# Years 3/4

## Small Steps Guidance and Examples

### Block 2: Addition and Subtraction

**White Rose Maths**

# Overview

## Small Steps

| Year 3 | Year 4 |
|---|---|
| Add and subtract multiples of 100 | Add and subtract 1s, 10s, 100s and 1,000s |
| Add two 3-digit numbers – not crossing 10 or 100 | Add two 4-digit numbers – no exchange |
| Add 2-digit and 3-digit numbers – crossing 10 and 100 | Add two 4-digit numbers – one exchange |
| Add two 3-digit numbers – crossing 10 or 100 | Add two 4-digit numbers – more than one exchange |
| Subtract 3-digits from 3-digits – no exchange | Subtract two 4-digit numbers – no exchange |
| Subtract 2-digits from 3-digits – exchange | Subtract two 4-digit numbers – one exchange |
| Subtract 3-digits from 3-digits – exchange | Subtract two 4-digit numbers – more than one exchange |
| | Efficient subtraction |
| Estimate answers to calculations | Estimate answers |
| Check | Checking strategies |

# Add & Subtract Multiples of 100

## Notes and Guidance

Within this small step, children are introduced, for the first time, to numbers greater than 100.

In year 2 children would have been exposed to the bar model when working with fact families.

Using concrete manipulatives and pictorial representations throughout is important so the children can see the value of hundreds.

## Mathematical Talk

What is the same and what is different about 2 ones and 3 ones, 2 tens and 3 tens and 2 hundreds and 3 hundreds?

How many different ways can you represent 200 + 300?

## Varied Fluency

**1** 2 ones and 3 ones is equal to 5 ones

2 tens and 3 tens is equal to 5 tens
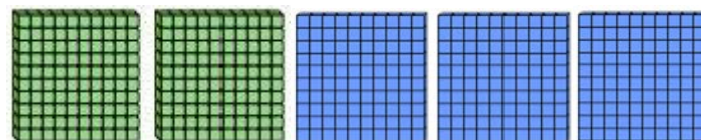
So 2 hundreds and 3 hundreds is equal to ……. hundreds

**2** Complete each box for 400 + 500

| Build it and draw it | Write it in words |
|---|---|
| | |
| Put it in a part whole model | Write it as a number sentence |
| | |

| Build it and draw it | Write it in words |
|---|---|
| | Four hundreds and five hundreds is equal to nine hundreds |
| Put it in a part whole model | Write it as a number sentence |
| 900 400 500 | 900 = 400 + 500 |

**3** Use the bar model to complete the number sentences.

| 600 | |
|---|---|
| 200 | 400 |
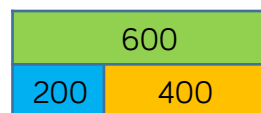
_____ + _____ = 600          600 = _____ + _____

_____ + _____ = 600          600 = _____ + _____

_____ - _____ = 400          400 = _____ - _____

_____ - _____ = 200          200 = _____ - _____

# Add & Subtract Multiples of 100

## Reasoning and Problem Solving

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The answer is 800

How many ways can you get to the answer using multiples of 100?

Possible answers:
1,000 – 200
900 – 100
800 + 0

Etc.

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Write a sensible story for the calculation:

$$500 + 400 = 900$$

Open ended.
Example answer:

A school has 500 boys and 400 girls. How many children are there altogether?

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Which is the odd one out?

Explain why.



Possible answers:
The odd one out could be
$300 + 500 = 800$ because it does not have the number 200 in the calculation.
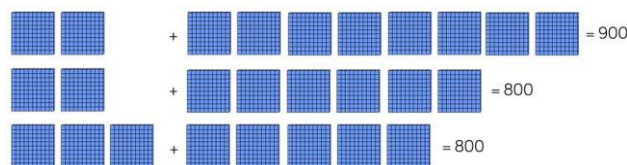
The odd one out could also be
$200 + 700 = 900$ because the answer is not 800

# 1s, 10s, 100s, 1,000s

## Notes and Guidance

Building on Year 3, children use their knowledge of adding and subtracting hundreds, tens and ones as well as introducing adding thousands.

This can be done using concrete representations (Base 10, place value counters) before moving to abstract and mental methods.

## Mathematical Talk

Which is the highest value counter?

Can you make the same number using Base 10?

Which place value column are we focusing on?

If we are adding tens, is it only the tens column that changes?

5382 + 5 tens- Will only the tens column change?

Which other column will change?

