITY 2: Counting in steps of 50

- Recap the five multiplication table with the children by reciting from memory as a group. Ask them to describe the pattern to you. Say: *Remember the pattern counting in fives makes – every number ends in five or in zero.*
- Highlight that **counting in steps of 50** makes a similar pattern – the numbers either end in 50 or 00. Explain that this is because 50 is ten times larger than five, so there is an extra zero added to the end. Demonstrate this using Base 10 materials. Write the five and 50 multiplication tables on the board to clarify the pattern, e.g.:

  $1 \times 5 = 5$ $1 \times 50 = 50$

  $2 \times 5 = 10$ $2 \times 50 = 100$

- Work with the children to complete the multiplication table up to 12×5 and 12×50.
- Now shuffle the number cards and place them in a pile in the middle of the group.
- Ask the children to work together to put the number cards in order to make a number track in steps of 50.
- Once the cards are in order, the children take it in turns within their group to remove one card from the number track while the other children close their eyes. The rest of the group then work out which number is missing by counting up or down in 50s.

✓ **TIP:** Count as a group if you notice that the children are struggling to identify the missing number from the track.

OBJECTIVE

- Count from zero in multiples of four, eight, 50 and 100

Rising Stars Progression Framework: 3.1.a.1, 3.1.a.3

RESOURCES

- Activity 1: Base 10 (only the 100 pieces)
- Activity 2: Number cards with the numbers of the 50 multiplication table up to 600; Base 10 (hundreds and tens)

Strand: Number

DAY 2

Sub-strand: Counting in steps and multiples

TEACH

ACTIVITY 1: Counting multiples of four using a 100 square

- Start by asking the children what they know about the four multiplication table.

WATCH OUT: The children may not know the four multiplication table – the next part of the activity introduces them to this – but start by discovering their knowledge base.

- Give each child their four cubes or counters and explain that they will use them to help them count in **steps of four**.
- Starting from zero, model using the cubes to count in fours. As you count, colour in each number on the 100 square: *one, two, three,* ***four***.
- Ask the children to fill in their own 100 square by colouring in the numbers that they say when counting in fours up to 48. They should continue to use cubes to help them.
- Explain: *The numbers that you say when you count in fours are the numbers in the four multiplication table.*
- The children then read the four multiplication table by saying the coloured numbers out loud. Start by saying *4 × 1 is four*, then ask the child next to you to say the next: 4 × 2 is eight; the next child then says 4 × 3 is 12, and so on round the group until 4 × 12.

TIP: Keep the coloured 100 squares for the activity on multiples of eight later in the week.

ACTIVITY 2: The pattern behind the four multiplication table

- Ask: *Do you notice anything about the numbers in the four multiplication table? Are they odd or even numbers? Can you get an answer ending in three? Why?*

TIP: The pattern is important for children with working memory problems. Point out that all the numbers are even numbers and are double the two multiplication table.

- Hand out copies of the number strip for the four multiplication table, with spaces for the answers to be written in.
- Encourage the children to complete the number strip for the four multiplication table with as many answers as they can. Remind them that they can use their 100 square from Activity 1 if they need help or forget some of the numbers.
- Give each child a number strip with the correct answers so they can mark their answers.
- Ask them to give you their completed strip. They can keep the number strip with the correct answers to help them practise the four multiplication table at home.

OBJECTIVE

- Count from zero in multiples of four, eight, 50 and 100

Rising Stars Progression Framework: 3.1.a.1, 3.1.a.3

RESOURCES

- Activity 1: Each child needs: a 100 square; four cubes or counters; coloured crayon or highlighter
- Activity 2: A number strip with the multiples of four without the answers and also one with the answers supplied (see example below), one per child

4 × 1 = ☐
4 × 2 = ☐
4 × 3 = ☐
4 × 4 = ☐
4 × 5 = ☐
4 × 6 = ☐
4 × 7 = ☐
4 × 8 = ☐
4 × 9 = ☐
4 × 10 = ☐
4 × 11 = ☐
4 × 12 = ☐

Number strip for the four multiplication table

Strand: Number

DAY 3

Sub-strand: Counting in steps and multiples

TEACH

ACTIVITY 1: Number arc of the four multiplication table

- Ask the children to work in pairs to make a number arc of the **multiples of four**. Give a set of number cards to each pair.
- Ask the children to set their cards out in a number arc in the correct order from four to 48. Suggest that they say the multiples of four and touch each card as they do this.
- The children then take it in turns to remove a number from the number arc. Can their partner work out which number is missing? Ask: *Can you suggest ways to help your friend if they get stuck and can't remember the missing number?*

WATCH OUT: If the children struggle to identify the missing card, suggest that they try saying the four multiplication table to themselves. They could count on from the part of the table that they know and can remember.

- The children can continue to play the game, taking turns in each role.

ACTIVITY 2: Counting in multiples of eight using a 100 square

- Give each of the children eight cubes or counters, a crayon and a 100 square.
- Model putting the eight cubes in a line and, starting from zero, use them to find the **multiples of eight**. Each time you get to the last counter or cube, colour in the number you say on the (clean) 100 square. *zero, one, two, three, four, five, six, seven, **eight**,...16...24, etc.*
- Ask the children to fill in their own 100 square by colouring in the numbers that they say when counting in eights. They should continue to use cubes to help them.
- Explain: *The numbers you say when you count in eights are the numbers in the eight multiplication table.*
- Now ask the children to swap sheets with a partner and check that they have coloured in the correct numbers in their 100 square. Allow the children time to correct any mistakes. Then check their completed sheets so you are confident that all children have the correct numbers coloured.
- Once the children have coloured in the multiples of eight, hand out the 100 squares with the multiples of four coloured in, from Day 2. Ask the children if they notice anything about the sets of multiples. *Is there a matching pattern?*
- Write the numbers in the four and eight multiplication tables on the board with the help of the children, to make the pattern as clear as possible. Do the first few and then ask the children to tell you the rest of the numbers. Ask them to put their hand up when they can see a pattern.

OBJECTIVE

- Count from zero in multiples of four, eight, 50 and 100

Rising Stars Progression Framework: 3.1.a.1, 3.1.a.3

RESOURCES

- Activity 1: Each pair needs: number cards with multiples of four from 0 to 48
- Activity 2: Each child needs: eight cubes or counters; crayons and a 100 square; their coloured-in 100 square from Day 2

Strand: Number

DAY 4

Sub-strand: Counting in steps and multiples

TEACH

ACTIVITY 1: Counting in multiples of eight

- Give each child a copy of Worksheet 4 which shows ten starfish with eight legs each. Ask them: *If one starfish has eight legs, how can we work out the number of legs for two starfish?* The children may suggest counting the legs, or they might realise they can use doubling or their knowledge of the **multiples of eight**.

✓ **TIP:** There isn't a right or wrong strategy – just a strategy that works for the child. The purpose is to make them aware of the range of strategies available.

- Write on the board. $8 \times 1 = 8$, $8 \times 2 = 16$. Refer the children to the pictures of the starfish on Worksheet 4 for visual support, if necessary.
- Now ask the children to work out the number of legs on three starfish. Again, you are looking for strategies, e.g. using the three or the eight multiplication table, or adding on eight.
- Check answers with the group; then ask the children to complete Worksheet 4. The images of the starfish serve as visual support initially, but they finish by writing the eight multiplication table out as a list, like the one started on the board.

! **WATCH OUT:** Notice the strategies the children use. If you see a child counting every leg, help them find a quicker method such as adding on in eights or using the other tables they know, e.g. 3×8 if they know the three multiplication table or 5×8.

ACTIVITY 2: The eight multiplication table

- Lay out the cards in an arc so that all the children can easily see the numbers the right way up.
- Ask the children to close their eyes and then remove a card from the arc, such as 40.
- Ask the children to work out which number is missing.
- Ask the children to explain to the group how they worked out which was the missing number. Discuss differences in the methods, including: *Is one way quicker? If counting on in ones is slow, what other method could we use? What ways do you use to remember the eight multiplication table?*
- Next, chant the eight multiplication table together as a group. The children can refer to the list they made earlier, from Worksheet 4, for support.
- Repeat the missing number exercise a few more times, asking different children to secretly remove a card. Check each time what strategy the children use to work out the missing number.

✓ **TIP:** Chant the eight multiplication table after each go, to aid the children in memorising the numbers.

OBJECTIVE

- Count from zero in multiples of four, eight, 50 and 100

Rising Stars Progression Framework: 3.1.a.1, 3.1.a.3

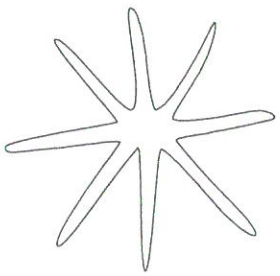
RESOURCES

- Activity 1: Worksheet 4
- Activity 2: One set of number cards with the numbers of the eight multiplication table up to 80; each child needs their coloured 100 square from Day 2

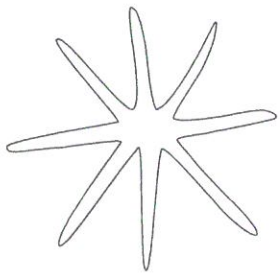
Worksheet 4

Name _____ Date _____

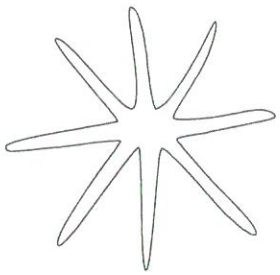
Counting in multiples of 8, using starfish



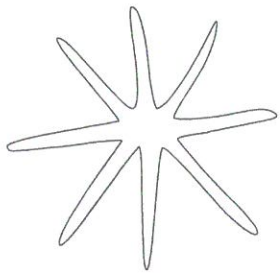
1 starfish has ☐ legs



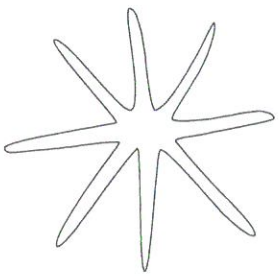
2 starfish have ☐ legs



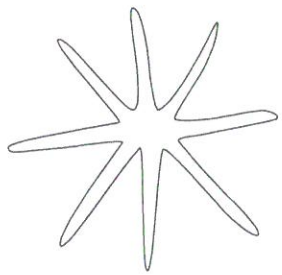
3 starfish have ☐ legs



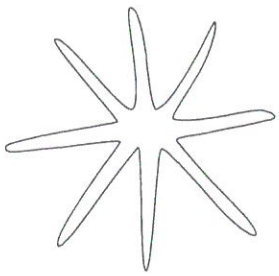
4 starfish have ☐ legs



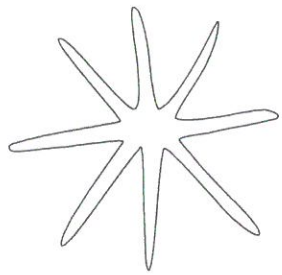
5 starfish have ☐ legs



6 starfish have ☐ legs



7 starfish have ☐ legs



8 starfish have ☐ legs

$8 \times 1 =$ ☐

$8 \times 2 =$ ☐

$8 \times 3 =$ ☐

$8 \times 4 =$ ☐

$8 \times 5 =$ ☐

$8 \times 6 =$ ☐

$8 \times 7 =$ ☐

$8 \times 8 =$ ☐

$8 \times 9 =$ ☐

$8 \times 10 =$ ☐

Strand: Number

DAY 5

Sub-strand: Counting in steps and multiples

ASSESS

ASSESSMENT ACTIVITY

- The purpose of the assessment is to check what each child can do independently, carefully noting down any difficulties and misconceptions. The adult will need to watch carefully what the children do, any strategies they use and their confidence levels.
- Give each child a copy of Worksheet 5.
- Explain that all the questions relate to the work they have been doing during the week on counting in steps or multiples.
- The first questions have a number track with missing numbers. They must first work out how much the numbers are increasing by and then use their knowledge of that multiplication table to help them to find the missing numbers.
- The second question requires them to use what they know about **multiples of 50, 100, four and eight** to solve the problems of a wizard making an invisibility spell.
- Explain that they can use their 100 squares and any other resources they feel would help them.

WATCH OUT: Watch the children when they are working to see who makes use of resources, who can count in multiples mentally and who uses their multiplication tables. Note which resources the children use, as this will help to evaluate their understanding and confidence.

- Use the remaining time of the assessment session to go through the questions and the answers with the group.

EVIDENCING SUCCESS

Meeting expectations:

- The child can confidently count in hundreds and also 50s. The child is able to use the pattern to continue the sequence and apply their understanding to solving problems.
- The child understands the four multiplication table and can recall it up to 4×12.
- The child understands and can recall most of the eight multiplication table, sometimes needing more time or support to be completely accurate.
- The child can apply their knowledge of the four and eight multiplication tables to problem-solving situations.

OBJECTIVE

- Count from zero in multiples of four, eight, 50 and 100

Rising Stars Progression Framework: 3.1.a.1, 3.1.a.3

RESOURCES

- Each child needs: Worksheet 5; a pencil and a 100 square; any other resources to support them in counting in multiples, e.g. Base 10

Worksheet 5

Name _____ **Date** _____

Counting in steps or multiples

1. Count in multiples to complete these sequences.

8,	16,	24,	☐,	40,	☐,	56,	☐,	☐,	80
4,	8,	☐,	16,	☐,	24,	28,	32,	☐,	☐
0,	50,	100,	☐,	☐,	250,	☐,	☐,	400,	☐
100,	200,	300,	400,	☐,	☐,	☐,	800,	☐,	1000

2. Florrie the absent-minded wizard is try to make an invisibility spell. Can you help her with her shopping list?

a) Beetles come in packets of 5. She needs 50 beetles. How many packets should Florrie buy?

.....

b) The Beetle packets cost 50p each. How much money will Florrie need to buy all the beetles she needs?

.....

c) Batswings come in packets of 8. Florrie needs 40 batswings. How many packets should she buy?

.....

d) Each packet of batswings costs £1. How much money will Florrie need to buy all the packets she needs?

.....

e) Eye of newt costs 4p each. Florrie needs 10 for her spell. How much will that cost her?

.....

Strand: Number

DAY 1

Sub-strand: Place value

TEACH

ACTIVITY 1: Identify and represent numbers up to 1000

- Introduce the activity: *Today we are going to learn to **partition** numbers. This means splitting them up into parts. The parts are **hundreds, tens and ones**.*
- Display the hundreds, tens and ones table. Say: *Look at the table. What would we need to make 246? We would need 200 (point to 200), 40 (point to 40) and six (point to 6).*

100	200	300	400	500	600	700	800	900
10	20	30	40	50	60	70	80	90
1	2	3	4	5	6	7	8	9

HTO table

- Ask the children: *How many hundreds, tens and ones in 246?* Model how to write it clearly, showing the hundreds, tens and ones on a place-value grid. Explain that each number has a position to show its value.
- Ask if anyone can use the place-value (arrow) cards to make 246.
- Show the children how to put the partitioned number back together by adding: 200 + 40 + 6 = 246.

✓ **TIP:** You may need to repeat with other three-digit numbers before the children have a go themselves.

- Once the children are secure in this method, ask pairs to write 328 in hundreds, tens and ones and then put it back together again.

ACTIVITY 2: Using place value

- Place the quiz cards, cut out from Worksheet 6, face down on the table.
- Each child takes a card, jots down the letter in their book and writes their answer. Remind them to read the question carefully.
- If a child is struggling with a card, ask them to read the card to you first, get the place-value grid and write the number on the grid. Ask them to tell you what each number means. Use this and the other resources to clarify the question and help the child arrive at the answer to the question.

✓ **TIP:** Discuss how the children have arrived at their answers. Ask them to explain their method to others and highlight good practice. Note any misconceptions, etc.

OBJECTIVES

- Recognise the place value of each digit in a three-digit number (hundreds, tens, ones)
- Compare and order numbers up to 1,000
- Identify, represent and estimate numbers using different representations

Rising Stars Progression Framework: 3.1.b.1, 3.1.b.3, 3.1.c.1

RESOURCES

- Activity 1: HTO table; exercise book; pencil; place-value grids (from Worksheet 2, page 5); place-value (arrow) cards
- Activity 2: Quiz cards cut out from Worksheet 6; each child needs: their exercise book; 100 square; place-value grids (from Worksheet 2, page 5); grid cards; place-value (arrow) cards

Worksheet 6

Photocopy and cut into cards.

Quiz cards

A Write this as a number: Four hundreds, five tens and two ones.	**B** A number is more than 100 but less than 200. It has 5 tens and 6 ones. What is it?
C How many tens are there in 462?	**D** How many tens are there in 806?
E One hundred, six tens and zero ones; write it in **numerals**.	**F** How many hundreds are there in 101?
G 200 + 40 + 8 What is this number?	**H** Partition 826.

Strand: Number

DAY 2

Sub-strand: Place value

TEACH

ACTIVITY 1: Recognise the place value of digits in a three-digit number

WATCH OUT: It is vital the children understand that the value of a number depends on its place in a number. So 153 has one hundred, five tens and three ones; if we use the same digits in different places we have a different number (e.g. 315).

- Explain that the children will be looking at **three-digit numbers**. Ask: *Can you remember what **digit** means?* Ensure they are clear that a digit is one of the key numbers one to nine. Explain that digits are used to make numerals, so the numeral 153 is made up from the digits one, five and three.
- Take one of the three-digit number cards from the box or bag, e.g. 124. Ask: *How many hundreds are in this number? How do you know? How many tens are there? How many ones are there? What is the number on the card?* Demonstrate by writing the number on the place-value grid. Ask one of the children to use the place-value (arrow) cards to show the same number.
- Repeat this exercise with another three-digit number.
- Now challenge the children to take a three-digit number card from the bag or box and say how many hundreds, tens and ones are in their chosen number.

WATCH OUT: Allow the children access to the place-value resources for support.

- Each time, ask the group to check the child's stated answer is correct.

ACTIVITY 2: Finding the smallest and largest numbers with three digits

- Draw three number cards and arrange them to make a three-digit number, read it out, e.g. 361, and write it onto a place-value grid.
- Ask the children to rearrange the three digits to make a larger number, and to explain how moving the digits to different columns can make the number larger.
- Next, ask them to find the smallest number they can make with the three digits and explain how they have done this.
- Draw three more cards and read out the numbers on them. Ask the children: *What is the largest number you can make from the three digits? What is the smallest number? What other numbers can you make with those digits?*
- Repeat this activity with more cards. Continue to use the place-value cards and grids for support and to help the children to share their ideas.
- When the children seem confident with the activity, introduce a trickier set of numbers, e.g. three, four and zero. Ask: *What different numbers can I make with these three numbers? Would you have 043? Why not?* Make sure the children understand what the zero means in different positions, such as 403 and 430.

OBJECTIVES

- Recognise the place value of each digit in a three-digit number (hundreds, tens, ones)
- Compare and order numbers up to 1,000
- Identify , represent and estimate numbers using different representations

Rising Stars Progression Framework: 3.1.b.1, 3.1.b.3, 3.1.c.1

RESOURCES

- Activity 1: Cards with three-digit numbers on them; a bag or box; place-value (arrow) cards; place-value grids (from Worksheet 2, page 5)
- Activity 2: Exercise books; pack of number cards

Strand: Number

DAY 3

Sub-strand: Place value

TEACH

ACTIVITY 1: Compare and order numbers up to 100

- Display the A4 cards, not in numerical order, so all the children can see them.

✓ **TIP:** Avoid using 'tricky' numbers such as 19 and 91 at this stage.

- Explain that the lesson is about learning to put numbers in **order** of size. Ask: *Are these numbers in size order? Can we put them in the right order?*
- Ask for suggestions as to how to order them according to size; e.g. find the smallest number first, and then the next smallest and so on.

✓ **TIP:** Have 100 squares on the table for the children to refer to if necessary.

- Now ask the children to work in pairs. One child in each pair deals six playing cards from the pack and puts them in order. Pairs then check the ordering together. Encourage them to think carefully about the order from smallest to largest.

! **WATCH OUT:** Ensure the children do not simply rely on their partner in this task.

- Ask how the children could check they have ordered the numbers correctly. What strategies are they using (saying numbers out loud, counting on, etc.)?

ACTIVITY 2: Compare and order numbers up to 1000

- Explain that you are going to order some 'tricky' numbers. Point out that tricky numbers look very similar, so they will have to look and check really carefully!
- Display the numbers 19 and 91 using the A4 cards and write each number on a place-value grid. Ask: *How many tens/ones does 19/91 have?*
- Display the following number cards: 16, 61, 15, 51, 14, 41. Discuss the strategy to put them in the **correct order** (see 'Tip').

✓ **TIP:** Say: *Look at the number. Say it out loud. Look at the tens and ones. Find the smallest number first, then the next smallest, etc.*

- Display six more two-digit numbers, including some tricky numbers, such as 84, 14, 21, 12, 38, 83. Again, model the strategy for putting them in order.
- Tell the children: *Now we are going to put some three-digit numbers in order. We will use the same strategies as with the two-digit numbers.*
- Move on to some examples. *Let's put these numbers in order from smallest to largest: 234, 112, 86, 944, 567.* Start by writing the numbers onto a place-value grid and then ask the children to identify the smallest number (86) by looking at the hundreds in each number, then the tens and ones.
- Finally, encourage the children to try ordering these numbers on their own: 205, 457, 129, 754, 84, 101.

! **WATCH OUT:** Keep an eye out for any children who are struggling. Encourage them to use the place-value resources for support.

OBJECTIVES

- Recognise the place value of each digit in a three-digit number (hundreds, tens, ones)
- Compare and order numbers up to 1,000
- Identify, represent and estimate numbers using different representations

Rising Stars Progression Framework: 3.1.b.1, 3.1.b.3, 3.1.c.1

RESOURCES

- Activity 1: A4 cards with selection of numbers up to 100; playing cards with numbers from 1 to 100; 100 squares if needed
- Activity 2: A4 cards as above; exercise books; place-value grids and cards

Strand: Number

DAY 4

Sub-strand: Place value

TEACH

ACTIVITY 1: Compare and order numbers up to 1000

- The children will each throw a welly and then measure the distance using a trundle wheel or metre sticks.

WATCH OUT: Think about any safety issues with this activity. It is best done outside where there is plenty of space. You can't rely on the throwing being accurate, so keep the children a sensible distance behind the thrower.

TIP: Before they start to throw, let the children practise with the trundle wheels, as it may be some time since they used one. They need to make sure they position the start point carefully and count each click of the wheel.

- Ask the children to work in pairs. Explain that one child will throw the welly and then they will both measure the distance; the other child will write the measurement on the chart. Distances should be measured to the nearest centimetre.

TIP: Remind the children that there are 100 cm in a metre so, if a welly is thrown 4 m 35 cm, that is 435 cm.

- Back in the classroom, collate all the distances. Ask each pair to work together to put them in **order** on a number track, starting with the largest distance.
- Once all pairs have finished, bring the group together to check whether everyone agrees on the order. Use a number track to present the correct order.

ACTIVITY 2: Using > and < to compare numbers

- Explain that there is a sign used in maths to mean 'more than'. It is >.
- Ask: *Can anyone think of other signs we use in maths and what they mean?* Here the children may suggest the equals (=) and addition (+) signs.
- Choose two numbers from Activity 1. Ask: *Which is the biggest number?* Show the children how to insert the > sign.
- Give other examples, asking the children to write the sign in.
- Now go on to explain that < means 'less than'. Choose two numbers from Activity 1. Ask: *Which is the smallest number?* Show the children how to insert the < sign.
- Give other examples asking the children to write the sign in.
- Write 254 > 100. Ask the children: *What does this tell you? Is it true?*
- Give other examples, e.g. 260 and 620, 19 and 91, 104 and 410, again asking the children to say whether they are true.

OBJECTIVES

- Recognise the place value of each digit in a three-digit number (hundreds, tens, ones)
- Compare and order numbers up to 1,000
- Identify, represent and estimate numbers using different representations

Rising Stars Progression Framework: 33.1.b.1, 3.1.b.3, 3.1.c.1

RESOURCES

- Activity 1: Wellington boot; trundle wheel or metre sticks; clipboard with chart; whiteboards
- Activity 2: Measurements from Activity 1; whiteboards

Strand: Number

DAY 5

Sub-strand: Place value

ASSESS

ASSESSMENT ACTIVITY

- The purpose of the assessment is to check what each child can do independently, carefully noting down any difficulties and misconceptions. The adult will need to watch carefully what the children do, any strategies used and confidence levels.
- Provide each child with a copy of Worksheet 7. Explain that there are three sections:
  - The first section is very short and involves reading and partitioning numbers.
  - The second section asks them to put numbers in order from the smallest to the largest.
  - The third section asks them to use what they know about > and < signs to say whether statements are true or false.

✓ **TIP:** You might choose at this point to put an example on the board, to check that the children understand the form of the questions, e.g. *802 > 206. Is this true or false?*

- Remind the children that they have used place-value grids and that these are available if required.

! **WATCH OUT:** While the children are working, note those that do and do not need the resources to achieve a correct answer.

EVIDENCING SUCCESS

Meeting expectations:

- The child can arrange three digit cards, e.g. three, four and seven, to make the largest possible number and can justify their choice of 743 using the language of hundreds, tens and ones.
- The child can partition 462 in several ways and draw an appropriate diagram to show each of them.
- The child can place the correct sign (=, < and >) in statements such as between 304 and 187 and between 425 and 394.

OBJECTIVES

- Recognise the place value of each digit in a three-digit number (hundreds, tens, ones)
- Compare and order numbers up to 1,000
- Identify, represent and estimate numbers using different representations

Rising Stars Progression Framework: 3.1.b.1, 3.1.b.3, 3.1.c.1

RESOURCES

- Worksheet 7; access to place-value grids

Worksheet 7

Name _____ Date _____

What is the number?

1. Write these numbers using digits.

a) 2 hundreds, 4 tens and 7 ones .....

b) 6 hundreds, 0 tens and 2 ones .....

Partition these numbers.

c) 548

d) 301

e) 462

Order! Order!

2. Put these numbers in order from the smallest to the largest.

a) 550 110 660 880 .....

b) 311 457 210 109 .....

c) 806 608 680 860 .....

True or false?

3. Are these true or false? Write your answer next to each.

a) 160 > 300 .....

b) 156 > 111 .....

c) 230 < 320 .....

d) 425 > 394 .....

e) 304 < 187 .....

f) 833 > 177 .....

Strand: Addition and Subtraction

DAY 1

Sub-strand: Mental calculation strategies

TEACH

ACTIVITY 1: Rounding and adjusting for addition

- Explain that **rounding and adjusting** is a useful mental calculation strategy for addition and subtraction.
- Write an addition calculation on the board: 234 + 147. Make the numbers with Base 10 apparatus.
- Ask the children: *How could we round these numbers up or down so that we can add them more easily?* Here you are looking for the children to suggest rounding to the nearest 10 to make 230 + 150 = 380.

✓ **TIP:** Model each step of the calculation with the Base 10 apparatus.

- Now ask: *What is the difference between our original number (234) and our rounded number (230)?* Elicit that 230 is four **less than** 234. *We must add the four ones to our answer: 380 + 4 = 384.*
- Next ask: *What is the difference between our original number (147) and our rounded number (150)?* Elicit that 150 is three **more than** 147. *We must subtract the three ones from our answer: 384 – 3 = 381.*
- Write the calculation 279 + 133 on the board. Make sure all the children can access the Base 10 materials. Ask the children to work in pairs and find the answer using rounding and adjusting.

✓ **TIP:** Encourage the children to model each step of the calculation with the Base 10 apparatus.

! **WATCH OUT:** Observe carefully to make sure that the children don't make an error when adjusting.

- Collect feedback from the group. *Did each pair reach the same answer? Did each pair round in the same way?*

ACTIVITY 2: Rounding and adjusting for subtraction

- Tell the children that they must now use **rounding and adjusting** to answer subtraction calculations mentally.
- Give each pair one of the following calculations: 302 – 118, 265 – 109, 308 – 143, 633 – 216.
- Ask the children to discuss which numbers they will round. Agree which numbers must be rounded and how they should be rounded.
- Tell the children to work in their pairs to complete the calculation. Remind them to adjust their answers.

✓ **TIP:** Watch the children carefully while they are working. Do they use Base 10 apparatus to help them? Are some children able to answer without the support of the apparatus?

OBJECTIVE

- Add and subtract numbers mentally, including: a three-digit number and ones, a three-digit number and tens, a three-digit number and hundreds

Rising Stars Progression Framework: 3.2.b.1

RESOURCES

- Activity 1: Base 10 apparatus
- Activity 2: Base 10 material; exercise books

Strand: Addition and Subtraction

DAY 2

Sub-strand: Mental calculation strategies

TEACH

ACTIVITY 1: Crossing the hundreds barriers

- Start by saying a three-digit number, such as 322.

TIP: Jot the numbers down for yourself as you say them, so you have a record for the end of the session when you go through the answers with the children!

- Then say: *What is one more than 322? Write it in your book. What is ten more than 322? Jot that down too. Model using a number track.*
- Continue with other numbers, asking the children to write down one more/ten more and one less/ten less than that number in their books. Use numbers that do not cross ten or hundred barriers at this stage.
- Move on to use numbers that cross ten or hundred barriers. E.g. *What is ten less than 409? What is one more than 119? What is ten less than 199? What is ten more than 990? What is one less than 110?*
- Use the number track to show children how to bridge from 409 to 400, and then down one more to 399. Ask the children to use the number track to show you how they could solve the questions.
- Go through the answers with the group, making sure any mistakes are corrected and understood.

TIP: Use place-value grids as a visual support when clarifying any misconceptions.

ACTIVITY 2: Adding and subtracting a three-digit number and hundreds

- Place the three-digit number cards face down on the table in the middle of the group. Pick up a card, such as 400. Tell the children that you are going to flip the coin. If it comes up heads, they will have to add 100 and, if it comes up tails, they will have to subtract 100.
- Remind children of the work they've done on finding 100 more and 100 less. Adding and subtracting 100 builds on this idea.

TIP: Model the strategy for the children, e.g. *I am adding 100 to 300 which gives me 400,* to ensure they are clear they are adding or subtracting hundreds. Otherwise there is a danger the children will slip into saying they are adding on one.

- Now let the children take turns to take a card, flip the coin and tell the group the answer. When the children are confident with this, ask them to roll a die to decide how many hundreds to add on or subtract.

WATCH OUT: The use of a die means you could find you are trying to take 600 from 400. Be prepared to discuss the fact that the answer will be less than zero: *It will be 200 less than zero and we call this negative 200.* However, try to keep the children focused on positive numbers at this stage, to avoid confusion.

OBJECTIVE

- Add and subtract numbers mentally, including: a three-digit number and ones, a three-digit number and tens, a three-digit number and hundreds

Rising Stars Progression Framework: 3.2.b.1

RESOURCES

- Activity 1: Exercise books and pencils; number track showing tens up to 200
- Activity 2: A selection of 20 cards with three-digit numbers written on them; whiteboards; coin; a die

Strand: Addition and Subtraction

DAY 3

Sub-strand: Mental calculation strategies

TEACH

ACTIVITY 1: Using compensation for addition

- Explain that using **compensation** is a useful mental calculation strategy for adding and subtracting a number that is close to a multiple of ten (ending in 1, 2, 8, 9).
- Write the following calculation on the board: 29 + 5. *How could you complete this calculation mentally?* The children may suggest counting on from 29, or bridging to 30 and adding on four more.
- Place 29 cubes in one pile and five cubes in a separate pile. *We can add one cube to the pile of 29. Now we have 30 cubes. We have too many cubes, so we take one from the pile of five. We are left with 30 cubes and four cubes: 34 cubes in total.*
- Give the children another example to try: 24 + 9. Ask the children to discuss in pairs how to use compensation to make the numbers easier to add. Elicit that it would be easier to calculate 25 + 10 mentally.
- Again, demonstrate the strategy with cubes.
- Give the children a few more examples to try with a partner, including questions involving three digits: 14 + 9, 126 + 9, 640 + 28.
- Share children's answers. Did all children use compensation in the same way?

ACTIVITY 2: Using compensation for subtraction

- Tell the children that they must now use **compensation** to answer subtraction calculations mentally.
- Write the following calculation on the board: 29 – 4.
- Place 29 cubes in one pile. Highlight that 29 is a near multiple of ten (30). Model adding one cube to the pile: *Now we have a pile of 30. We can subtract four cubes from the pile of 30 and are left with 26. If we now remove the extra cube we added, we are left with the total 25.*
- Give the children another example to try: 36 – 9. Ask the children to discuss in pairs how to use compensation to make the numbers easier to subtract. Elicit that it would be easier to calculate 36 – 10 mentally.
- Again, demonstrate the strategy with cubes.
- Give the children a few more examples to try with a partner, including questions involving three digits: 27 – 8, 118 – 7, 341 – 9.

WATCH OUT: Make sure the children remember to subtract the extra ones that were added at the beginning of the calculation.

- Share children's answers. Did all children use compensation in the same way?

OBJECTIVE

- Add and subtract numbers mentally, including: a three-digit number and ones, a three-digit number and tens, a three-digit number and hundreds

Rising Stars Progression Framework: 3.2.b.1

RESOURCES

- Activity 1: counters/ cubes
- Activity 2: counters/ cubes

Strand: Addition and Subtraction

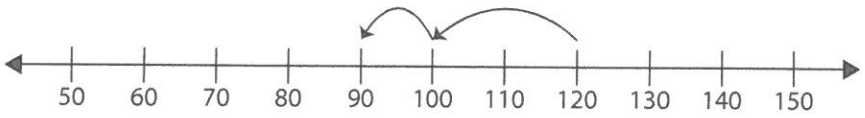
DAY 4

Sub-strand: Mental calculation strategies

TEACH

ACTIVITY 1: Using bridging for addition and subtraction

- Explain that **bridging** is a useful mental calculation strategy for addition and subtraction and we can use a number track as a support.
- Place a piece of tape on the number track at 120. *How can we subtract 30 from 120 on the number track?* The children may suggest counting backwards in tens. If so, ask: *Is there a quicker way?* Elicit that the children could count backwards to 100 in one step, and then count backwards ten.



- *This strategy is called bridging because we go to the 'bridge' of 100 and then continue subtracting.*
- Give the children another example: 70 + 40. *How much do we need to add on to reach 100 (the bridge)?* (30) *How many more do we need to add on?* (10). *What is the final answer?* (110) Give out Worksheet 1 and ask the children to complete question 1 with a partner. Ask each pair to explain their answer to the group. Did everyone come up with the same solution? Now ask the children to complete the remaining questions independently.

ACTIVITY 2: Adding on ones and tens with visual support

- Explain to the children that they will be adding and subtracting ones and tens from three-digit numbers in their heads. Draw three numbers from the bag to make a three-digit number, e.g. 342, and place the cards where all the children can see them. Ask one child to tell you what the number is. Ask another child to tell you how many hundreds, tens and ones are in the number.

✓ **TIP:** Check the children are clear about the place value of each column. This will support a clear visualisation of the number, which will help them when they are adding and subtracting larger numbers without the cards to support them.

- Now ask: *Add a one to this number. What is the answer? Can you add ten to this number? What is the answer?*

! **WATCH OUT:** If the children are insecure with place value, they might confuse adding a ten and adding a one. If so, ask them to count to ten out loud. Then draw their attention to the hundreds, tens and ones columns.

- Model another example, asking the children the questions such as: *Can you add three ones to this number?*
- The children take turns to draw three numbers from the bag. They roll a die to find out how many ones to add on. They do the addition and write down the new number on their whiteboards. Then ask them to write ten more, followed by a number of ones less (based on the roll of the die) and ten less.