## Varied Fluency

**1** Here is a number.



Add 3 thousands to the number. Which counter did you use?
Add 3 hundreds to the number. What number do you have now?
Subtract 3 tens from the number. Which counters do you need to take away?
Add five ones to the number. How many ones do we have? Can we exchange our ones for a ten?
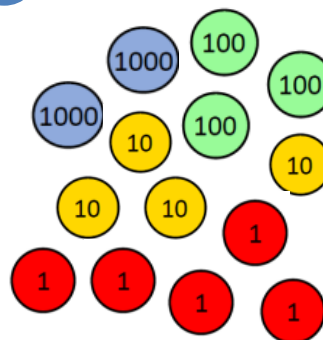
**2** Here is a number.

| Thousands | Hundreds | Tens | Ones |
|-----------|----------|------|------|
| 5 | 3 | 8 | 2 |

Add three hundreds to the number.
Subtract 4 thousands.
Subtract 2 ones.
Add 5 tens.
What number do you have now?

**3** Complete:

3456 + 1000=          734 – 400=
7234 + 500 =          6218 – 200=
3821 + 700 =          715 + 50 =
8527 – 2000=          4060 – 200 =

# 1s, 10s, 100s, 1,000s

## Reasoning and Problem Solving

Which questions are easy?
Which questions are hard?

$$8,7273 + 4 =$$

$$8,273 + 4 \text{ tens} =$$

$$8,273 - 500 =$$

$$8,273 - 5 \text{ thousands} =$$

Why are some easier than others?

8,273 + 4 and
8,273 –
5 thousands are easier
because you do not
cross any boundaries.

8,723 + 4 tens and
8,273 – 500 are harder because you
have to cross boundaries and make
an exchange.

Jack says:
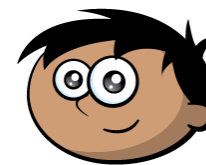
When I add hundreds to a number, only the hundreds column will change

Do you agree with Jack?
Explain your answer.

I do not agree with Jack because when you add hundreds to a number and end up with more than ten hundreds you will affect the thousands column as well.

# Add two 3-digit Numbers

## Notes and Guidance

This small step progresses on from previous learning of 1-1 correspondence; as children will need to understand that one 100 counter represents ten 10 counters and one hundred one counters.

The examples used throughout this step build on children's understanding of Base 10 equipment, as the individual units can no longer be seen.

## Mathematical Talk

Where would these digits go on the place value chart? Why?

Why do we make both numbers when we add?

Can you represent ____ using the equipment?

Can you draw a picture to represent this?

Why are the numbers partitioned in this way?

How can this help you?

Why is it important to put the digits in the correct column?

What is addition?

## Varied Fluency

1   Complete the calculations.



___ + ___ = ___      ___ + ___ = ___
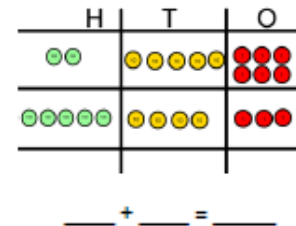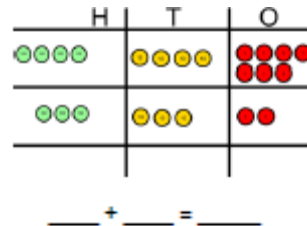
2   Use column addition to work out:
- Three hundred and forty-two add two hundred and Thirty-six.
- Five hundred and sixteen plus three hundred and sixty-two.
- The total of two hundred and forty-seven and four hundred and two.

3   Use column addition to work out:

$352 + 237$     $458 + 231$     $306 + 283$

## Add two 3-digit Numbers

## Reasoning and Problem Solving

Which creates an answer of 567?

### a)



### b)
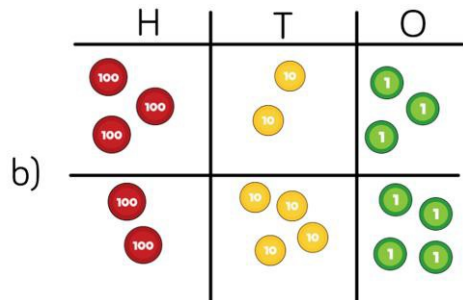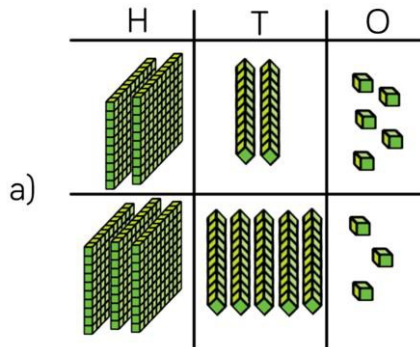


B is correct because it shows
$323 + 244 = 567$

A shows
$343 + 225 = 568$

Here are three cards.



Rosie and Jim make 3 digit numbers using each card once.

Rosie

I have made the greatest possible number

I have made the smallest number possible

Jim

Work out the total of the two numbers.

$432 + 234 = 666$

# Add two 4-digit Numbers

## Notes and Guidance

From Year 3 children should have an understanding of addition of 3-digit numbers.

Moving on from the previous step of adding and subtracting 1s, 10s, 100s, 1000s, children begin adding 2 four-digit numbers with no exchange.

Children will use a place value grid to support understanding alongside column addition.

## Mathematical Talk

Which is the larger number? Why?