OBJECTIVE

- Add and subtract numbers mentally, including: a three-digit number and ones, a three-digit number and tens, a three-digit number and hundreds

Rising Stars Progression Framework: 3.2.b.1

RESOURCES

- Activity 1: Number track for 0 to 200 marked every 10 for the teacher; tape; Worksheet 1
- Activity 2: Five sets of number cards from 0 to 9 mixed together in a bag; a board for the teacher; whiteboard for each child; die

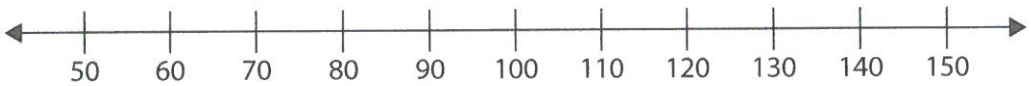
Worksheet 1

Name _____ **Date** _____

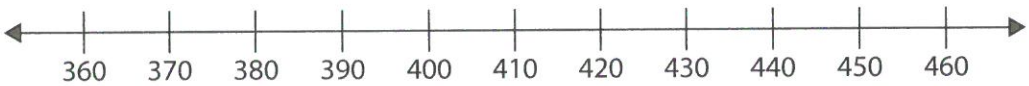
Bridging for addition and subtraction

Use bridging to find the answers to these calculations mentally.

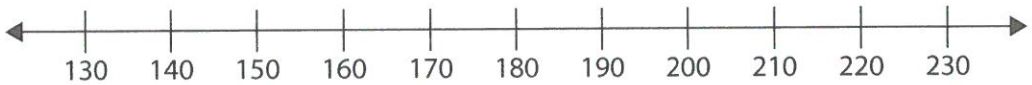
1. 60 + 50



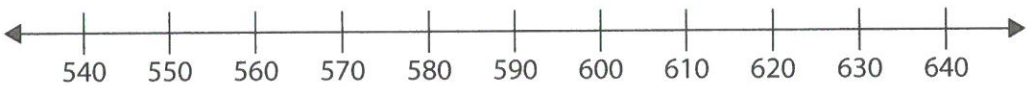
2. 440 – 70



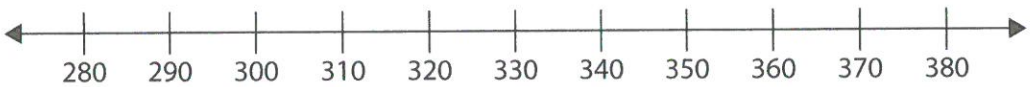
3. 140 + 70



4. 630 – 50



5. 280 + 40



Strand: Addition and Subtraction

DAY 5

Sub-strand: Mental calculation strategies

ASSESS

ASSESSMENT ACTIVITY

- The purpose of the assessment is to check what each child can do independently, carefully noting down any difficulties and misconceptions. The adult will need to watch carefully what the children do, any strategies used and confidence levels.
- Give each child a copy of Worksheet 2.
- Remind the children of the different strategies they have been learning about to help them add and subtract mentally: rounding and adjusting, compensation, bridging and using known facts.
- Explain that there is a suggested strategy for answering each question on the worksheet, but they can use a different strategy if they choose.

✓ **TIP:** Observe whether the children use the suggested strategy or a different strategy. If they use a different strategy ask: *Why did you choose that strategy? Is your chosen strategy more efficient?* The reasons that children give will indicate how secure they are in their understanding of the variety of mental calculation strategies and how confident they are in selecting an efficient method.

- Encourage the children to draw number tracks or make jottings to support their mental calculations. Remind the children that making jottings or sketches is not cheating - quite the opposite!

OBJECTIVE

- Add and subtract numbers mentally, including: a three-digit number and ones, a three-digit number and tens, a three-digit number and hundreds

Rising Stars Progression Framework: 3.2.b.1

RESOURCES

- Worksheet 2

EVIDENCING SUCCESS

Meeting expectations:

- The child can add and subtract up to three digit numbers mentally, e.g. 227 + 147 or 317 –186.
- The child has more than one strategy that they can apply.

Worksheet 2

Name _____ Date _____

1. Find the answer to these calculations.

HINT: You could use rounding and adjusting.

a) 227 + 147

b) 317 – 186

2. Find the answer to these calculations.

HINT: You could use known facts.

a) 247 + 1 **d)** 693 – 1

b) 247 + 10 **e)** 693 – 10

c) 247 + 100 **f)** 693 – 100

3. Find the answer to these calculations.

HINT: You could use bridging.

a) What is 120 + 70?

b) What is 210 – 60?

4. Find the answer to these calculations.

HINT: You could use compensation.

a) 149 + 5

b) 161 – 8

Strand: Addition and Subtraction

DAY 1

Sub-strand: Mental calculation strategies

TEACH

ACTIVITY 1: Using place value to solve number problems

- Working as a group, ask a child to choose three digits from the cards. Ask them to make a three-digit number with their chosen numbers by placing their digit cards in a **place-value grid**, e.g. three, nine and five could combine to make 395.
- Ask: *Can anyone make a larger number using those digits?* When you have an answer (e.g. 953) check how the children arrived at the answer or why it wasn't possible to make a larger number.

WATCH OUT: Using the example of 953, you are looking for the children to be able to explain that the nine is the largest number so it goes in the hundreds column, five is the next largest so it goes in the tens column, and the smallest number (three) is in the ones column.

- Ask: *Can anyone make a smaller number?* When you have an answer (e.g. 359) check how the children arrived at the answer or why it wasn't possible to make a smaller number.

ACTIVITY 2: Using number bonds to solve number problems

- Tell the children: *I know the* ***number bond*** *3 + 4 = 7.* Ask: *So what else do I know?*
- Demonstrate using a 100 square. Take your time to ensure the children clearly understand these statements.

3 + 4 = 7	30 + 40 = 70
4 + 3 = 7	40 + 30 = 70

- Make sure they can see how this related to the number bond 3 + 4 = 7.
- Show that 3 – 7 *does not* equal four. Ask: *Why not?* Work through another example and this time take it further.

2 + 7 = 9	20 + 70 = 90	200 + 700 = 900
7 + 2 = 9	70 + 20 = 90	700 + 200 = 900
9 – 7 = 2	90 – 70 = 20	900 – 700 = 200
9 – 2 = 7	90 – 20 = 70	900 – 200 = 700

- Remind the children about using number bonds, then ask them to try on their own using 3 + 5 = 8 all the way up to the hundreds.
- Tell the children: *Let's try it the other way around. I know that 600 + 200 = 800. So what do I know about 60 + 20 and 6 + 2?* Ask the children to write out a grid for these numbers. See example above.

OBJECTIVE

- Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction

Rising Stars Progression Framework: 3.2.c.1, 3.2.c.2

RESOURCES

- Activity 1: Set of 12 playing cards or number cards from 1 to 12; place-value grids
- Activity 2: 100 square; whiteboard

Strand: Addition and Subtraction

DAY 2

Sub-strand: Mental calculation strategies

TEACH

ACTIVITY 1: Making a given number using known number facts

- Ask the children to work in pairs. One of them picks a number card from the bag, e.g. 120. The other child then counts out the correct number of manipulative resources to use. Pairs then work together to split the manipulatives into two groups and write this down. They should aim to write in *two* different ways to make that number, e.g. 60 + 60 = 120; 70 + 50 = 120. 6 + 6 = 12, 7 + 5 = 12.

TIP: You may wish to model to the children how this is done first.

- When they have done this, ask: *How did you find the correct* ***total****? How did you choose the first number? How did you work out the second?* Discuss their strategies and which ones work well. Here, the children may say that 'I know 6 + 6 = 12 so I know 60 + 60 = 120'. They may have tried adding on from the first number.
- The second child in the pair then draws another number card from the bag and together the children write down two calculations to give that number total, again using the manipulative resources for support.
- Repeat the process but this time challenge the children to find the two calculations *without* using manipulative resources. Ask them: *Can you use a number fact about the total to make the number?* Model this first with the number 190: *180 is 10 less than 190 so we did 180 + 10 = 190. We also know that 190 is 10 less than 200 so we did 150 + 40 = 190 because 100 + 100 = 200.*
- Check the children are familiar with the process of using facts they know to make given totals before moving on to the next activity. You could ask them to complete the first two questions on Worksheet 3 to check understanding.

ACTIVITY 2: Making the total when we already know some of the numbers, but one is missing

- Start by looking at an example, such as: 130 + ? = 180. Ask: *How can we work out the missing number?* See what the children suggest. Then show them how to work it out using a number track.
- Have a go at another question together, but this time with three numbers to make a total where one is missing, e.g. 150 + 130 + ? = 300.
- As soon as you feel the children understand, ask them to work independently to complete the questions on Worksheet 3.

TIP: Ensure the children have access to a number track and counters, in case they are needed.

- As an extension task, ask the children to write five more sums with missing numbers for their friends to have a go at.

OBJECTIVE

- Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction

Rising Stars Progression Framework: 3.2.c.1, 3.2.c.2

RESOURCES

- Activity 1: 20 number cards from a selection of numbers between 100 and 500; bag for cards; manipulative resources (counters, cubes, buttons, etc.); Worksheet 3
- Activity 2: Worksheet 3; number balance/number track/counters

Worksheet 3

Name _____ Date _____

Missing numbers

1. Here is one way to make 100 using addition. Can you find 2 more ways?

30 + 70 = 100 ☐ ☐

2. Here is one way to make 100 using subtraction. Can you find 2 more ways?

300 – 200 = 100 ☐ ☐

3. Find the missing numbers.

a) 140 + ☐ = 200 **b)** 210 + ☐ = 300

c) ☐ + 150 = 600 **d)** 160 + ☐ = 260

e) 100 + ☐ = 340 **f)** ☐ + 130 = 500

g) 160 + ☐ = 250 **h)** ☐ + 140 = 220

Strand: Addition and Subtraction

DAY 3

Sub-strand: Mental calculation strategies

TEACH

ACTIVITY 1: Understanding the language of addition and subtraction

WATCH OUT: One reason why children may struggle with number problems is the vocabulary rather than the maths. This lesson focuses on what the question is asking for and understanding the vocabulary of problem solving.

- Look with the children at the vocabulary cards from Worksheet 4. Start by asking them to read the cards and then to work as a group to sort them into two piles. Say to them: *Which words mean that we should **add** the numbers together and which words mean that we should **subtract** one number from another?*
- As you work as a group to sort the cards, give an example of how each word might be used in a calculation, e.g. *What is the **difference** between 400 and 900? What is 160 **subtract** 20? What is 30 **more than** 300?*
- When the children have sorted the cards, hand out copies of Worksheet 5. Look at question 1. Ask: *Can anyone see which word tells you what to do?* (It is 'add'.) The children should highlight the word. Ask the children to explain what it means. Ask: *Can you think of another sentence using the word 'add'?*

TIP: Remind the children they are not answering the questions at this point.

- Go on to the subsequent questions on Worksheet 5, taking time to ensure the children can find and highlight the words that tell them what to do. Although the words themselves are not tricky, the children will need to think about their meaning in each specific context.

ACTIVITY 2: Applying the language of addition and subtraction

- Return to Worksheet 5 and now focus on answering the questions.
- Look at question 1. Ask: *Which word have we highlighted as the word that tells us whether to add or subtract? What does that mean we have to do to?*
- Work through the question together as a group to find the answer.
- Go on to the subsequent questions on Worksheet 5, taking time to ensure the children can find the words that tell them what to do and then complete that operation.

TIP: Question 7 asks: '*What is the difference?*' To help the children understand what this means, use a number track to physically show the **difference** in the context of subtraction: *Here is the number ten and here is the number six. The 'difference' is the space between them.*

OBJECTIVE

- Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction

Rising Stars Progression Framework: 3.2.c.1, 3.2.c.2

RESOURCES

- Activity 1: Worksheet 4 cut into cards; highlighter pens; Worksheet 5
- Activity 2: Worksheet 5; highlighter pens of a different colour for the subtraction words; number track

Worksheet 4

Photocopy and cut into cards.

Addition and subtraction vocabulary cards

more	subtract
altogether	sum
total	take away
less	add
difference	left
and	make

Worksheet 5

Name _____ Date _____

Language of addition and subtraction

1. Add 6, 2 and 4.

2. What is the total of 7, 3 and 10?

3. What is the sum of 20 and 12?

4. What is the total of 4 + 4 + 4?

5. Altogether, how many are 40 + 40 + 40?

6. Take away 5 from 10.

7. Count back from 10 to 6. What is the difference?

8. If I have 12 sweets and eat 6, how many are left?

9. Subtract 40 from 60.

10. What is 6 subtracted from 20?

Strand: Addition and Subtraction

DAY 4

Sub-strand: Mental calculation strategies

TEACH

ACTIVITY 1: Solving simple word problems

- Give each child a copy of Worksheet 6 and ask the children to read through the first question. Ask: *What is the operative word in the question? Which word tells you what to do? Is it addition or subtraction? How do you know?*
- The children should work together to highlight the **operation** words in each of the calculations on Worksheet 6 and then write each of the problems and a calculation in the box provided.

WATCH OUT: Observe the children closely to make sure they are able to put the numbers into the calculations in the correct places and know the symbol to use.

- The children then solve the word problems from the calculations they have written down in the calculation box.

TIP: Allow the children to use whichever method they feel most comfortable with to find the answers (manipulative resources, number tracks, working out in their heads, etc.).

ACTIVITY 2: Creating simple word problems

- Model choosing a vocabulary card (from Worksheet 4, page 33) from the selection and devising a word problem around it. *I have chosen difference. I am 6 and my brother is 11. What is the difference between our ages?*
- Ask the children to now do the same thing. They then write down their word problem on a whiteboard.
- When all of the children have written their word problem down they are to swap boards and have a go at solving each other's word problems.
- Repeat the activity as time allows, so the children have the opportunity to create word problems using different vocabulary cards.

OBJECTIVE

- Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction

Rising Stars Progression Framework: 3.2.c.1, 3.2.c.2

RESOURCES

- Activity 1: Worksheet 6; pencils; highlighter pens; number tracks; manipulative resources
- Activity 2: Vocabulary cards from Worksheet 4, page 33; whiteboards and pens

Worksheet 6

Name _____ Date _____

Solving problems

Word problem	Can you write the calculation?
Example: There are 80 birds in the oak tree and 40 birds in the elm tree. How many more birds are there in the oak tree than in the elm tree?	80 – 40 = 40
1. There are 6 frogs in my pond and 12 frogs in my friend's pond. What is the difference between them?	
2. I have brought 15 cupcakes for the bake sale and my friend has brought 20. How many cakes do we have altogether?	
3. Beth has 36 books. For her birthday she got 23 more. How many books does Beth have now?	
4. In my room I have 45 dolls. My sister has 65 dolls. How many more dolls does she have than me?	
5. My Grandma lives 125 miles away. We have driven 75 miles. How much further do we have to go?	
6. There are 94 sandwiches at the picnic. During lunch 53 of them are eaten. How many sandwiches are left?	

Strand: Addition and Subtraction

DAY 5

Sub-strand: Mental calculation strategies

ASSESS

ASSESSMENT ACTIVITY

- The purpose of the assessment is to check what each child can do independently, carefully noting down any difficulties and misconceptions. The adult will need to watch carefully what the children do, any strategies used and confidence levels.
- The children work independently to complete Worksheet 7 which provides them with practice of the methods of calculation taught on Days 1 to 4. They can use the 100 square, number tracks and counters if they want to. Ask the children to complete the questions in their exercise books to give them more space for jotting and recording.

WATCH OUT: Observe the children closely as they work to see how they approach the questions. Notice if they use the equipment or are making notes. Are they using their fingers? These observations will tell you if the children are able to calculate mentally and can use the methods they have been taught, such as partitioning for addition. The observations will also reveal whether the children can use resources such as a number track or a 100 square confidently, or whether they need additional support to use these resources effectively.

- When the children have finished, take them through the questions and encourage discussion where there are different answers. Also discuss how the apparatus helped.

EVIDENCING SUCCESS

Meeting expectations:

- The child understands the language of addition and subtraction in the context of number problems.
- The child can use their knowledge of place value to help them to solve number problems.
- The child can use their knowledge of number facts to help them to solve number problems.
- The child can solve simple missing number problems.

OBJECTIVE

- Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction

Rising Stars Progression Framework: 3.2.c.1, 3.2.c.2

RESOURCES

- Worksheet 7; exercise books; number track; 100 square; counters

Worksheet 7

Name _____ Date _____

Using the language of addition and subtraction

Find the answers to these calculations.

1. What is the total of 46 and 32?
2. What is the sum of 27 and 14?
3. What is the answer to 36 take away 10?
4. How many are left if you subtract 21 from 42?

Find the missing numbers

5. 14 + ____ = 30
6. ____ + 121 = 140
7. 226 – 100 = ____
8. ____ – 64 = 36

Word problems

Read each word problem then write the calculation and the answer.

9. I am 174 cm tall and my mum is 156cm tall. How much taller am I?
10. My dog eats 56 bones a year and my friend's dog eats 97 bones a year. How many more bones does her dog eat?

What else do I know?

11. If I know that 6 + 4 = 10, what else do I know?

    Find 3 facts.

Strand: Addition and Subtraction

DAY 1

Sub-strand: Written calculation

TEACH

ACTIVITY 1: Partitioning refresher

- Start by asking: *What does the word **partition** mean?*
- Show the children the different parts of numbers using the place-value (arrow) cards. E.g. *This number is one hundred, two tens and three ones. It is one hundred and twenty-three.*
- Starting with two-digit numbers and using place-value (arrow) cards, ask the children to partition 72. They should check answers with a partner. Then ask them to partition 87.
- Move on to three-digit numbers. Ask the children to partition 542 using place-value cards then check answers with a partner. Finally, ask the children to partition 423.
- Check answers. Ask the children to explain their method, i.e. starting with either ones or hundreds and working their way through the number identifying the place value of each part. Reinforce that in the number 542 the answer is 500 or five hundreds, 40 or four tens, and two or two ones.

✓ **TIP:** Include numbers with zero as a **place holder**, such as 403. Use a place-value grid to show that the zero represents no tens in the number.

! **WATCH OUT:** Children who say 'five' or 'four' without specifying the hundreds or tens might not be entirely clear what the numbers mean, in which case you may need to spend the rest of the session on simple partitioning.

ACTIVITY 2: Adding three-digit numbers using partitioning

- Start by giving them an example, e.g. 324 + 251. Partition each number using the place-value (arrow) cards and then put these numbers into a calculation. Point out that we can write the sum as: 300 + 20 + 4 + 200 + 50 + 1. Lay the place-value cards out above one another and ask the children to write the numbers down in their books: 300, 20, 4, 200, 50 and 1
- Ask: *How many ones?* (4 + 1 = 5) *How many tens?* (50 + 20 =70) *How many hundreds?* (300 + 200 = 500).
- The children can write these numbers underneath and combine them to make the answer: 500, 70, 5, or 575.
- To secure learning, guide the children through further examples, such as 346 + 142; 246 + 121; 523 + 423; 503 + 612; 300 + 234.

! **WATCH OUT:** Make sure the children write the numbers in the correct columns, to reinforce the positional value of each digit. If some children struggle to keep to the columns, provide paper with larger squares.

OBJECTIVE

- Add and subtract numbers with up to three digits, using the efficient written methods of columnar addition and subtraction

Rising Stars Progression Framework: 3.2.e.1

RESOURCES

- Activities 1 and 2: Exercise books/squared paper; place-value (arrow) cards

		H	T	O
First, partition each number	+	300 200	20 50	4 1
Then add the columns		500	70	5

Partitioning numbers to add

Strand: Addition and Subtraction

DAY 2

Sub-strand: Written calculation

TEACH

ACTIVITY: Columnar addition

- Ask: *What methods of addition do we already know?* Responses may include **partitioning**, using fingers, counting using a number track or using known facts such as number bonds.
- Tell the children: *We are going to add 523 and 436 together.* Remind them about adding numbers together using place-value (arrow) cards (Day 1): *First, we **partitioned** both numbers. Then we added the numbers together and put the partitioned answer back together to make one total.*
- Explain: *We are going to find the answer to addition calculations in a similar way but without partitioning the numbers.*
- Model this method for 523 + 436: *I write the digits in the correct **columns (hundreds, tens and ones)**. Then I add the ones together and write this number underneath, add the tens numbers together and write this number underneath, and then finally do the same with the hundreds numbers.* As you describe what you are doing, model writing the numbers on squared paper.
- Explain: *We write the calculation in columns so we call this method the **columnar method for addition**.*

	H	T	O
	5	2	3
+	4	3	6
	9	5	9

WATCH OUT: Emphasise that the numbers represent the same quantity as when you wrote them as partitioned parts: this is just a short-hand way of writing it. Some children may think that the numbers represent ones, as they do not have the zero place holders in the numbers. If this is the case use the place-value cards to model to the children that the zeros are simply hidden behind the other numerals.

- The children can practise using the columnar method of addition using these numbers: 685 + 213; 107 + 392; 242 + 150; 301 + 298.

TIP: Be prepared to talk the children through another example or two on the board, to help secure understanding. As you do this you should use a range of addition vocabulary – such as **add**, **total**, **sum of** – to reinforce learning of the vocabulary of addition.

OBJECTIVE

- Add and subtract numbers with up to three digits, using the efficient written methods of columnar addition and subtraction

Rising Stars Progression Framework: 3.2.e.1

RESOURCES

- Exercise books/squared paper; place-value cards for support

Strand: Addition and Subtraction

DAY 3

Sub-strand: Written calculation

TEACH

ACTIVITY 1: Grid method of subtraction with two-digit numbers

- Tell the children: *We can use partitioning to **subtract** numbers. Can anyone think how we would start?* Encourage them to use what they know about **partitioning** numbers for **addition** to explain how to partition numbers for **subtraction**.

WATCH OUT: The children need to understand that the partitioning stage is exactly the same for subtraction as addition; the difference is that this time they will be subtracting one number from the other.

TIP: At this stage, ensure that you write the larger number first.

- Give the children the calculation 48 – 25. Model partitioning the numbers 48 and 25 using the place-value (arrow) cards and place them in a grid. (See diagram below.) 40, 8 and 20, 5
- Model the method: *We start by subtracting the ones (8 – 5 = 3). Write the three underneath the ones in the calculation. Now we will subtract the tens (40 – 20 = 20). Write the 20 underneath the ones in the calculation. Now combine the numbers to make the answer 23.*
- The children should then try these subtractions using place-value (arrow) cards and writing the numbers in their exercise books using the same method: 36 – 21; 96 – 42; 86 – 55; 33 – 10.

WATCH OUT: None of the examples involves exchanging. This is to ensure that the children can practise partitioning in the right order, writing the numbers in the correct column and doing the simple subtraction to achieve the correct answer.

ACTIVITY 2: Grid method of subtraction with three-digit numbers

- Using the place-value cards, model partitioning the numbers 423 and 112. Place the cards above one another in columns, as you did in Activity 1.
- Write out the grid as shown for the subtraction 423 – 112.
- Subtract the columns in turn. Write each number in the **correct column (hundreds, tens or ones)**. Combine the numbers to make the answer.
- The children can then try the subtraction questions using the place-value cards, writing the numbers in their exercise books using the same method: 641 – 230; 527 – 116; 307 – 201.

OBJECTIVE

- Add and subtract numbers with up to three digits, using the efficient written methods of columnar addition and subtraction

Rising Stars Progression Framework: 3.2.e.1

RESOURCES

- Activities 1 and 2: Whiteboard for adult; exercise books/squared paper; place-value cards

	T	O
	40	8
–	20	5
	20	3

Partitioning two-digit numbers to subtract

	H	T	O
	400	20	3
–	100	10	2
	300	10	1

Partitioning three-digit numbers to subtract

Strand: Addition and Subtraction

DAY 4

Sub-strand: Written calculation

TEACH

ACTIVITY: Columnar subtraction

- Tell the children: *Today we are going to learn a new **method** of doing subtraction with three-digit numbers. We are going to subtract 112 from 423.*
- Remind the children how they subtracted numbers using the place-value (arrow) cards on Day 3. *First, we partitioned the numbers and laid them out in columns before subtracting one number from another. We then put the partitioned answer back together to find the final answer.*
- Explain that they are now going to find the answer to subtraction calculations *without* partitioning the numbers.
- Model this to the children: *I write the digits in the **correct columns (hundreds, tens and ones)**. Then I subtract the ones numbers bottom from top and write this number underneath, the tens numbers bottom from top and write this number underneath, and finally the hundreds numbers bottom from top and write this underneath.* As you describe what you are doing, model writing the numbers on squared paper.

	H	T	O
	4	2	3
−	1	1	2
	3	1	1

- Explain: *We write the calculation in columns so we call this method the **columnar method for subtraction**.*

✓ **TIP:** Emphasise that the numbers represent the same quantities as when you wrote them as partitioned parts: this is just a short-hand way of writing it.

! **WATCH OUT:** Some children may think that the numbers represent ones as they do not have the zero place holders in the numbers. In this case, use the place-value cards to model that the zeros are simply hidden behind the other numerals.

- The children can practise using the column method using these numbers: 534 – 231; 403 – 201; 567 – 345; 987 – 234.

✓ **TIP:** Be prepared to talk the children through another example or two on the board, to help secure understanding. As you do this be careful to use a range of subtraction vocabulary – such as **subtract**, **difference between** – to reinforce learning of the vocabulary of subtraction.

OBJECTIVE

- Add and subtract numbers with up to three digits, using the efficient written methods of columnar addition and subtraction

Rising Stars Progression Framework: 3.2.e.1

RESOURCES

- Whiteboard for adult; exercise books/squared paper; place-value cards for support

Strand: Addition and Subtraction

DAY 5

Sub-strand: Written calculation

ASSESS

ASSESSMENT ACTIVITY

- The purpose of the assessment is to check what each child can do independently, carefully noting down any difficulties and misconceptions. The adult will need to watch carefully what the children do, any strategies used and confidence levels.
- Hand out copies of Worksheet 8 and ask the children to complete it independently.
  - In question 1, the children must partition three-digit numbers.
  - In question 2, the children must add three-digit numbers using the written method of their choice.
  - In question 3, the children must subtract three-digit numbers using the written method of their choice.

  None of the questions involve carrying or borrowing. Observe closely to see which children are confident in using the columnar method of addition and subtraction.

✓ **TIP:** Before they start the assessment, ask the children for their top tips for answering the questions correctly, such as:

- writing the numbers in the correct column;
- remembering what each number means in hundreds, tens and ones.

- After they have finished the worksheet, go through the answers with the children.

! **WATCH OUT:** If the children have the wrong answer, this may be because the numbers were not written in neat, clear columns. Also be aware that, when partitioning 655, for example, it is 600 rather than 6, and 50 rather than 5.

EVIDENCING SUCCESS

Meeting expectations:

- The child can add and subtract 613 and 285 using a formal method of columnar addition or subtraction.

OBJECTIVE

- Add and subtract numbers with up to three digits, using the efficient written methods of columnar addition and subtraction

Rising Stars Progression Framework: 3.2.e.1

RESOURCES

- Worksheet 8

Worksheet 8

Name _____ **Date** _____

1. Partition these numbers.

a) 237

H	T	O

b) 478

H	T	O

c) 613

H	T	O

2. Add these numbers using the written method of your choice.

a) 613 + 285

b) 558 + 411

c) 854 + 431

3. Subtract these numbers using the written method of your choice.

a) 643 – 221

b) 836 – 632

c) 977 – 431

Strand: Multiplication and Division

DAY 1

Sub-strand: Mental calculation strategies

TEACH

ACTIVITY 1: Refresher of the two multiplication table and the inverse

- Place the cubes in the middle of the table for easy access.
- Explain the purpose of the session, then write 2 × 1 on the board. Ask what 2 × 1 means (one set of two).
- Ask a child to use the cubes to show the group 2 × 1.
- Lay the cubes on a large piece of paper and write 2 × 1 = 2 next to them.
- Write 2 × 2 on the board and ask a child to make 2 × 2 in cubes. Lay the cubes on the paper and write 2 × 2 = 4 next to them. They should lay them out in the format shown below.
- Continue with the children adding the cubes to the paper to display the **two multiplication table** up to 12 × 2.

TIP: Ensure that all the children are involved in making bars of cubes.

- Ask the children how many twos there are in ten. Ask a child to prove it using the cubes. Here you want the child to take the bar of ten cubes and physically split it into five pairs of cubes.
- Explain to the children: *You can see there are five twos in ten by dividing the ten cubes into five equal pairs. Who can prove there are six twos in 12?*
- Make explicit that, because we know that 2 × 3 = 6, we also know that 6 ÷ 2 = 3. Ask: *Can anyone use the cubes to show me what else we know?* You want the children to demonstrate that 2 × 3 = 6, 6 ÷ 2 = 3 and also 6 ÷ 3 = 2.

ACTIVITY 2: Linking the two and four multiplication tables

- Write on the board: 2 × 1 = 2, 2 × 2 = 4, 4 × 1 = 4. Ask the children to tell you what this means (one set of two, two sets of two, one set of four).
- Ask the children to make 2 × 2 using the cubes and to also make 4 × 1. Draw their attention to the fact that they both use four cubes.
- Now write on the board: 2 × 3 = 6, 2 × 4 = 8, 4 × 2 = 8.
- Again, ask the children to use cubes to make 4 × 2 and 2 × 4.
- Ask: *What comes next in the pattern? How do you know and what pattern can you see?* Point out that all the numbers are even. Have they noticed that four is double two and eight is double four?
- Ask: *Can anyone use the cubes to prove that 2 × 6 = 12 and 4 × 3 = 12? Can anyone prove how many fours are in 12 using the cubes?*
- Continue using the cubes to go through the **four multiplication table** until you get to 40.
- Now ask the children to complete Worksheet 1. They will stick it in their exercise books to refer to later if needed.

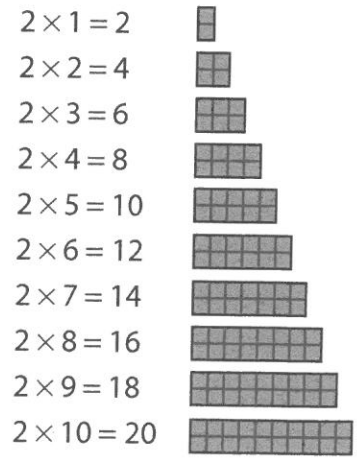
OBJECTIVES

- Recall and use multiplication and division facts for the three, four and eight multiplication tables
- Solve problems, including missing number problems, involving multiplication and division

Rising Stars Progression Framework: 3.2.b.3, 3.2.c.3

RESOURCES

- Activity 1: Cubes; board for teacher; large sheet of paper to display the cubes
- Activity 2: Cubes; board for teacher; Worksheet 1; exercise books; glue sticks



Two multiplication table using cubes

Worksheet 1

Name _____ Date _____

The 2 and 4 multiplication tables

Complete the 2 and 4 multiplication tables.

$2 \times 1 =$ ☐	$4 \times 1 =$ ☐
$2 \times 2 =$ ☐	$4 \times 2 =$ ☐
$2 \times 3 =$ ☐	$4 \times 3 =$ ☐
$2 \times 4 =$ ☐	$4 \times 4 =$ ☐
$2 \times 5 =$ ☐	$4 \times 5 =$ ☐
$2 \times 6 =$ ☐	$4 \times 6 =$ ☐
$2 \times 7 =$ ☐	$4 \times 7 =$ ☐
$2 \times 8 =$ ☐	$4 \times 8 =$ ☐
$2 \times 9 =$ ☐	$4 \times 9 =$ ☐
$2 \times 10 =$ ☐	$4 \times 10 =$ ☐
$2 \times 11 =$ ☐	$4 \times 11 =$ ☐
$2 \times 12 =$ ☐	$4 \times 12 =$ ☐

Strand: Multiplication and Division

DAY 2

Sub-strand: Mental calculation strategies

TEACH

ACTIVITY 1: Introducing the eight multiplication table

- Place two cubes, four cubes and eight cubes on the table in front of the children. Remind them that they know the **four multiplication table** is **double** the **two multiplication table**. Ask them: *How do you think the **eight multiplication table** will compare with the four and two multiplication tables?* Encourage them to explain their ideas.

TIP: Use the cubes to demonstrate that four is double two, and eight is double four or four multiplied by two.

- Write the tables out as before but now add in the eight multiplication table. Ask the children to predict what comes next at each stage. Write on the board:

  $2 \times 1 = 2$

  $2 \times 2 = 4$ $\quad 4 \times 1 = 4$

  $2 \times 3 = 6$

  $2 \times 4 = 8$ $\quad 4 \times 2 = 8$ $\quad 8 \times 1 = 8$, etc.

- As in Day 1, ask the children to make the numbers with cubes.
- Continue making the pattern up to 2×12, 4×12 and 8×12.
- As the children work, ask if they can use their knowledge of the two and four multiplication tables to predict what will come next.
- Now ask the children to write out the two, four and eight multiplication tables on Worksheet 2.

ACTIVITY 2: Multiplication and division facts – patterns and the inverse relationship

- Ask the children to work in pairs. Each pair needs 24 cubes arranged in sticks of 8. Ask: *How can this be written down?*

TIP: The children's answer here may be $8 \times 3 = 24$. Draw their attention to alternatives, such as $24 \div 8 = 3$. Can they come up with other suggestions?

- Ask the children to write the **multiplication and division facts** for 24 in their books with a diagram next to it.
- Ask: *How else can we split our 24 cubes?* Encourage the children to think about what they know about the two, four and eight multiplication tables. Ask them to write their solutions in their books, using both multiplication and division facts, and with quick and simple diagrams.
- Encourage the children to share their solutions with the group.
- If time allows, ask pairs of children to take 40 cubes and see how many different ways they can find to make 40 using the two, four and eight multiplication tables.

OBJECTIVES

- Recall and use multiplication and division facts for the three, four and eight multiplication tables
- Solve problems, including missing number problems, involving multiplication and division

Rising Stars Progression Framework: 3.2.b.3, 3.2.c.3

RESOURCES

- Activity 1: Multi-link cubes; Worksheet 2
- Activity 2: Exercise books; multi-link cubes

Worksheet 2

Name _____ **Date** _____

The 2, 4 and 8 multiplication tables

Complete the 2, 4 and 8 multiplication tables.

$2 \times 1 =$	$4 \times 1 =$	$8 \times 1 =$
$2 \times 2 =$	$4 \times 2 =$	$8 \times 2 =$
$2 \times 3 =$	$4 \times 3 =$	$8 \times 3 =$
$2 \times 4 =$	$4 \times 4 =$	$8 \times 4 =$
$2 \times 5 =$	$4 \times 5 =$	$8 \times 5 =$
$2 \times 6 =$	$4 \times 6 =$	$8 \times 6 =$
$2 \times 7 =$	$4 \times 7 =$	$8 \times 7 =$
$2 \times 8 =$	$4 \times 8 =$	$8 \times 8 =$
$2 \times 9 =$	$4 \times 9 =$	$8 \times 9 =$
$2 \times 10 =$	$4 \times 10 =$	$8 \times 10 =$
$2 \times 11 =$	$4 \times 11 =$	$8 \times 11 =$
$2 \times 12 =$	$4 \times 12 =$	$8 \times 12 =$

Strand: Multiplication and Division

DAY 3

Sub-strand: Mental calculation strategies

TEACH

ACTIVITY 1: Introducing the three multiplication table

- Start by asking the children what facts they already know about the **three multiplication table**. As the suggestions are made, e.g. $5 \times 3 = 15$, write them on the board, leaving spaces for the missing parts of the table.

✓ **TIP:** As you do this, make explicit links between the suggestions given and the tables the children already know. E.g. *Yes, $3 \times 2 = 6$, and we already know that $2 \times 3 = 6$ from the two multiplication table.*

- Now complete the missing parts of the table using sets of three cubes. Ask the children to make 3×7 with the cubes and put their hand up when they have the answer.
- Check that all the children have the correct answer and continue to write out the three multiplication table on the board.
- When the full three multiplication table is written on the board, ask the children to copy it into their exercise books for future reference.

✓ **TIP:** Remember to check that they have written it correctly in their books.

ACTIVITY 2: Multiplication and division facts using the three multiplication table

- Ask the children (or pairs of children) to take 30 cubes and prove that $3 \times 10 = 30$. Encourage them to share their outcomes and explanation.

✓ **TIP:** Point out that the children *divided* 30 to prove that $3 \times 10 = 30$.

- Ask them to take 21 cubes and see if they can prove that $21 \div 3 = 7$. Again, ask them to share their findings.
- Now ask: *If $3 \times 11 = 33$, what is $33 \div 11$?*

✓ **TIP:** Get the children to work with the cubes, but note which children are able to answer without the cubes, i.e. because they understand the **pattern**.