Compare place value columns – which column has a greater number of thousands/hundreds/tens/ones?

When we add, what happens in the ones column? The tens? The hundreds? The thousands? What has changed?

How is the question different when we add a 4-digit number to a 3-digit number?

## Varied Fluency

1. Add the place value counters together.



Can you write this as a calculation? (3,242 + 2,213)
Now complete the question 3,242 + 213 in the same way.
What is the same and what's different?
Look at how the place value columns are lined up in the new question.
How is our answer different? Why?

2. Complete the missing numbers.

# Add two 4-digit Numbers

## Reasoning and Problem Solving

Tamsin adds 2 numbers together that total 4,444

> Both numbers have 4 digits.
>
> All the digits in both numbers are even.

**Tamsin**

What could the numbers be? Prove it. How many ways can you find?

Possible answers:

$2,222 + 2,222$
$2,244 + 2,200$
$2,224 + 2,220$
$2,442 + 2,002$
$2,242 + 2,202$
$2,424 + 2,020$
$2,422 + 2,022$
$2,444 + 2,000$

This includes 0 as an even number.

There are more possible pairs of numbers.

This question could include a discussion about whether 0 is an odd or an even number and why.

Two children completed the following calculation:

$$1,234 + 345$$

> When I added 1,234 and 345 together I got 1,589.

Suri

> I added 1,234 to 345 and I got 4,684.

Eleanor

Both of the children have made a mistake in their calculations.

Calculate the actual answer to the question.

What mistakes did they make?

Actual answer:

1,579

Suri's mistake was a miscalculation for the 10s column, adding 30 and 40 to get 80 rather than 70.

Eleanor's mistake was a place value error, placing the 3 hundred in the thousands column and following the calculation through incorrectly.

# Add 2-digit & 3-digit Numbers

## Notes and Guidance

Children add 3 and 2 digit numbers that cross both the 10 and 100 barrier. They will build upon the previous small steps and the concept of 'exchange' is explored.

In this small step it is important to focus on the position of numbers and place value. The placement of numbers is also key- i.e 'Does it matter which number goes on top?'
The use of Base 10 equipment will support understanding at this stage.

## Mathematical Talk

What happens when we have 10 Ones? Can we exchange them for anything? Why?

Where does this Ten go? How does that help us?

What happens when we have 10 Tens? Can we exchange them for anything? Why?

Where does this Hundred go? How does that help us?

## Varied Fluency

1 Represent 46 + 367 using Base 10.
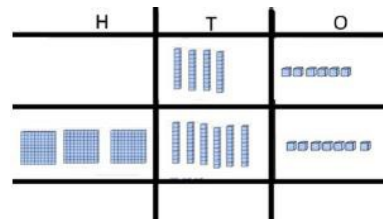


2 Use column addition to work out:
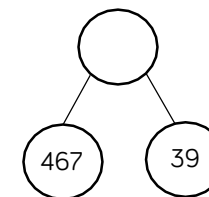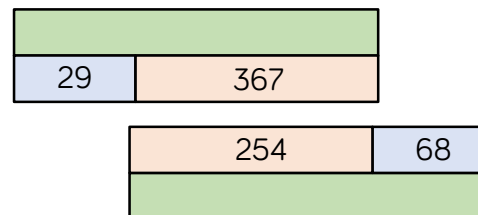


3 Use column addition to work out

| 248 + 37 | 476 + 59 | 556 − 77 |

# Add 2-digit & 3-digit Numbers

## Reasoning and Problem Solving

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Khloe

$265 + 87 = 242$

Here is her working out.

$$
\begin{array}{r}
2\,6\,5 \\
+\ \ 8\,7 \\
\hline
2\,4\,2 \\
\end{array}
$$

Is she correct?
Explain why.

Khloe is incorrect because she has not exchanged ten ones for one ten when adding 5 and 7

---

Write your own problem which is represented by the bar model.

| 276 | 89 |
|-----|-----|

Possible answer: 267 children attended a play. They were accompanied by 89 adults. How many people saw the play in total?

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Kourtney, Scott and Mason are working out $374 + 37 =$

Kourtney

I started at 374 on a number line

Scott

I used column method

Mason

I added 40 and subtracted 3

Which method do you prefer?
Are there any other ways to work this out?

Children choose their preferred method and explain why.

# Add two 4-digit Numbers

## Notes and Guidance

Prior to this step, children must be confident in adding two 4 digit numbers with no exchange.

Children will again use a place value grid to support understanding alongside column addition.

They will explore exchanges as they occur in different place value columns and look for similarities/differences.

## Mathematical Talk

What is the maximum number of counters you can have in each place value column?

What happens in a place value column when there are more than ten counters?
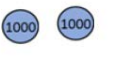
What happens when we exchange?

Which counters are exchanged? What are they exchanged for? Where do they move to?

How does this work when exchanging ten 1s? Ten 10s? Ten 100s?

## Varied Fluency

**1** Add the place value counters together.



Look at the result for each column; what do you notice?

Exchange ten ones for a 10 counter and move it to the tens column.

What is the final result?

Now write the same calculation in numbers, showing the exchanged 10 underneath the tens column.

**2** Daniel buys a new laptop costing £1,265. He also buys a new mobile phone costing £492. What is the total cost?

His friend, Paul, buys a smart watch for £342.

How much money have they spent altogether?

# Add two 4-digit Numbers

## Reasoning and Problem Solving

What is the missing four digit number?



$$+ \quad 6{,}395$$
$$\phantom{+ \quad} 8{,}949$$

The missing number is 2,554.

You could work it out by thinking about what is added to 5 to make 9 and so on.

Some children might use the inverse and subtract 6,395 from 8,949 to find the answer.

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Anne, Beth and Alex are working out the solution to the following calculation: $6{,}374 + 2{,}823$

**Anne's strategy:**
$$6{,}000 + 2{,}000 = 8{,}000$$
$$300 + 800 = 110 \qquad 70 + 20 = 90$$
$$4 + 3 = 7$$
$$8{,}000 + 110 + 90 + 7 = 8{,}207$$

**Beth's strategy:**     **Alex's strategy:**

$$\begin{array}{r} 6{,}374 \\ + 2{,}823 \\ \hline 8{,}197 \end{array}$$

$$\begin{array}{r} 6{,}374 \\ + 2{,}823 \\ \hline 7 \\ 90 \\ 1{,}100 \\ 8{,}000 \\ \hline 9{,}197 \end{array}$$

Alex is correct with 9,197

Anne has miscalculated 300 + 800, forgetting to exchange a ten hundreds to make a thousand (showing 11 tens instead of 11 hundreds)

Beth has forgotten to show and add on the exchanged thousand.

# Add two 3-digit Numbers

## Notes and Guidance

Once children are confident adding two 3-digit numbers together with no exchange, they need to be able to add two 3-digit numbers that do cross the 10 and 100 barrier.

The examples used throughout this step build on children's understanding of Base 10 equipment, as the individual units can no longer be seen.

## Mathematical Talk

Where would these digits go on the place value chart? Why?
Why do we make both numbers when we add?
Can you represent _____ using the equipment?
Can you draw a picture to represent this?
Why are the numbers partitioned in this way?
How can this help you?
Why is it important to put the digits in the correct column?
What is addition?

## Varied Fluency

**1**
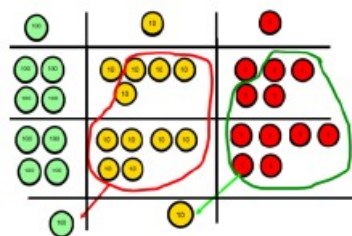


What happens when we have 10 ones/tens?
Can we exchange them for anything? Why?
Where does the ten/hundred go?
How does that help us?

**2** Use column addition to work out:



| 178 | 349 |
| 457 | 187 |

286  356
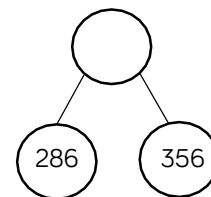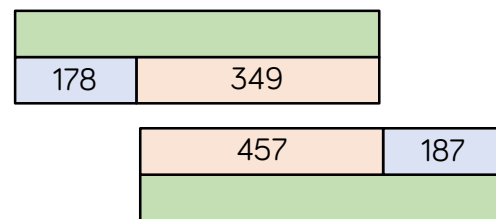
**3** Joan and Fred play a game. Fred scored 354. Joan scores 478. What was the total of their scores?

Car A drives 248 miles. Car B drives 40 miles more. How many miles do they drive altogether?

## Add two 3-digit Numbers

## Reasoning and Problem Solving

Roll a 1-6 die.
Fill in a box each time you roll.

☐☐☐ + ☐☐☐ =

Can you make the total:

- An odd number
- An even number
- A multiple of 5
- The greatest number possible
- The smallest number possible

Discuss the rules with the children and what they would need to roll to get them e.g. To get an odd number only one of the ones should be odd because if both ones have an odd number, it will make an even.

Complete the statements to make them correct.

a)  $487 + 368$  ◯  $487 + 468$

b)  $326 + 258$  ◯  $325 + 259$

c)  $391 + 600$  =  $401 +$ ☐

Explain why you did not have to work out the answers to compare them.

(a) $<$
(b) $=$
(c) 90
(a) The starting number is the same so only need to compare the second number in each.
(b) They are the same because the second calculation has subtracted one from the first number and added one to the second.
(c) 401 is ten more than 391 so just need to subtract 10 from 600

# Add two 4-digit Numbers

## Notes and Guidance

Building on adding two 4-digit numbers with one exchange, children explore multiple exchanges as they occur in different place value columns and look for similarities/differences.

## Mathematical Talk

Compare the place value counters method with the numeric representation – how do they relate?