- Finish by asking them to take 24 cubes and see how many ways they can make 24 using their knowledge of the two, three, four and eight multiplication tables. You are looking for answers such as: 3×8, 4×6, $24 \div 2$, etc.

OBJECTIVES

- Recall and use multiplication and division facts for the three, four and eight multiplication tables
- Solve problems, including missing number problems, involving multiplication and division

Rising Stars Progression Framework: 3.2.b.3, 3.2.c.3

RESOURCES

- Activities 1 and 2: Multi-link cubes; exercise books; whiteboard

Strand: Multiplication and Division

DAY 4

Sub-strand: Mental calculation strategies

TEACH

ACTIVITY: Solving problems using the two, three, four and eight multiplication tables

- Give each child a copy of Worksheet 3 and place a tray of cubes on the table. Explain that they will be using their knowledge of the two, three, four and eight multiplication tables to solve the problems.
- Read out question 1: *Andrea has 24 eggs. Each egg box holds 6 eggs. How many egg boxes will she need to store them?* Ask the children to work with a partner to discuss the question and how to solve it. Suggest that they use the cubes to represent the eggs.

✓ **TIP:** Remind the children to read the question carefully and highlight or underline the parts that give key information (i.e. that there are *24 eggs* and that *each egg box holds 6 eggs*).

- Ask them to report back on their discussions, focusing on key information and ways to solve the problem. Use cubes to illustrate the solution the children suggest.
- Establish with the children that for the first question they are sharing 24 eggs between the egg boxes, so the calculation could be 24 ÷ 6. So, they can solve the problem by asking how many sixes are in 24.
- Take the children through question 2: *Tariq has 4 boxes of apples. Each box has 4 apples. How many apples does he have?* Ask them to identify the key information and decide whether to multiply or divide to find the answer. Remind them that they can use the cubes. Ask them: *What would the cubes represent?* (apples)
- Here the key information is: *each box has 4 apples and he has 4 boxes*. Help the children to see that the solution lies in multiplying 4 × 4.

✓ **TIP:** Use the cubes to support any child struggling to understand. E.g. lay the cubes out in sets of four to represent a box of apples.

- Ask the children to try the remaining questions. Ask them to answer the questions in their exercise books to give them more space for jotting and recording. Reinforce the importance of reading the questions carefully. Remind them to use the multi-link cubes for support, if needed. Observe the children as they work.
- Call the group together after the children have completed question 5 on the worksheet, to check how they are getting on. Compare answers and methods as a group. The children then complete the worksheet.

✓ **WATCH OUT:** If a child struggles to identify the calculation, ask them to show you how they understand the question using the cubes. This should enable you to determine whether they have identified the key facts and how they relate to each other.

OBJECTIVES

- Recall and use multiplication and division facts for the three, four and eight multiplication tables
- Solve problems, including missing number problems, involving multiplication and division

Rising Stars Progression Framework: 3.2.b.3, 3.2.c.3

RESOURCES

- Multi-link cubes; Worksheet 3; exercise books

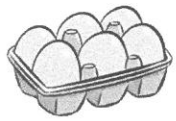
Worksheet 3

Name _____ Date _____

Solving problems using the 2, 3, 4 and 8 multiplication tables

Solve these problems using your knowledge of the 2, 3, 4 and 8 multiplication tables.

1. Andrea has 24 eggs. Each egg box holds 6 eggs. How many egg boxes will she need to store them?



2. Tariq has 4 boxes of apples. Each box has 4 apples. How many apples does he have?

3. There are 12 pairs of shoes on the shelf. How many left-foot shoes are there?

4. Steve has 20p in 2p coins. How many coins does he have?

5. Amelie has 80 candles. Each box holds 10 candles. How many boxes of candles does she have?

6. How many legs do 6 cows have altogether?

7. There are 16 chairs. I want to make 4 rows of chairs. How many chairs will be in each row?

8. Abram has 50p in 5p coins. How many coins does he have?

9. I need 3 marshmallows for each of my 4 friends. How many do I need altogether?

10. A spider has 8 legs. How many legs do 8 spiders have altogether?

Strand: Multiplication and Division

DAY 5

Sub-strand: Mental calculation strategies

ASSESS

ASSESSMENT ACTIVITY

- The purpose of the assessment is to check what each child can do independently, carefully noting down any difficulties and misconceptions. The adult will need to watch carefully what the children do, any strategies used and confidence levels.
- Give each child a copy of Worksheet 4.
- Explain that all of the questions relate to work that they have been doing during the week.
- The first set of questions are simple questions on multiplication and division facts, such as 3×4 or $12 \div 3$.
- The second set of questions involving filling in missing numbers and are about the two, three and four multiplication tables.
- The final set of questions present problems similar to those covered on Day 4. Remind the children to read the questions carefully.

✓ **TIP:** Encourage the children to solve the problems independently without resources, if possible. However, resources should be easily accessible if a child wants them.

! **WATCH OUT:** Observe the children carefully as they carry out the assessment. The use of resources as a support should be noted for assessment purposes.

EVIDENCING SUCCESS

Meeting expectations:

- The child can recall and use the two, three and four multiplication tables and can recall and use the eight multiplication tables with access to occasional support.
- The child can use their knowledge of these tables to solve problems.

OBJECTIVES

- Recall and use multiplication and division facts for the three, four and eight multiplication tables
- Solve problems, including missing number problems, involving multiplication and division

Rising Stars Progression Framework: 3.2.b.3, 3.2.c.3

RESOURCES

- Worksheet 4; multi-link cubes should be available, if needed

Worksheet 4

Name _____ Date _____

Multiplication tables

1. Multiplication and division facts

a) $2 \times 4 =$ ☐ **b)** $5 \times 8 =$ ☐ **c)** $3 \times 6 =$ ☐ **d)** $4 \times 10 =$ ☐

e) $15 \div 3 =$ ☐ **f)** $20 \div 4 =$ ☐ **g)** $24 \div 8 =$ ☐ **h)** $48 \div 4 =$ ☐

2. Find the missing numbers.

a) 2, ☐, 6, ☐, 10, ☐, ☐, 16, 18, 20, ☐, ☐

b) 3, 6, ☐, 12, 15, ☐, ☐, 24, 27, 30, ☐, 36

c) 4, ☐, 12, ☐, ☐, 24, ☐, 32, ☐, ☐

3. Solve these problems.

a) Ms Riley has 8 cars. She needs new tyres for all the wheels on her cars. How many new tyres will she need to buy?

b) A box of chocolates has 3 layers, with 8 chocolates on each layer. How many chocolates are in the box?

c) There are 3 cakes in a packet. Miss Broom has 30 children in her class. How many packets should she buy so every child gets a cake?

Strand: Multiplication and Division

DAY 1

Sub-strand: Written calculation

TEACH

ACTIVITY 1: Multiplication as repeated addition

- Start by saying: *Let's think about 5 × 3. It is three lots of five. Or we could say 5 + 5 + 5. Another way of saying it is three groups of five.*

✓ **TIP:** You can use multi-link cubes to physically show three sets of five cubes. You may prefer the children to use the cubes instead of drawing on paper at this stage.

- Ask the children: *Can you draw 5 × 3 on your squared paper using dots?* Write the calculation (5 × 3) and draw the answer next to it.
- Ask the children to work through another example with less structuring, e.g. to find the answer to 5 × 6. Give them access to the multi-link cubes to lay out the calculation. Then draw the calculation and write the answer, as in the example above.

ACTIVITY 2: Introducing short multiplication through arrays

- Point out that **arrays** are very important for *understanding* multiplication and for seeing the **commutative law** – e.g. that 5 × 6 = 6 × 5.
- Make the cubes accessible and give each child a copy of Worksheet 5. Challenge them to find out if the law remains true with different numbers of cubes.
- Say: *Let's look at 5 × 6. This time we are going to make it as an **array**.*
- Ask: *How many rows of five do we need to make 5 × 6?* (six)
- Arrange six rows of five cubes in the form of an array.
- Say: *Here we can see six rows of five showing the answer to our calculation. Can you now find the answer to the calculation by counting?* (30)

! **WATCH OUT:** The children may choose to count each row as a block of five or may count each cube individually. If the children choose to count the cubes individually, encourage them to count in fives for the following examples. Record this as 5 × 6.

- Ask the children how many rows would be needed if there were six cubes in a row (five). Ask a pair of children to confirm the answer by making rows of six cubes to make a total of 30. Record this as 6 × 5.
- Now ask the children to find the answers to the following calculations in the same way – making the array with cubes, counting the cubes and verbally confirming the answer in each case: 9 × 5; 4 × 5; 5 × 5; 7 × 5.

OBJECTIVE

- Write and calculate mathematical statements for multiplication using the multiplication tables that they know, including for two-digit numbers multiplied by one-digit numbers, using mental and progressing to formal written methods

Rising Stars Progression Framework: 3.2.e.2

RESOURCES

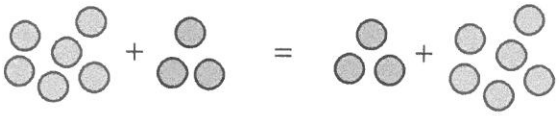
- Activity 1: Squared paper or board display with squares; graph paper with 1 cm squares for the children; multi-link cubes
- Activity 2: Worksheet 5; multi-link cubes

Worksheet 5

Name _____ Date _____

The commutative law

The commutative law states that it doesn't matter which order you multiply or add in, the answer is always the same.

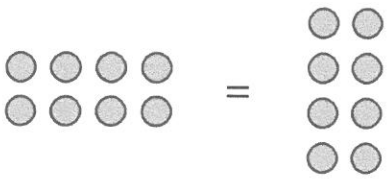


$6 + 3$ $3 + 6$

1. Take 12 cubes and make the sum $10 + 2 = 12$.

If you swap them around, do you get the same answer?

Try with another number of cubes. Is the commutative law always true for addition?



4×2 2×4

2. Is the commutative law true for multiplication?

Take 3 sets of 4 cubes. Is it the same as 4 sets of 3 cubes?

Try with a multiplication calculation for another number of cubes. Is the commutative law always true for multiplication?

Strand: Multiplication and Division

DAY 2

Sub-strand: Written calculation

TEACH

ACTIVITY 1: Multiplication of one-digit numbers using partitioning and arrays

▶ Start by saying: *Now we are going to draw (or make) an* ***array*** *for 8 × 8.*

✓ **TIP:** The array could be made using cubes, as the children are familiar with them from Day 1, or drawn on paper.

▶ Explain **partitioning** to the children as splitting a number up to make it more manageable. We can split, or **partition**, ten into five and five, or into four and six, etc.

▶ Then ask: *How can we partition the* ***array*** *for 8 × 8 to carry out the multiplication? Which numbers can we split eight up into?* Give each child eight cubes and invite them to come up with suggestions. The children could suggest three and five or they may suggest four and four.

▶ Next, say to the children: *We have split the array into 3 × 8 and 5 × 8.* Do each of these calculations and add them together to get the answer.

$$\begin{array}{l} 3 \times 8 = 24 \\ +\ 5 \times 8 = 40 \\ \hline 8 \times 8 = 64 \end{array}$$

▶ Repeat the process, with the children making arrays for 8 × 5, 4 × 6, 8 × 6 and 9 × 5, finding different ways of partitioning the numbers in the calculations.

✓ **TIP:** The children need to see how to partition the numbers in the calculations to be able to find the answers. They do not need to write anything down.

ACTIVITY 2: Multiplication of one- and two-digit numbers using partitioning and arrays

▶ Tell the children they will try a calculation with a two-digit number: 5 × 14.

▶ Make the array for 5 × 14 using cubes: *We need to make 14 rows of five cubes.*

▶ Ask: *How can we partition the array to make it easier to calculate?*

! **WATCH OUT:** The children may make many suggestions, but we want to partition into tens and ones – ten and four. This will build their understanding as they move towards formal written methods.

▶ Show the children how to partition the calculation into ten and four by moving the cubes. *We have 5 × 4 = 20 and 5 × 10 = 50. Now we can add 20 + 50 to make 70, so we know that 5 × 14 = 70.*

▶ Now ask the children to try 5 × 12 and then 5 × 15 on their own. They can use cubes or drawings for support as needed.

▶ Go through their answers as a group. Ask: *How did you partition the numbers? Did you partition the 12 or the five? Why did you choose to partition that number? Which two numbers did you then add together to make the total?*

OBJECTIVE

- Write and calculate mathematical statements for multiplication using the multiplication tables that they know, including for two-digit numbers multiplied by one-digit numbers, using mental and progressing to formal written methods

Rising Stars Progression Framework: 3.2.e.2

RESOURCES

- Activities 1 and 2: Whiteboard; squared paper; pencils; multi-link cubes

Strand: Multiplication and Division

DAY 3

Sub-strand: Written calculation

TEACH

ACTIVITY: Moving to formal written methods of multiplication with arrays

- Say: *We are going to multiply 24 × 5.* Explain that it would take a lot of little dots to draw a full array of five rows of 24, so we will just do the outline, like this:

- Explain that we can partition 24 into tens and ones to make it easier to multiply it by five.
- Say to the children: *Let's start by drawing a grid to show the calculation* (see diagram above) *and multiply each part. Then we can add it together,* e.g.:

$5 \times 4 = 20$
$5 \times 10 = 50$
$5 \times 10 = 50$
$5 \times 24 = 120$

- Point out that this example took three steps to solve. Ask: *Can anyone think of how it could be reduced to two steps?* Here you are looking to see if they can suggest 5×20 instead of 5×10 twice.
- Now write 5×28 on the board. Ask the children: *How can we partition this to make it easier to multiply?*

! WATCH OUT: The children may make many suggestions, but we want to partition into tens and ones – 20 and eight.

- Use the same method as before, but this time point out that instead of writing 5×10 twice, we can put 5×20 instead.

$5 \times 8 = 40$
$5 \times 20 = 100$
$5 \times 28 = 140$

Draw the children's attention to the fact that this was solved in two steps.

- Ask the children to work in pairs to try these calculations: 4×32; 2×27; 5×58. They should aim to keep the number of steps as small as possible.
- When the children have finished, compare answers as a group.

OBJECTIVE

- Write and calculate mathematical statements for multiplication using the multiplication tables that they know, including for two-digit numbers multiplied by one-digit numbers, using mental and progressing to formal written methods

Rising Stars Progression Framework: 3.2.e.2

RESOURCES

- Squared paper; pencils

Strand: Multiplication and Division

DAY 4

Sub-strand: Written calculation

TEACH

ACTIVITY 1: Using different methods for different multiplication calculations

- Write a calculation on the board, e.g. $3 \times 5 = ?$
- Ask: *How could we find the answer to this calculation? Do we need to write the calculation down? Do we need to partition any numbers? Do we need to use cubes to help? Can we find the answer mentally?*
- Remind the children that they know the five multiplication table, so they can find the answer to this calculation mentally. They then write the calculation on their board with the answer.
- Write another calculation on the board, e.g. $9 \times 6 = ?$
- Ask: *How could we find the answer to this calculation? Do we need to write the calculation down? Do we need to partition any numbers? Do we need to use cubes to help? Can we find the answer mentally?* In this case encourage the children to partition using an array to find the answer.
- They then write the calculation on their board with the answer.
- Repeat this process with the following calculations (methods given in brackets): $13 \times 6 = ?$ (partitioning); $18 \times 3 = ?$ (partitioning); $45 \times 8 = ?$ and $8 \times 45 = ?$ (commutativity)

WATCH OUT: Each time, allow the children to discuss their reasoning. This will allow you to see if they fully understand how to choose the method. If they are unsure, remind them of the examples they have just looked at.

ACTIVITY 2: Choosing the most efficient method

- Give each child a copy of Worksheet 6. Explain that this time the calculations are in the form of problems.
- Work through question 1 as a group. Ask the children to identify the calculation (17×4) and write it down.
- The children then solve the calculation using their chosen method and then explain their working to the group.

TIP: If the children have found the correct answer but have done so using an inefficient method, model the most efficient method for them.

- Ask the children to complete the remaining problems on Worksheet 6 using the methods discussed before going through their answers as a group.

OBJECTIVE

- Write and calculate mathematical statements for multiplication using the multiplication tables that they know, including for two-digit numbers multiplied by one-digit numbers, using mental and progressing to formal written methods

Rising Stars Progression Framework: 3.2.e.2

RESOURCES

- Activities 1 and 2: Whiteboard and pen per child; large number of cubes; paper and pencils for jottings
- Activity 2: Each child needs a copy of Worksheet 6

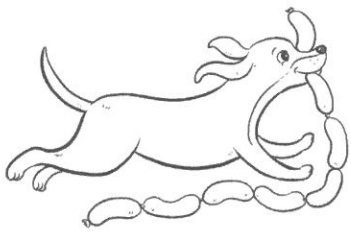
Worksheet 6

Name _____ Date _____

Multiplication problems

1. 4 princes each have 17 gold coins. How many coins do they have altogether?

2. 3 dogs stole 8 sausages each from the butcher. How many sausages did they have altogether?



3. 6 children have 4 cakes each. How many cakes do they have altogether?

4. May, June and July each had 14 hot, sunny days. How many hot, sunny days were there altogether?

Strand: Multiplication and Division

DAY 5

Sub-strand: Written calculation

ASSESS

ASSESSMENT ACTIVITY

- The purpose of the assessment is to check what each child can do independently, carefully noting down any difficulties and misconceptions. The adult will need to watch carefully what the children do, any strategies used and confidence levels.

✓ **TIP:** The children need to work independently. Remind them to make any notes and to draw grids or other jottings to work out the calculations.

- Give each child a copy of Worksheets 7 and 8.
- Explain that the questions are all examples of the work they have been doing during the preceding lessons. Each question has a grid of squared paper for the children to write on. This is to help them write their calculation in neat columns and to ensure there is designated space for making jottings.
- The questions start with a simple calculation to multiply one digit by one digit, such as 5×4. The children can answer this question mentally if they wish.
- They then move on to questions involving one digit multiplied by two digits, such as 5×14. Remind the children that they have been taught to multiply using partitioning. Advise them to use this method.

✓ **WATCH OUT:** If a child seems to be struggling to remember their tables, suggest that they write them out as a jotting on the page.