How did we make the extra 10 place value counter?

What does the '1' in the tens column show?

How did we make the extra 1000 place value counter?

What does the '1' in the thousands column show?

State: 'We have exchanged ten ones to make one ten'. 'We have exchanged ten hundreds to make one thousand'.

## Varied Fluency

1. Complete the following calculation, with place value counters and in written form.
Remember to start with the ones column.

$$\begin{array}{r} 4,844 \\ + 2,156 \\ \hline \end{array}$$

2. What interesting thing happens with this question?
Can you explain what is happening? Why?
Make some more questions that create a 'chain' of exchanges.

3. Write <, > or = in each of the circles to make the number sentences correct:

3,456 + 789 ◯ 1,810 + 2,436

2,829 + 1,901 ◯ 2,312 + 2,418

7,542 + 1,858 ◯ 902 + 8,496

1,818 + 1,999 ◯ 3,110 + 707

# Add two 4-digit Numbers

## Reasoning and Problem Solving

Luke says:

When I add two numbers together I will only ever make up to one exchange in each column.

Is Luke correct?
Explain your answer

Luke is correct. When adding any two numbers together, the maximum value in any given column will be 18 (e.g. 18 ones, 18 tens, 18 hundreds). This means that only one exchange can occur in each place value column. Children may explore what happens when more than two numbers are added together.

Complete:

$$6 \square \square 8$$
$$+ \square \square 8 \square$$
$$9,3\,2\,5$$
$$1 \quad 1 \quad 1$$

Greg says that 'there is more than one answer for the missing numbers in the hundreds column'. Is he correct? Explain your answer.

The solution shows the missing numbers for the ones, tens and thousands columns. Greg is correct; the missing numbers in the hundreds column must total 1,200 (the additional 100 has been exchanged). Possibilities are 900+300, 800+400, 700+500, 600+600.

$$6\,?\,3\,8$$
$$+ \,2\,?\,8\,7$$
$$9,3\,2\,5$$
$$1 \quad 1 \quad 1$$

# Subtract 3-digits from 3-digits

## Notes and Guidance

It is important for the children to understand that there are different methods of subtraction. In this step children need to explore efficient strategies for subtraction, including:

- counting on (number lines)
- near subtraction
- number bonds

They then need to move on to setting out formal column subtraction supported by practical equipment.

## Mathematical Talk

What is the different between?

What do you notice about the numbers in the calculation? (Are they close?)

Which strategy would you use and why?
How could you check your answer is correct?
Does it matter which number is at the top of the calculation?

## Varied Fluency

1. Using counting on, find the missing value on these bar models.

| 607 | |
|---|---|
| 203 | ? |

| 298 | |
|---|---|
| 273 | ? |

| 794 | |
|---|---|
| ? | 132 |

2. There are 246 children on a school bus. 215 of them are girls. How many are boys?
Show your answer on the place value grid.

| Hundreds | Tens | Ones |
|---|---|---|
|  |  |  |

3. Start with:
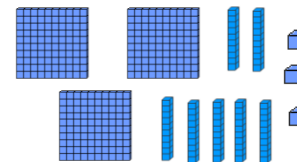
Then take away 142.
Copy and complete this column subtraction.

$$\begin{array}{r} \square\,\square\,\square \\ -\ 1\ 4\ 2 \\ \hline \square\,\square\,\square \end{array}$$

# Subtract 3-digits from 3-digits

## Reasoning and Problem Solving

There are 566 in counters altogether but the splat is covering some.
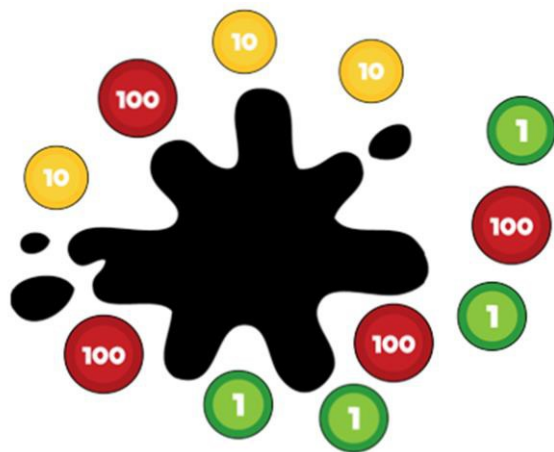


How many different ways can you make the missing amount?

$566 - 434 = 132$

Possible answer:
One 100, three 10s and two 1s

Thirteen 10s and two 1s

132 ones etc.

Use the digit cards to complete the calculation.
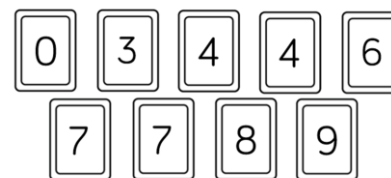




The digits in the shaded boxes are odd.

Is there more than one answer?

Possible answers:

$987 - 647 = 340$

$879 - 473 = 406$

# Subtract two 4-digit Numbers

## Notes and Guidance

Building on Year 3, children use their knowledge of subtracting using the formal column method to subtract 2 four digit numbers.

Children will be focusing on no exchange and will be concentrating on the correct place value.

## Mathematical Talk

Why is it important that we start subtracting the ones first? What could happen if we didn't?

Can you use place value counters to make this number? Can you use pictorial representations? Does this help you?

What happens when we take away all of the hundreds? Thousands? How does the number change?

What happens when we do not subtract anything from the value?

## Varied Fluency

1. Subtract 2,332 from the number below.



2. Complete this subtraction problem.

| | Thousands | Hundreds | Tens | Ones |
|---|---|---|---|---|
| | 7 | 6 | 4 | 6 |
| - | 4 | 3 | 3 | 5 |
| | | | | |

3. Using a place value grid work out the following.

$$2,348 - 235 = \underline{\hspace{2cm}}$$
$$\underline{\hspace{1.5cm}} = 4,572 - 2,341$$
$$6,582 - 582 = \underline{\hspace{2cm}}$$
$$\underline{\hspace{1.5cm}} = 7,262 - 7,151$$

# Subtract two 4-digit Numbers

## Reasoning and Problem Solving

Chloe is performing a column subtraction with two four digit numbers.

The larger number has a digit total of 35. The smaller number has a digit total of 2.

Use cards to help you find the numbers.

What could Chloe's subtraction be?

How many different options can you find?

Possible answers:

9998 −1100 = 8898
9998 −1010 = 8988
9998 − 1001 = 8997
9998 − 2000 = 7998
9989 − 1100 = 8889
9989 − 1010 = 8979
9989 − 1001 = 8988
9989 − 2000 = 7989
9899 − 1100 = 8799
9899 − 1010 = 8889
9899 − 1001 = 8898
9899 − 2000 = 7899
8999 − 1100 = 7899
8999 − 1010 = 7889
8999 − 1001 = 7998
8999 − 2000 = 6999

There are counters to the value of 3,470 on the table but some have been covered by the splat.
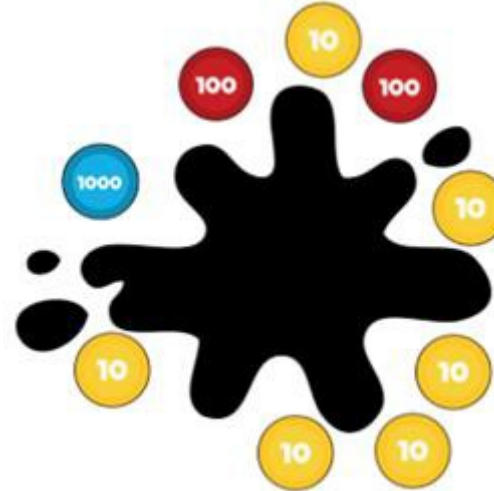
How many different ways can you make the missing amounts?

3470 - 1260 = 2210

Possible answers:

- two 1000s, two 100s and one 10

- twenty-two 100s and one 10

- twenty-two 100s and ten 1s

There are more possible answers.

# Subtract 2-digits from 3-digits

## Notes and Guidance

Children will build upon previous learning of column addition.

The term 'exchange' will be key during this small step and their understanding of place value will help them to see when they should be exchanging.

In this small step it is important to focus on the position of numbers and place value.

## Mathematical Talk

What happens when we are subtracting more ones than we have?

Can we exchange anything? (1 ten for 10 ones)
Where do the 10 ones go?
How does this help us solve the problem?

What happens if there are ones remaining after exchanging for 1 ten?

## Varied Fluency

1. Represent $235 - 29$ using Base 10.
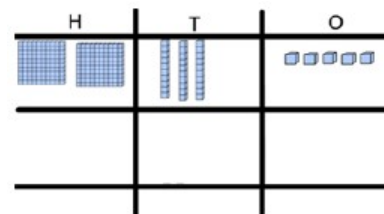


2. Use column addition to work out:
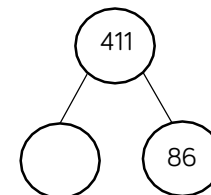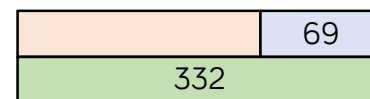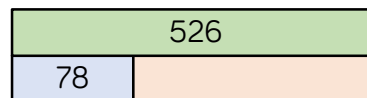


3. Use $<$, $>$ or $=$ to make the statements true.

$$215 - 47 \quad \bigcirc \quad 234 - 57$$

$$452 - 84 \quad \bigcirc \quad 411 - 43$$

$$332 - 89 \quad \bigcirc \quad 406 - 28$$

# Subtract 2-digits from 3-digits

## Reasoning and Problem Solving

Maria thinks $352 - 89 = 337$

```
  H  T  O
  3  5  2
     8  9  −
  3  3  7
```

Is she correct?