EVIDENCING SUCCESS

Meeting expectations:

- The child can calculate one-digit by two-digit numbers such as 3×27 using a formal written method.

OBJECTIVE

- Write and calculate mathematical statements for multiplication using the multiplication tables that they know, including for two-digit numbers multiplied by one-digit numbers, using mental and progressing to formal written methods

Rising Stars Progression Framework: 3.2.e.2

RESOURCES

- Worksheet 7; Worksheet 6; pencils

Worksheet 7

Name _____ **Date** _____

Choosing a method for multiplication

Choose a method and answer these questions. Use jottings to help you and show how you worked out the answer.

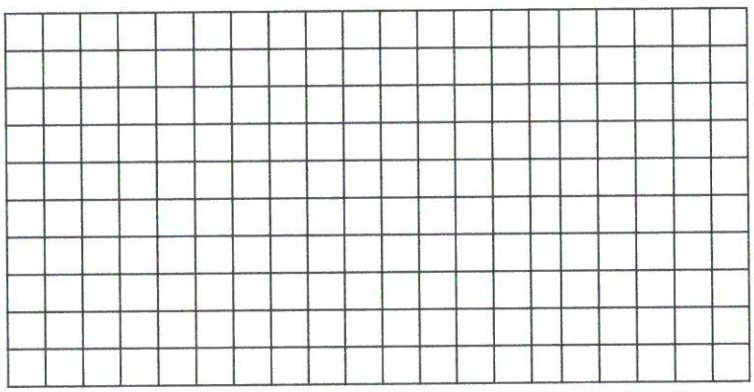
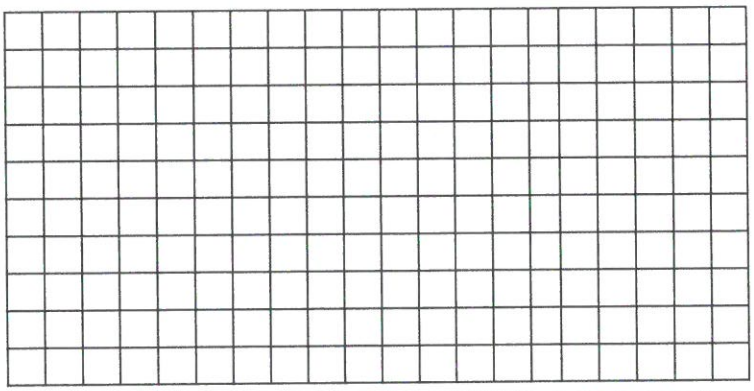
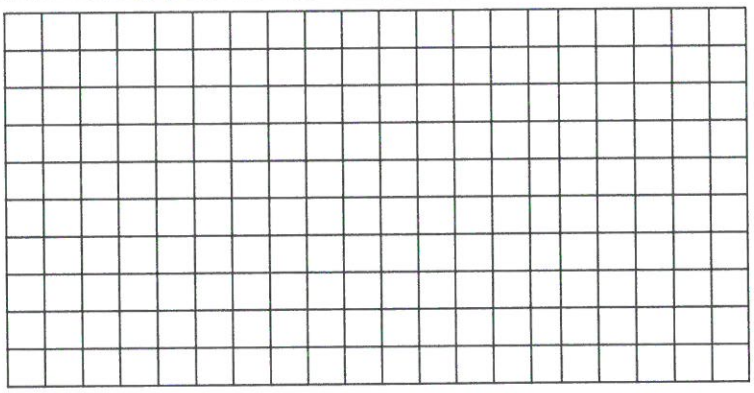
4×5	
8×12	
5×14	

Worksheet 8

Name _____ **Date** _____

Calculation and written methods

Choose a method and answer these questions. Use jottings to help you and show how you worked out the answer.

3×27	
2×42	
3×64	

Strand: Multiplication and Division

DAY 1

Sub-strand: Calculation and calculation methods

TEACH

ACTIVITY 1: Recapping sharing

- Spread out 16 counters and the four paper plates in front of the children. Tell them: *Let's **share** the counters between the four paper plates equally. How can we do that?* Ask: *What does sharing mean?*
- One child then shares the counters between the four plates **equally**. Watch how the children do this: they may choose to move one counter at a time or they may know how many to put onto each plate by calculating mentally.

✓ **TIP: Sharing** is an important aspect of understanding division and the link with multiplication, so give the children opportunities to physically share counters.

- Tell the children: *There were 16 counters and we **shared** them between four of us. We each got four counters.*
- Now ask: *How can we write what we have done? We divided 16 counters between four plates.* Write on the board: $16 \div 4 = 4$.
- Ask the children how many lots of four they had (four lots of four) and write on the board: $4 \times 4 = 16$, to make the link between division and multiplication.
- Work in the same way to share 24 counters and 32 counters between four plates. Each time, show the children how to write it as a division sum and also as multiplication, e.g. $24 \div 4 = 6$ and $6 \times 4 = 24$.

ACTIVITY 2: Moving towards chunking

- Say: *What if I had 60 counters to divide by four?* Write on the board: $60 \div 4$.
- Start the activity using the four plates and a pile of counters. Begin carrying out the division but then say: *This is taking a long time. Let's try another way.*
- Now write 60 on the board and keep taking away four, writing down each time how many fours you have taken away (see right).
- After a few goes, say: *This is still taking a long time. What do we know about the four multiplication table that could help us?* If the children are unsure, take the lead by suggesting: *We know that $4 \times 5 = 20$.*
- Now model on the board taking four away from 60 by stages.
- Explain: $4 \times 15 = 60$, so $60 \div 4 = 15$.
- Next work through another example with the children. Write $75 \div 5 = ?$ on the board. Ask the children to think how they can reduce the number of steps by using what they know. Ask: *How can you make a chunk of 50?* (5×10). Show the children how to divide 75 by five and use as large chunks as the children can suggest to get to the answer 15. To reinforce learning, let the children try another example in pairs, e.g. $85 \div 5$.

OBJECTIVES

- Write and calculate mathematical statements for division using the multiplication tables that they know using mental and progressing to efficient written methods
- Solve problems, including missing number problems, involving division

Rising Stars Progression Framework: 3.2.c.3, 3.2.e.2

RESOURCES

- Activities 1 and 2: Counters; four paper plates; number track

$$\begin{array}{r} 60 \\ -\ 4\ (4 \times 1) \\ \hline 56 \\ -\ 4\ (4 \times 1) \\ \hline \text{etc.} \end{array}$$

$$\begin{array}{r} 60 \\ -\ 20\ (4 \times 5) \\ \hline 40 \\ -\ 20\ (4 \times 5) \\ \hline 20 \\ -\ 20\ (4 \times 5) \\ \hline 0\ (4 \times 15) \end{array}$$

Moving towards chunking

Strand: Multiplication and Division

DAY 2

Sub-strand: Calculation and calculation methods

TEACH

ACTIVITY: Practising the chunking method of division

- Start by explaining that the children will be using the **chunking method** of division, which is a way of dividing larger numbers. Remind the children that yesterday they were dividing numbers by subtracting in chunks.
- The questions in this activity use multiplication tables the children should be secure with, such as two, three, four and five. However, if the children are struggling with some of those tables, alter the questions to use tables they are secure with.

✓ **TIP:** The learning here is about the method, not the multiplication tables. The key focus is for the children to understand how to partition and take away 'groups of' numbers, and to develop the confidence to use their knowledge of multiplication tables.

- Say: *You know how to partition numbers into hundreds, tens and ones for adding and subtracting. Now we are going to learn to use partitioning to help us to* ***divide****.*
- Demonstrate using this example. Write 72 ÷ 4 on the board. Ask the children: *What did we learn yesterday? How are we going to work this out?* Talk them through the early stages of the division, as shown:

$$\begin{array}{r} 72 \\ -\ 4 \quad (4\times 1) \\ \hline 68 \\ -\ 4 \quad (4\times 1) \\ \hline 64 \\ -\ 4 \quad (4\times 1) \\ \hline \end{array}$$

- Once you get to this point, say: *This is taking a long time. Can anyone think of a larger number that divides by four?* Take children's answers then settle on: *We know 5 × 4 = 20, so 20 ÷ 4 = 5.*
- Now start the division of 72 again, but this time as shown on the right.
- Finish by saying: *There are 18 fours in 72. 72 ÷ 4 = 18.*
- Once the children are clear about how to use the method, encourage them to have a go at these examples in their exercise books: 65 ÷ 5; 48 ÷ 3; 84 ÷ 2.

! **WATCH OUT:** You may notice that a child is struggling because they cannot remember the relevant tables easily. Draw their attention to the tables grid for support. Remind them to use what they know, such as 10 × 5 = 50 or 10 × 3 = 30, and to use the tables grid for confirmation.

$$\begin{array}{r} 72 \\ -\ 20\ (4\times 5) \\ \hline 52 \\ -\ 20\ (4\times 5) \\ \hline 32 \\ -\ 20\ (4\times 5) \\ \hline 12 \\ -\ 12\ (4\times 3) \\ \hline 12\ (4\times 18) \end{array}$$

OBJECTIVES

- Write and calculate mathematical statements for division using the multiplication tables that they know using mental and progressing to efficient written methods
- Solve problems, including missing number problems, involving division

Rising Stars Progression Framework: 3.2.c.3, 3.2.e.2

RESOURCES

- Whiteboard for teacher; exercise books; tables grid

Strand: Multiplication and Division

DAY 3

Sub-strand: Calculation and calculation methods

TEACH

ACTIVITY 1: Dividing with remainders using the chunking method

- Start by saying: *We are going to use the same method of division today – can you remember what it is called?* Remind them that it is the **chunking method**, if necessary, and that it requires them to use what they know about tables.
- Explain: *Today when we use the **chunking method**, the division will include a **remainder**.* Check they know a remainder is a leftover number. Use an example to reinforce understanding, e.g. *If we share five cakes between two people, each person has two cakes and there will be one cake left over.*

TIP: The questions in this lesson use the four and five multiplication tables. If the children struggle to remember the tables, write the tables out for them to refer to.

- Now talk the children through the calculation (75 ÷ 4). Ask pairs to make 75 from the Base 10 materials and then identify a chunk to be subtracted from 75 and hold it up. Here you may have a child holding 40 up in the form of four lots of ten sticks. See which pair has identified the largest chunk and ask them to explain it to the group – e.g., we know that $4 \times 10 = 40$.
- Write the subtraction on the board and continue until there is only a remainder left. The remainder is less than four – so less than a 'chunk'. Show the children how to show the remainder at the end. You could write the calculation shown below on the board.

TIP: Explain the importance of keeping the numbers in neat columns.

- To consolidate learning, talk the children through a few more divisions with remainders on the board, e.g.: 76 ÷ 5; 23 ÷ 4; 61 ÷ 5.

ACTIVITY 2: Practising dividing with remainders

- Split the children into pairs. Identify one child as A and the other as B. Ask the group A children to sit together and discuss how they can explain to the Bs how to do this calculation: 91 ÷ 5. Ask the Bs to discuss how to explain 55 ÷ 4 to the As. Suggest that they make notes in their exercise books. The children then explain to their partners how they did the division using the chunking method. Help them to use the language, e.g. **partition, tables, groups** and **remainder**, to explain what they have done.
- Finally ask the children to solve these calculations in their exercise books:
  56 ÷ 8; 42 ÷ 4; 42 ÷ 7; 37 ÷ 4; 30 ÷ 6; 36 ÷ 5; 43 ÷ 2.

OBJECTIVES

- Write and calculate mathematical statements for division using the multiplication tables that they know using mental and progressing to efficient written methods
- Solve problems, including missing number problems, involving division

Rising Stars Progression Framework: 3.2.c.3, 3.2.e.2

RESOURCES

- Activity 1: Board for teacher; Base 10 materials
- Activity 2: Exercise book

$$
\begin{array}{r}
75 \\
-\ 40\ (4 \times 10) \\
\hline
35 \\
-\ 20\ (4 \times 5) \\
\hline
15 \\
-\ 12\ (4 \times 3) \\
\hline
3\ (4 \times 18\ \text{r}3) = 83\ \text{r}3
\end{array}
$$

Chunking with remainders

Strand: Multiplication and Division

DAY 4

Sub-strand: Calculation and calculation methods

TEACH

ACTIVITY 1: Identifying possible 'chunks' to divide numbers using knowledge of tables

- Place the sets of numbers face down on the table and invite a child to take a card from the top of each pile. Place these cards face up, so the children can see a two-digit number, such as 36.
- Ask the children to think which tables would help them to divide these numbers using the **chunking method**. E.g., for 36 they know that they could use the two, three, four and six multiplication tables.
- Invite another child to select two cards to make a two-digit number. Ask the group: *What tables could help to divide this number by chunking?*
- Continue until each child has selected two cards to make a two-digit number.

ACTIVITY 2: Problem solving by applying the skill of chunking

- Give each child a copy of Worksheet 9 and share the first problem with the group. *Alex and Shane have 59 marbles. They want to share them with their friend Anya. How many marbles will each friend get? Will there be any marbles left over?*
- Ask the children what the calculation will be to solve this problem. (59 ÷ 3) Remind them that they are looking for the largest chunk of three that they can subtract from 59. Ask them to find the answer and write it in their exercise books.
- When they have had sufficient time to do the first question, go through their answers as a group. Ask: *Who found the largest chunks?* Ask the children to explain to the group how they found the answer.
- Now ask the children to try the remaining problems on Worksheet 9. They should work directly into their exercise books to give them more space for jotting and calculating.

✓ **TIP:** Remind them to read the questions on the worksheet carefully.

- Finish by going through the answers to all the questions on the worksheet as a group.

OBJECTIVES

- Write and calculate mathematical statements for division using the multiplication tables that they know using mental and progressing to efficient written methods
- Solve problems, including missing number problems, involving division

Rising Stars Progression Framework: 3.2.c.3, 3.2.e.2

RESOURCES

- Activity 1: Two sets of digit cards 0 to 9
- Activity 2: Each child needs a copy of Worksheet 9, their exercise book, a pencil

Worksheet 9

Name _____ Date _____

Problem solving using the chunking method

1. Alex and Shane have 59 marbles. They want to share them with their friend Anya. How many marbles will each friend get? Will there be any marbles left over?

2. The caretaker is putting out chairs for the end-of-term assembly. He has 84 chairs and he wants to put them in rows of 10. How many rows will he make? Will there be any remainders?

3. The zookeeper has 74 fish to share between 4 penguins. How many fish can each penguin have? Will there be any remainders?

4. The robbers have stolen 93 gold coins. There are 5 robbers in the gang. How many coins will each robber get? Will there be any remainders?

Strand: Multiplication and Division

DAY 5

Sub-strand: Calculation and calculation methods

ASSESS

ASSESSMENT ACTIVITY

- The purpose of the assessment is to check what each child can do independently, carefully noting down any difficulties and misconceptions. The adult will need to watch carefully what the children do, any strategies used and confidence levels.

✓ **TIP:** Make note of children who use the tables grids to help them, as this may indicate that they need more support and encouragement to learn the tables and be able to work independently.

- Hand out copies of Worksheet 10. Explain that the questions are based on the work they have been doing on the chunking method of multiplication and division during the week. Questions 2 to 4 involve remainders.
- The first two questions are straightforward division calculations. The children can use the chunking method that they have been learning about throughout the week.
- The second pair of questions require the children to apply their understanding of multiplication and division to contextualised problems. As the children complete these questions, remind them of the importance of reading the question carefully and picking out the key information.

! **WATCH OUT:** Keep an eye out in case a child is struggling to find chunks to subtract or is losing track of how many chunks they have subtracted. Remind them of the importance of noting this each time they subtract a chunk.

- When everyone has finished, go through the questions together.

EVIDENCING SUCCESS

Meeting expectations:

- The child can calculate 81 ÷ 3 using a formal written method such as chunking.
- The child can use their knowledge of these methods to solve problems.

OBJECTIVES

- Write and calculate mathematical statements for division using the multiplication tables that they know using mental and progressing to efficient written methods
- Solve problems, including missing number problems, involving division

Rising Stars Progression Framework: 3.2.c.3, 3.2.e.2

RESOURCES

- Worksheet 10; tables grid or similar

Worksheet 10

Name _____ Date _____

Division using the chunking method

Use the chunking method to answer these questions.

1. 81 ÷ 3

2. 57 ÷ 5

3. Sammy Squirrel had 62 nuts to share between his 6 baby squirrels. How many did each baby squirrel get? Were there any left over for Sammy?

4. The Rose Queen had 46 roses to share with her three flower girls. How many roses did each girl get? Were there any roses left over for the Rose Queen?

Strand: Fractions

DAY 1

Sub-strand: Recognise, order, compare and equivalence

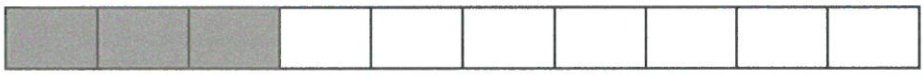
TEACH

ACTIVITY 1: Introducing tenths to prepare for decimals

▶ Draw a rectangle on the board, divided into ten equal parts. Ask the children: *How many squares are there?* (Ten) *What will we call each* ***fraction****?* (One-tenth) *How many one-tenths in a whole?* (Ten) *If I colour three-tenths red, how many will be white?* (Seven-tenths)

✓ **TIP:** Ensure that you phrase your questions so you use the term **tenths**. E.g., you will need the answer to be seven-tenths rather than seven.

▶ Draw this bar model on the board:



▶ Write the sum on the board: $\frac{3}{10} + \frac{7}{10} = \frac{10}{10} = 1$

✓ **TIP:** You are introducing the **addition** and **subtraction** of **tenths** straight away so that children become familiar with the concept from the start.

▶ Give each child a copy of Worksheet 1. Ask the children to see if they can answer the questions on the worksheet on their own.

! **WATCH OUT:** Make sure the children understand they should first shade a number of tenths then write the calculation in numbers, e.g. $\frac{2}{10} + \frac{8}{10} = 1$.

ACTIVITY 2: Dividing numbers and quantities by ten

▶ Give each pair of children a set of 20 objects. Explain that they are going to divide the set of objects into tenths. Ask them to discuss how they could do this.