Explain why.

Maria is incorrect because she has just found the difference between the ones rather than making an exchange. She has done the same with the tens.

Gail, Dave and Lucy are trying to work out $300 - 57$

Who has the most efficient way of working it out?
Explain how you know.

Gail: I know that take away means difference, so I can do 299 take away 56 and get the right answer.

Dave: I can count on from 57 to 100 (43) an then count on to 300 ( 200)

Lucy: I can use the column method to work it out and exchange when I need to.

Accept difference answers as long as they are justified. Children might even suggest subtracting 60 and then adding 3

# Subtract two 4-digit Numbers

## Notes and Guidance

Building on Year 3, children use their knowledge of subtracting using the formal column method to subtract 2 four digit numbers.

Children will be learning how to carry out this calculation with one exchange taking place within any column.

## Mathematical Talk

What happens when the digit we are subtracting from is smaller?
What are the strategies we use?
Which number do we exchange?

Can you use concrete or pictorial representations to help?

## Varied Fluency

1   Here is a number.
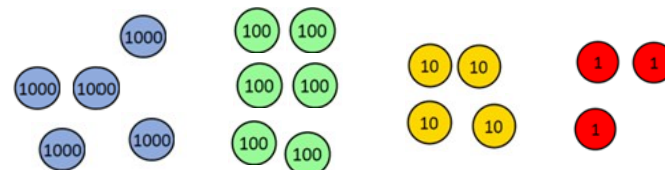


Subtract 4,345.
What is your answer?
Can you subtract 5 from 3?
What do you have to do?
You exchange a 10 – what does your number become  that you are subtracting from?

2   Complete the calculation.
What do we do?
Where do we exchange from?  Why do we exchange from there?

$$\begin{array}{r} 4578 \\ -\ 3643 \\ \hline \phantom{0000} \end{array}$$

3   Find the difference between 6,528 and 469 using column subtraction.

# Subtract two 4-digit Numbers

## Reasoning and Problem Solving

Three Primary Schools join together to go on a school visit to The Deep in Hull. 1,235 people go on the trip.
There are 1,179 children and 27 teachers. The rest are parents.

How many parents are there?

What do you need to do first?

Which operation do you use?

---

Add children and teachers together first.

$1,179 + 27 = 1,206$

Subtract this from total number of people.

$1,235 - 1,206 = 29$

29 parents

---

Find the missing numbers that could go into the boxes.

Give reasons for your answers.

$$\boxed{\phantom{xxxx}} - 1,345 = 4\boxed{\phantom{x}}6$$

What is the greatest number that could go in the first box?

What is the smallest?

How many possible answers could you have?

What is the pattern between the numbers?

What method did you use?

---

Possible answers:

1,751 and 0
1,761 and 10
1,771 and 20
1,781 and 30
1,791 and 40
1,801 and 50
1,811 and 60
1,821 and 70
1,831 and 80
1,841 and 90

1,841 is the greatest
1,751 is the smallest

There are 10 possible answers

Both numbers increase by 10

# Subtract 3-digits from 3-digits

## Notes and Guidance

This step focuses on a more formal/written method for subtraction where previous strategies may not be appropriate. Children will explore column subtraction using concrete manipulative.

It could be seen that this previous step is easier for many children as there is no ambiguity where to put the numbers.

## Mathematical Talk

Which method would you use for this calculation and why?

What happens when you can't subtract 9 from 7? 50 from 30 etc

How would you teach somebody else to use column subtraction with exchange?

Why do we exchange? When do we exchange?

## Varied Fluency

1. Complete these subtractions using counters.
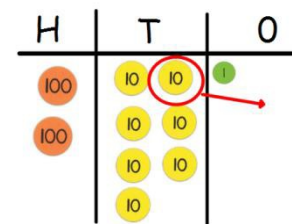
$$372 - 165 \qquad\qquad 629 - 483$$
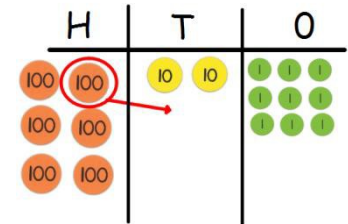


2. Complete these column subtractions showing exchanges.

# Subtract 3-digits from 3-digits

## Reasoning and Problem Solving

Work out the missing digits

(a)

$$
\begin{array}{r}
5\ *\ 3 \\
-\ 2\ 1\ 8 \\
\hline
3\ 1\ 5 \\
\end{array}
$$

(b)

$$
\begin{array}{r}
*\ 0\ * \\
-\ 2\ *\ 8 \\
\hline
2\ 4\ 6 \\
\end{array}
$$

(a) $533 - 218$

(b) $504 - 258$

Kassie is working out $406 - 289$

Here is her working out:

$$
\begin{array}{r}
406 \\
-\ 289 \\
\hline
7 \\
\end{array}
\qquad
\begin{array}{r}
406 \\
-\ 289 \\
\hline
0\ 2\ 7 \\
\end{array}
$$

Explain her mistake.