✓ **TIP:** Here you are looking for the children to suggest counting the number of objects first and then dividing that number by ten. If a child suggests counting the objects one by one into ten groups, ask if they can use what they know about the ten multiplication table to divide the number of objects by ten.

▶ Ask the children to divide the objects and then share their method and answer with another pair. They should all find that a tenth is two objects.

▶ Now add an additional ten objects to each pair's collection and ask them to divide the collection into tenths. They should all find that a tenth is three objects. Ask the children how many objects would make a tenth if there were 40 objects.

▶ Explain that you have 50p and want to give an equal amount to ten children. Ask: *How much would each child get? What fraction of 50p would each child get?* Again, give the children time to reflect before working with a partner to solve the problem. Encourage them to use what they know to solve it.

OBJECTIVES

- Count up and down in tenths; recognise that tenths arise from dividing an object into ten equal parts and in dividing one-digit numbers or quantities by ten
- Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators
- Recognise and use fractions as numbers: unit fractions and non-unit fractions with small number denominators
- Recognise and show equivalent fractions with small denominators
- Compare and order unit fractions, and fractions with the same denominator

Rising Stars Progression Framework: 3.3.a.1, 3.3.a.2, 3.3.a.3, 3.3.b.1, 3.3.c.1, 3.3.c.3

RESOURCES

- Activity 1: Whiteboard for teacher; Worksheet 1
- Activity 2: Each pair of children needs: sets of 20 objects such as beads, cubes, pencils; sets of a further ten objects

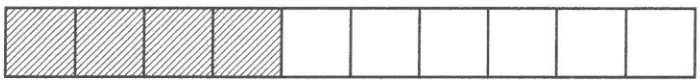
Worksheet 1

Name _____ Date _____

Adding and subtracting

1. Add and subtract tenths.
Use the diagrams to help you.

The first one has been done for you.

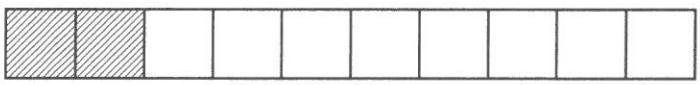
a)  $\frac{4}{10}$

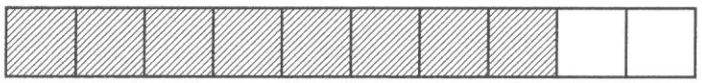
$\frac{4}{10} + \frac{6}{10} = 1$

$1 - \frac{4}{10} = \frac{6}{10}$

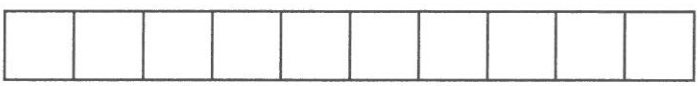
$\frac{6}{10} + \frac{4}{10} = 1$

$1 - \frac{6}{10} = \frac{4}{10}$

b)  $\frac{1}{5}$

c)  $\frac{4}{5}$

2. Can you make up your own addition and subtraction using tenths?



Strand: Fractions

DAY 2

Sub-strand: Recognise, order, compare and equivalence

TEACH

ACTIVITY 1: Paper plate fractions – making, finding and writing equivalent fractions

- Ahead of starting this activity, or for homework, give each child a paper plate to colour in.
- Take a plain paper plate and place it in front of you. Then take one of the decorated plates and **divide** it into **halves**. Say to the children: *I have cut this plate into **two equal parts**. What is each part called?* (Half) Write $\frac{1}{2}$ on each **half** and place one-half on the plain plate.

✓ **TIP:** Allow the children to divide and cut the plates where possible, unless time constraints and the need for accuracy mean it is best done by an adult.

- Now take another plain plate and a decorated plate. Say to the children: *I want to divide this plate into **quarters**. How many equal parts do I need?* (Four) When the children have identified four, cut the plate into four, write $\frac{1}{4}$ on each **quarter** and put one-quarter on the plain plate.
- Continue with this method until you have **halves**, **quarters**, **eighths**, **thirds** and **sixths** all laid on plates in front of the children.

✓ **TIP:** You could count the ridges around the edge of the plate to help you to make the fractions more accurate. You could use folding to help divide the plates accurately.

ACTIVITY 2: Equivalent fractions

- Now take a plain white plate and ask if anyone can cover half of it with the fraction plates. E.g., two-quarters or four-eighths.

! **WATCH OUT:** The children will not be able to make half with thirds – be prepared to spend a bit of time exploring why not.

- Now take the 'halves' off the plate and place them on the table, so the children can see them laid out. Say to them: *One-half equals two-quarters, equals three-sixths, equals four-eighths*. Write the fractions on the board: $\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{4}{8}$
- Explain that these are all ways of making half. Ask: *Can you see a pattern? What fraction would come next?* ($\frac{5}{10}$) *How do you know?*
- If there is time, start using the fraction pieces to make plates with $\frac{1}{4}$ and equivalents or $\frac{3}{4}$ and equivalents.

✓ **TIP:** Keep the plates of fractions for tomorrow's lesson.

OBJECTIVES

- Count up and down in tenths; recognise that tenths arise from dividing an object into ten equal parts and in dividing one-digit numbers or quantities by ten
- Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators
- Recognise and use fractions as numbers: unit fractions and non-unit fractions with small number denominators
- Recognise and show equivalent fractions with small denominators
- Compare and order unit fractions, and fractions with the same denominator

Rising Stars Progression Framework: 3.3.a.1, 3.3.a.2, 3.3.a.3, 3.3.b.1, 3.3.c.1, 3.3.c.3

RESOURCES

- Activities 1 and 2: Plain paper plates; decorated paper plates and scissors

Strand: Fractions

DAY 3

Sub-strand: Recognise, order, compare and equivalence

TEACH

ACTIVITY 1: Compare and order unit fractions

- Write $\frac{1}{2}$ and $\frac{1}{4}$ on the board and ask: *Which **fraction** is larger?* Ask the children to prove it by holding up a half and a quarter of the paper plate.

TIP: Draw attention to the fact that the smaller the number on the bottom, the larger the fraction. Begin to model the term '**denominator**'.

- Next write $\frac{1}{6}$ and $\frac{1}{8}$ on the board. Ask: *Which fraction is larger?* See if the children can explain their answer. Then hold up a one-sixth and one-eighth of the paper plate fractions so the children can see for themselves. Explain that to make **eighths**, something is split into eight pieces, and to make **sixths** it is split into only six pieces, so the sixths are larger than the eighths.
- Now write $\frac{1}{3}$ and $\frac{1}{6}$ and ask: *Which is the larger of these two?* Use the paper plate pieces to demonstrate the difference if necessary.
- Then write $\frac{1}{4}$ and $\frac{1}{8}$ on the board. Ask: *Which fraction is larger?* Again, use the paper plate pieces to show the difference. Check: can the children explain why $\frac{1}{8}$ is smaller than $\frac{1}{4}$?

TIP: Throughout this activity, use the paper plate pieces to show practically the differences in size.

- As you compare the fractions, write them on the board with the fractions you decide are larger on the right and the smaller ones on the left. You can then make a number track as a group, starting with the smallest fraction on the left and moving to the largest fraction on the right.

ACTIVITY 2: Comparing and ordering fractions with the same denominator

- Provide children with cut out fraction cards from Worksheet 2.
- Ask the children to look at their fractions cards and sort them based on the bottom number. Tell them the number on the bottom of the fraction is a **denominator** and write the word on the board as you say it.

WATCH OUT: While the children work independently, check if they recognise which part of the fraction is the denominator.

- Once the children have sorted the fractions, they order them into a number track from smallest to largest (one number track for each denominator set). The number tracks can be stuck into their exercise books for future reference.

TIP: The children do not need to be focused on whether $\frac{1}{6}$ or $\frac{1}{8}$ is larger but whether $\frac{2}{6}$ or $\frac{4}{6}$ is larger. Show the children using the plates cut up in earlier sessions if they need a visual representation.

OBJECTIVES

- Count up and down in tenths; recognise that tenths arise from dividing an object into ten equal parts and in dividing one-digit numbers or quantities by ten
- Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators
- Recognise and use fractions as numbers: unit fractions and non-unit fractions with small number denominators
- Recognise and show equivalent fractions with small denominators
- Compare and order unit fractions, and fractions with the same denominator

Rising Stars Progression Framework: 3.3.a.1, 3.3.a.2, 3.3.a.3, 3.3.b.1, 3.3.c.1, 3.3.c.3

RESOURCES

- Activity 1: Whiteboard for teacher; paper plates and fractions from Day 2
- Activity 2: Fractions cards (one set per child) cut out from Worksheet 2; exercise books; glue sticks

Worksheet 2

Photocopy and cut out to make one set of cards per child.

Fractions cards

$\frac{1}{6}$	$\frac{2}{6}$	$\frac{3}{6}$	$\frac{4}{6}$	$\frac{5}{6}$
$\frac{1}{10}$	$\frac{2}{10}$	$\frac{3}{10}$	$\frac{4}{10}$	$\frac{5}{10}$
$\frac{1}{5}$	$\frac{2}{5}$	$\frac{3}{5}$	$\frac{4}{5}$	$\frac{5}{5}$
$\frac{1}{3}$	$\frac{2}{3}$	$\frac{3}{3}$	$\frac{1}{2}$	$\frac{2}{2}$
$\frac{1}{4}$	$\frac{2}{4}$	$\frac{3}{4}$	$\frac{4}{4}$	$\frac{6}{6}$

Strand: Fractions

DAY 4

Sub-strand: Recognise, order, compare and equivalence

TEACH

ACTIVITY 1: Recognise and use fractions as numbers

TIP: Remember: Recognising fractions as numbers means the child can look at a diagram and see it is showing one-third. One-third $\left(\frac{1}{3}\right)$ is a unit fraction because the numerator is one.

- Hold up the first fraction card from Worksheet 3, showing a circle with a third shaded. Ask: *What fraction is shaded in?* (One-third) *How do you know that a third has been shaded?*
- Ask a child to write $\frac{1}{3}$ in numbers on the board.
- Explain that the children will be working in pairs and that each pair will have a set of cards (cut out from Worksheet 3). Explain that they must lay all the cards out on the table and match each picture fraction with a word or number fraction. If there is time, the children could be asked to stick the pairs in their exercise books.

WATCH OUT: If a pair is struggling, check that they are remembering to count how many sections the whole has been divided into. Remind them that the number on the bottom is the number of sections that make up the whole.

ACTIVITY 2: Recognise and use fractions as shapes and numbers

- Give each child a copy of Worksheet 4. Explain that they will be making some fraction cards for another child to match. Their first task is to draw a fraction in the first circle. Ask them for suggestions of a fraction they might draw.

TIP: Ensure that children have the right number of sections. E.g. if the fraction is $\frac{5}{8}$ there must be eight sections with five shaded.

- After the children have drawn their first fraction, they write the fraction as a number in the box below it. Take feedback and check responses.
- The children then continue to complete all fraction cards on Worksheet 4.
- Now cut the cards out and jumble them up. Each child should swap their fraction cards with another child and try to match them.
- Finish the session by checking that all children have matched their partner's cards correctly.

OBJECTIVES

- Count up and down in tenths; recognise that tenths arise from dividing an object into ten equal parts and in dividing one-digit numbers or quantities by ten
- Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators
- Recognise and use fractions as numbers: unit fractions and non-unit fractions with small number denominators
- Recognise and show equivalent fractions with small denominators
- Compare and order unit fractions, and fractions with the same denominator

Rising Stars Progression Framework: 3.3.a.1, 3.3.a.2, 3.3.a.3, 3.3.b.1, 3.3.c.1, 3.3.c.3

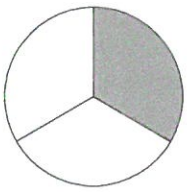
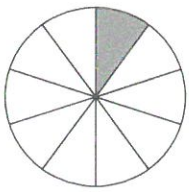
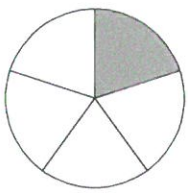
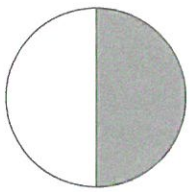
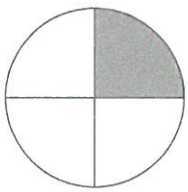
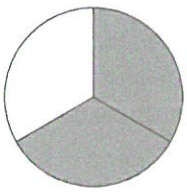
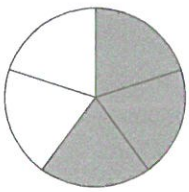
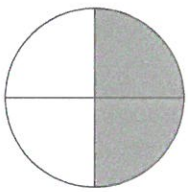
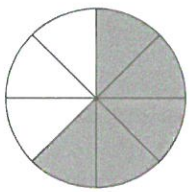
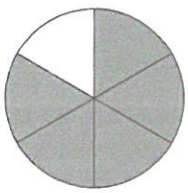
RESOURCES

- Activity 1: Each pair needs a set of fraction matching cards from Worksheet 3; exercise book
- Activity 2: Each child needs a copy of Worksheet 4 and a pair of scissors

Worksheet 3

Photocopy and cut up, one set for each pair.

Fractions cards

				
				
$\frac{1}{3}$	one-tenth	a fifth	a half	$\frac{1}{4}$
$\frac{2}{3}$	three-fifths	two-quarters	$\frac{5}{8}$	$\frac{5}{6}$

Worksheet 4

Name _____ **Date** _____

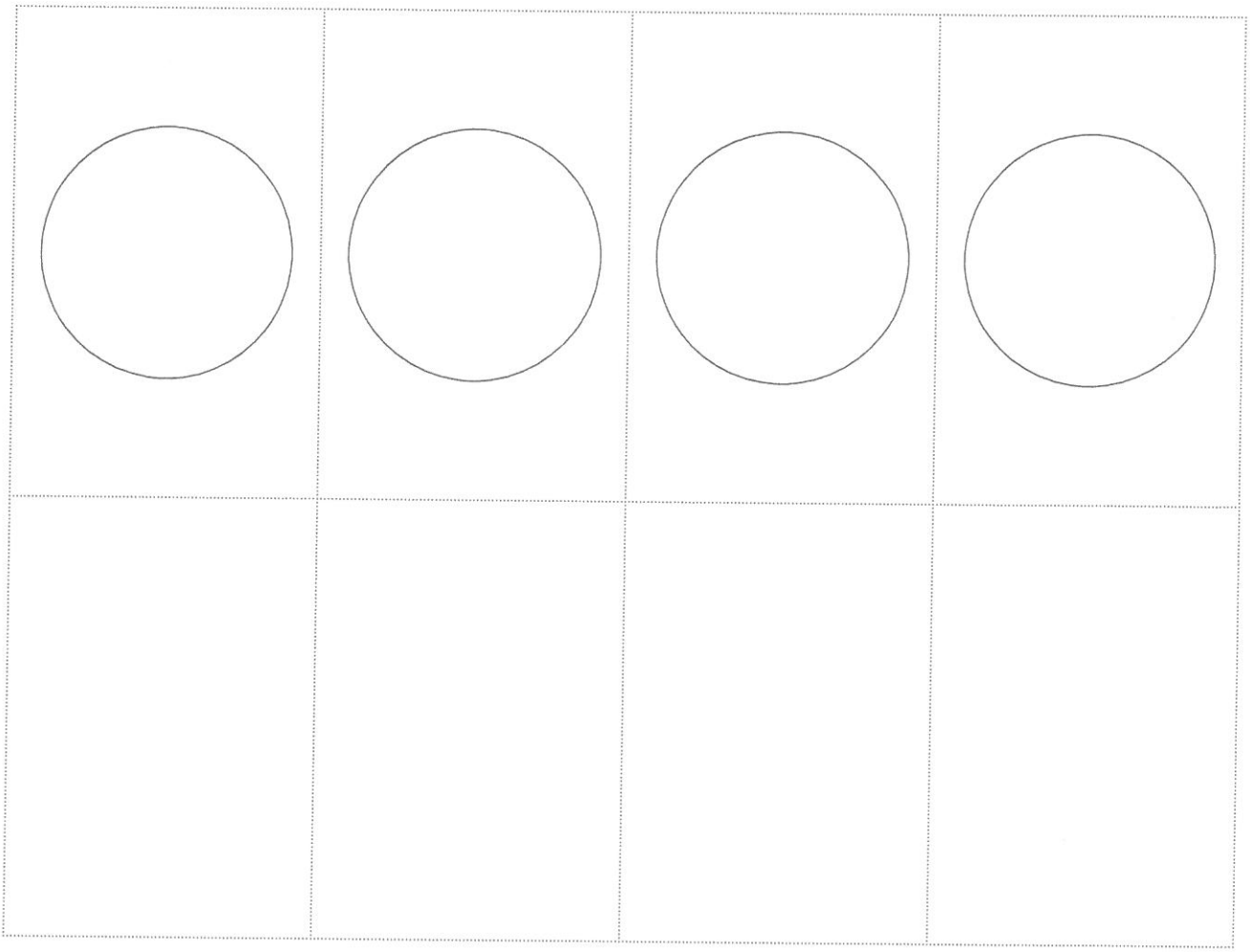
Make your own fractions cards

1. Divide each circle into parts (such as 5 parts, or fifths). Then colour in some of the parts (e.g. you could colour in 2 of 5 parts, or two-fifths).

2. Write the fraction using numbers or words in the box underneath, e.g. you could write two-fifths or $\frac{2}{5}$.

3. When you have finished, cut out the cards and jumble them up.

4. Can your partner match them?



Strand: Fractions

DAY 5

Sub-strand: Recognise, order, compare and equivalence

ASSESS

ASSESSMENT ACTIVITY

- The purpose of the assessment is to check what each child can do independently, carefully noting down any difficulties and misconceptions. The adult will need to watch carefully what the children do, any strategies used and confidence levels.
- Give each child a copy of Worksheets 5 and 6. Explain that the first questions on Worksheet 5, show shapes with different fractions shaded; the task is to label the shape with the correct fraction.
- The second question on Worksheet 5, asks the children to match equivalent fractions by drawing a line between them.

✓ **TIP:** Give the children an example of the type of question by asking them which is the same as a half: two-quarters or three-quarters? Ask one of the children who knows the correct answer to remind the group how they worked it out.

! **WATCH OUT:** The children may not be able to visualise these fractions. Remind them of the activity they did with the paper plates and suggest that they can use jottings or multi-link cubes to help them.

- The first question on Worksheet 6 asks the children to put fractions in order of size, and the second question involves addition and subtraction of tenths.

EVIDENCING SUCCESS

Meeting expectations:

- The child can understand tenths and can add and subtract tenths.
- The child can recognise fractions of an object or group of objects.
- The child can compare and order simple fractions and can find simple equivalents.
- The child can recognise fractions in pictorial, numerical and written form.

OBJECTIVES

- Count up and down in tenths; recognise that tenths arise from dividing an object into ten equal parts and in dividing one-digit numbers or quantities by ten
- Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators
- Recognise and use fractions as numbers: unit fractions and non-unit fractions with small number denominators
- Recognise and show equivalent fractions with small denominators
- Compare and order unit fractions, and fractions with the same denominator

Rising Stars Progression Framework: 3.3.a.1, 3.3.a.2, 3.3.a.3, 3.3.b.1, 3.3.c.1, 3.3.c.3

RESOURCES

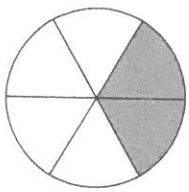
- Worksheet 5; Worksheet 6; a pencil; access to multi-link cubes

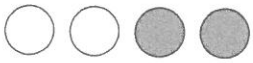
Worksheet 5

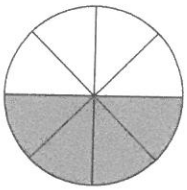
Name _____ Date _____

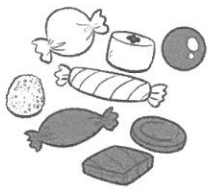
Finding fractions

1. Write the fraction of each shape that is **shaded**. The first example has been done for you.

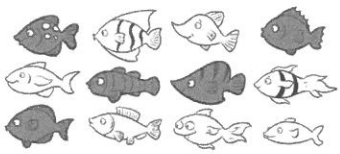


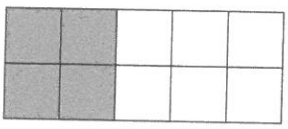


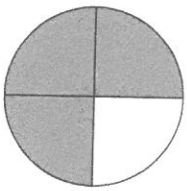


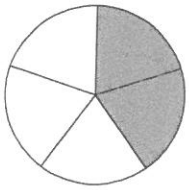


$\frac{2}{6}$			









2. Draw a line between the equivalent fractions.

$\frac{1}{2}$	$\frac{2}{6}$
$\frac{1}{3}$	$\frac{6}{8}$
$\frac{1}{4}$	$\frac{5}{10}$
$\frac{3}{4}$	$\frac{2}{8}$

Worksheet 6

Name _____ Date _____

Comparing and counting in fractions

1. Put these fractions in order of size from the smallest to the largest.

$\frac{1}{10}$ $\frac{1}{5}$ $\frac{1}{12}$ $\frac{1}{4}$ $\frac{1}{2}$ $\frac{1}{8}$

2. Complete these additions and subtractions.

a) $\frac{2}{10} + \frac{3}{10} =$ ☐

b) $\frac{3}{10} + \frac{5}{10} =$ ☐

c) $\frac{1}{10} + \frac{1}{10} + \frac{1}{10} =$ ☐

d) $\frac{8}{10} - \frac{2}{10} =$ ☐

e) $\frac{5}{10} - \frac{1}{10} =$ ☐

Strand: Fractions

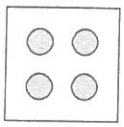
DAY 1

Sub-strand: Addition and subtraction

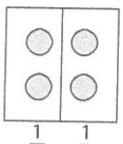
TEACH

ACTIVITY 1: Recapping halves and quarters

▶ Tell the children: *Let's start by reminding ourselves about what we know about* ***fractions***. Talk the children through the illustrated example below.



Here are four counters. If we split this into two, we get two halves.



We write it like this

$\frac{1}{2}$ $\frac{1}{2}$

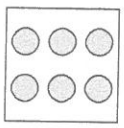
one on each side of the dividing line: $\frac{1}{2}$

▶ Ask: *How many* ***quarters*** *in each half?* $\left[\frac{(2)}{4}\right]$

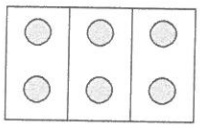
✓ **TIP:** Use counters to support the children's discussion. This will help them understand denominators other than two and four involving halves and quarters.

▶ Now say: *We know that:* $\frac{2}{4}+\frac{2}{4}=\frac{4}{4}=1$ *whole.*

▶ Introduce another example visually, this time using six counters, as follows:



Each counter is $\frac{1}{6}$



Each third has $\frac{2}{6}$

▶ Tell the children: *So we know:* $\frac{2}{6}+\frac{2}{6}+\frac{2}{6}=\frac{6}{6}=1$ *whole.*

▶ Repeat the process with the children having their own set of eight counters. Ask the children to lay them out in two rows of four as an oblong.

▶ Now ask the children to split the counters into quarters. Ask them: *How many eighths are in* $\frac{1}{4}$*? How do you know?* Elicit that there are two counters in each $\frac{1}{4}$ and therefore $\frac{2}{8}$ in each $\frac{1}{4}$.

▶ Model writing on the board: $\frac{2}{8}+\frac{2}{8}+\frac{2}{8}+\frac{2}{8}=1$ whole.

ACTIVITY 2: Written calculations for fractions

▶ Hand out copies of Worksheet 7 and go through the first question together. Ask: *Can anyone suggest what the first sum using fractions might be?* Check answers using counters then talk them through it: *Count how many spots there are and then count how many spots are in each section. You write it like this:* $\frac{2}{4}+\frac{2}{4}=1$.

▶ Encourage the children to try the rest of the questions working on their own.

! **WATCH OUT:** Observe the children while they are working. If they are struggling, ask them to explain what they are doing. Use their explanation to help you work out any areas of confusion. They may be forgetting to count all the spots first or they may become confused as they move from the spots to writing the fractions, in which case you may want to suggest they use counters to help them.

OBJECTIVES

- Add and subtract fractions with the same denominator within one whole
- Solve problems that involve the Year 3 National Curriculum for fractions

Rising Stars Progression Framework: 3.3.c.2, 3.3.d.1

RESOURCES

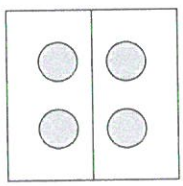
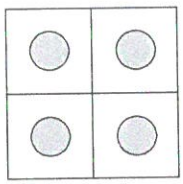
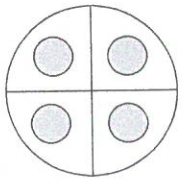
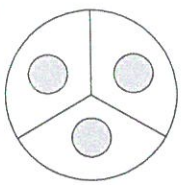
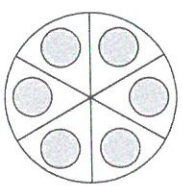
- Activity 1: Board for the teacher; each child needs a set of eight counters
- Activity 2: Worksheet 7; counters

Worksheet 7

Name _____ Date _____

Written calculations for fractions

For each shape, write the sum using fractions to show how the parts add up to the whole. The first question has been done for you.

	Shape	Written calculations
1.		$\frac{2}{4}+\frac{2}{4}=1$
2.		
3.		
4.		
5.		

Strand: Fractions

DAY 2

Sub-strand: Addition and subtraction

TEACH

ACTIVITY 1: Introducing eighths

- Fold a paper plate and then draw on it to divide it into eighths. Tell the children: *Here is a birthday cake. Eight children are coming to my party so I have* ***divided*** *it into eight pieces. What is each piece called?*
- Make sure that all the children are familiar with the term 'eighth' then say: *Let's all take a turn at writing* $\frac{1}{8}$ *on a piece of our cake.*
- Model the sum using **fractions**:
  $\frac{1}{8}+\frac{1}{8}+\frac{1}{8}+\frac{1}{8}+\frac{1}{8}+\frac{1}{8}+\frac{1}{8}+\frac{1}{8}=1$ whole.

✓ **TIP:** Explain to the children that the number at the bottom (the **denominator**) shows us *how many parts there are to the whole*. The number at the top (the **numerator**) tells us *how many parts we are looking at*.

  - Now cut your paper plate 'cake' into half. Ask: *How many eighths are there in half a cake?* Establish with the children that there are four-eighths. Explain that you can write it like this: $\frac{1}{8}+\frac{1}{8}+\frac{1}{8}+\frac{1}{8}=\frac{4}{8}$.
  - Point out to the children that we now know that $\frac{4}{8}=\frac{1}{2}$.
- Now cut one-half of the plate into half again, to make a quarter 'cake'. Establish that you now have two-eighths, or one-quarter, of the cake. Explain that you can write it like this: $\frac{1}{8}+\frac{1}{8}=\frac{2}{8}$.
- Point out to the children that you now know that $\frac{2}{8}=\frac{1}{4}$.
- Use questioning to draw out equivalence, as follows:
  - *How many eighths are in the whole cake?* ($\frac{8}{8}$ = 1 whole)
  - *How many eighths are in* $\frac{1}{2}$*?* ($\frac{1}{2}=\frac{4}{8}$)
  - *How many eighths are in* $\frac{1}{4}$ *of the cake?* ($\frac{1}{4}=\frac{2}{8}$)

ACTIVITY 2: Adding eighths

! **WATCH OUT:** If you have a child for whom accurate cutting is a problem, be prepared to do the cutting with/for them. It is more important that they write $\frac{1}{8}$ on each piece than cut each piece themselves. You could draw on the cutting lines.

- First, children divide their 'cake' into eighths and write $\frac{1}{8}$ on each segment ('piece of cake'). They then add the eighths to make a whole.
- Next they cut their 'cake' in two and add the eighths to make a half, again writing down the sum using fractions.
- The children then cut their half-cakes again, to make quarter-cakes, and write the sum for two-eighths making a quarter.
- End the lesson by testing the children's knowledge of equivalence, e.g. by asking: *How many eighths make a half? How many eighths make a quarter?*

OBJECTIVES

- Add and subtract fractions with the same denominator within one whole
- Solve problems that involve the Year 3 National Curriculum for fractions

Rising Stars Progression Framework: 3.3.c.2, 3.3.d.1

RESOURCES

- Activity 1: Paper plate; scissors; felt tip pen
- Activity 2: Paper plates; scissors; pens; exercise book

Strand: Fractions

DAY 3

Sub-strand: Addition and subtraction

TEACH

ACTIVITY 1: Investigating subtraction of fractions with the same denominator

- Hold up the A4 piece of paper to show the children. Say: *This is the whole.*
- Now fold the paper in half and then in half again, and in half again. Explain what you have done: *I have folded my paper to show eighths.*
- Cut the paper along the folded lines to make eight pieces and write $\frac{1}{8}$ onto each piece. Explain that: *Each piece is one of the eight pieces of the paper.*
- Ask the children do the same to their piece of paper.

✓ **TIP:** It might be worth giving each child a different coloured piece of paper, or at least different to the people sitting next to them, to prevent mix ups.

- Display a subtraction calculation and ask the children to read it: $\frac{5}{8} - \frac{2}{8} = ?$
- Now say: *You need to start off with $\frac{5}{8}$. You could show this with five pieces of your paper. Now you need to subtract $\frac{2}{8}$. You could just remove two of the pieces of paper. How many do you have left?* ($\frac{3}{8}$) *So:* $\frac{5}{8} - \frac{2}{8} = \frac{3}{8}$.
- Write another calculation: $\frac{7}{8} - \frac{2}{8}$, and ask a child to read the question to the group. Place seven of the pieces on the table in front of you and say: *I have $\frac{7}{8}$ here. How many eighths do I need to subtract?* Remove $\frac{2}{8}$ and ask a child to tell you have many eighths are left. Then ask a child to write the answer on the board to complete the calculation.
- Now give the children other simple fraction subtractions to solve using their pieces of paper, such as: $\frac{4}{8} - \frac{2}{8}$, $\frac{8}{8} - \frac{5}{8}$, $\frac{6}{8} - \frac{1}{8}$, $\frac{7}{8} - \frac{4}{8}$.

! **WATCH OUT:** If the children struggle to read the calculations, read the calculations to them so they can then find the answer.

ACTIVITY 2: Problem solving involving subtraction of fractions

- Read out the problems and ask the children to listen carefully. They should try to solve them using their paper pieces to help them.
  - *There are eight pieces of cake and three of them get eaten. How many are left?*
  - *There are eight stickers on the sheet. Sally gets one and so does Joe. How many stickers are left on the sheet?*
  - *There are eight puppies in the pet shop. Jane buys two and Ahmed buys three. How many puppies are left?*

✓ **TIP:** Remind the children that each part of the whole is a fraction. You have eight parts and therefore each part is $\frac{1}{8}$.

- Repeat the problems asking the children to give their answers as a fraction.

OBJECTIVES

- Add and subtract fractions with the same denominator within one whole
- Solve problems that involve the Year 3 National Curriculum for fractions

Rising Stars Progression Framework: 3.3.c.2, 3.3.d.1

RESOURCES

- Activity 1: Each child needs: a sheet of A4 paper (ideally different colours), scissors
- Activity 2: Each child needs their eight pieces of paper from Day 2 Activity 2

Strand: Fractions

DAY 4

Sub-strand: Addition and subtraction

TEACH

ACTIVITY 1: Consolidating subtraction

- Hand out copies of Worksheet 8, which shows four cats (two black and two white) and six dogs (two black, two white, and two Dalmatians).
- Use Worksheet 8 to review the children's understanding of fraction equivalences. Read the questions together. Challenge the children to complete the questions in pairs.

✓ **TIP:** If the children seem unsure, remind them to start by counting the total number of the cats/dogs and then to count the number asked for by the question.

- The last two questions focus on subtraction of fractions. In each case the children need to use their information from the previous questions to find the answer.

! **WATCH OUT:** The children may easily see how many dogs or cats will be left, but they will need to recognise this and write it as a fraction. E.g. $\frac{2}{6}$ of the dogs are spotty. One spotty dog is therefore $\frac{1}{6}$ of the total group. There will be $\frac{1}{6}$ of the dogs missing so only $\frac{5}{6}$ left.

- Finish the session by inviting the children to make up their own subtraction problem. First they must solve their own problem and then swap it with another child to try. Finally, the children can feedback on the problem they have been given, talking about how they solved it and what answer they got.

ACTIVITY 2: Fraction bingo

- Cut out the six bingo cards on Worksheet 9 and give one card to each child. The children will need a pen or pencil to cross off the fractions as they hear them.
- The statements/questions to be read out for the bingo game are given on Worksheet 10.

! **WATCH OUT:** Remember to read the questions slowly and repeat them to help the children who struggle with memory.

- The 'winner' is the first child to cross off all the fractions on their card and shout 'Bingo!' Check the winner's card carefully against your list of answers, to ensure that no mistakes have crept in.

OBJECTIVES

- Add and subtract fractions with the same denominator within one whole
- Solve problems that involve the Year 3 National Curriculum for fractions

Rising Stars Progression Framework: 3.3.c.2, 3.3.d.1

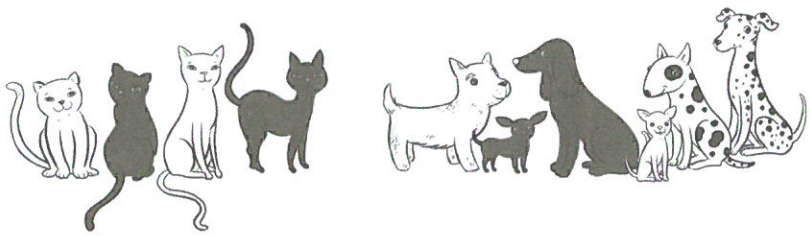
RESOURCES

- Activity 1: Worksheet 8
- Activity 2: Worksheet 9 cut into cards (bingo boards); pencils; Worksheet 10

Worksheet 8

Name _____ Date _____

Cats and dogs



1. We have 4 cats; 2 are black and 2 are white. What fraction of the cats are white? What fraction is black?

2. Now look at the dogs.

   a) What fraction is black?

   b) What fraction is spotty?

   c) What fraction is spotty and plain white?

3. If 1 spotty dog runs away, how many dogs will be left? Write this problem as a fraction and answer it.

4. If 1 of the white cats runs away, how many cats will be left? Write this problem as a fraction and answer it.

Worksheet 9

Photocopy and cut up the cards, one per child.

Bingo cards

$\frac{1}{2}$	$\frac{1}{3}$	$\frac{2}{4}$
$\frac{3}{8}$	$\frac{2}{8}$	$\frac{2}{3}$

$\frac{2}{3}$	$\frac{3}{8}$	$\frac{2}{4}$
$\frac{3}{4}$	$\frac{1}{2}$	$\frac{1}{6}$

$\frac{4}{6}$	$\frac{3}{8}$	$\frac{2}{4}$
$\frac{1}{2}$	$\frac{1}{6}$	$\frac{2}{8}$

$\frac{2}{8}$	$\frac{1}{6}$	$\frac{3}{8}$
$\frac{3}{4}$	$\frac{2}{4}$	$\frac{1}{2}$

$\frac{1}{6}$	$\frac{1}{2}$	$\frac{2}{3}$
$\frac{3}{8}$	$\frac{2}{4}$	$\frac{4}{6}$

$\frac{2}{4}$	$\frac{2}{8}$	$\frac{1}{2}$
$\frac{2}{3}$	$\frac{3}{8}$	$\frac{1}{6}$

Worksheet 10

Read the questions to the children.

Bingo questions

1. Who has $\frac{1}{2}$?
2. Who has a fraction that is equivalent to $\frac{1}{2}$?
3. Who has a fraction that is equivalent to $\frac{1}{4}$?
4. Who has a fraction equal to $\frac{1}{3} + \frac{1}{3}$?
5. There are 8 apples left on the apple tree. 5 are rotten.
   What fraction can be eaten?
6. 4 people share a cake. 2 people eat their pieces.
   What fraction is left?
7. There are 6 bottles of juice. 5 children drink a bottle each.
   What fraction is left?
8. 3 people go to a cafe. 2 order tea.
   What fraction of the group doesn't order tea?
9. 4 people go to a cafe. 3 order cake.
   What fraction order cake?
10. 1 cake is cut into 6 pieces. 2 pieces are eaten.
    What fraction is left?