What should the answer be?

Kassie has exchanged from the hundred column to the ones so there are 106 ones in the ones column. She should have exchanged 1 hundred for 10 tens and then 1 ten for 10 ones.

$406 - 289 = 117$

# Subtract two 4-digit Numbers

## Notes and Guidance

Building on the previous step, children explore what happens when a subtraction has more than one exchange.

Here it is important that children focus on when an exchange is and isn't needed.

## Mathematical Talk

What happens when the digit we are subtracting from is smaller? What are the strategies we use? Which number do we exchange?

What happens when we have to exchange from more than one number?

Can we use the inverse to check our calculation?

## Varied Fluency

**1** Use place value counters to complete the subtractions. Remember to exchange between the columns when you cannot subtract easily.

$$
\begin{array}{r}
5783 \\
-\ 894 \\
\hline
\end{array}
\qquad
\begin{array}{r}
6737 \\
-\ 759 \\
\hline
\end{array}
$$

**2** Find the missing 4-digit number.
What are you going to do to solve the problem?
Which operation are you going to do? Why?

$$
\begin{array}{r}
?\,?\,?\,? \\
+\ 4\,6\,7\,8 \\
\hline
7\,4\,3\,1
\end{array}
$$

**3** A shop has 8,435 magazines.
367 are sold in the morning and 579 are sold in the afternoon.
How many magazines are left?

| 8,435 | | |
|:---:|:---:|:---:|
| 367 | 579 | ? |

# Subtract two 4-digit Numbers

## Reasoning and Problem Solving

Max and Will solve a problem.

Max

When I subtract 546 from 3,232 my answer is 2,714.

Will

When I subtract 546 from 3,232 my answer is 2,686.

Who is right?
Which answer is correct?
Explain your reasons why.
Why is one of the answers wrong?

Will is correct as
3,232 – 546 =
2,686

Max is incorrect because he did not exchange the 2 and the 3 and subtracted the bottom numbers from the top.

There were 2,114 visitors to the museum on Saturday.
650 more people visited the museum on Saturday than on Sunday.

MUSEUM

Altogether how many people visited the museum over the two days?

What do you need to do first to solve this problem?

First you need to find the number of visitors on Sunday which is

2,114 - 650 = 1,464

Then you need to add Saturday's visitors to that number to solve the problem.

1,464 + 2,114 = 3,578

# Efficient Subtraction

## Notes and Guidance

Here children build on their understanding of column subtraction and mental methods to find the most efficient methods of subtraction.

Children compare the different methods of subtraction and discuss whether they would partition, take away or find the difference.

## Mathematical Talk

Is the column method always the most efficient method?
When we find the difference, what happens if we take one off each number? Is the difference the same? How does this help us when subtracting large numbers?
When is it more efficient to count on rather than use the column method?
Can you represent your subtraction in a part whole model or a bar model?

## Varied Fluency

1. Sam, Lucas and Jemima are solving the calculation
7000 – 3582
Here are their methods.



Who is correct? Can you explain how each child has reached their answer? Whose method is the most efficient?
Use the different methods to solve 4000 – 2831
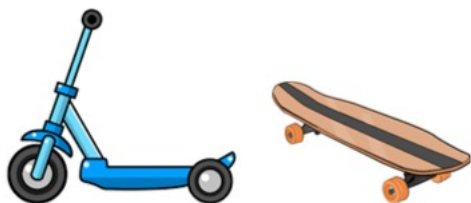
2. Find the missing numbers.
What methods did you use?

# Efficient Subtraction

## Reasoning and Problem Solving

Jamal has £1000.



He buys a scooter for £345 and a skateboard for £110.

How much money does he have left?

Show 3 different methods of finding the answer.

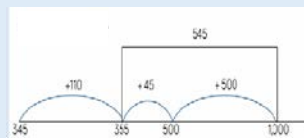Explain how you completed each one.

Which is the most effective method?

$$\begin{array}{r} 345 \\ +110 \\ \hline 455 \end{array} \qquad \begin{array}{r} {}^{9}\cancel{10}{}^{9}\cancel{00}10 \\ -455 \\ \hline 545 \end{array}$$

He has £545 left

$$\begin{array}{r} 345 \\ +110 \\ \hline 455 \end{array} \qquad \begin{array}{r} 999 \\ -454 \\ \hline 545 \end{array}$$

He has £545 left

Above I have used column method, taken one off each number to find the difference and found the difference by counting on. Below I used counting on the number line.



Look at each pair of calculations below. Which one out of each pair of calculations has the same difference as 2450 – 1830?

2,451 – 1,831 =          2,451 – 1,829 =

2,500 – 1,880 =          2,500 – 1,780 =

2,449 – 1,829 =          2,449 – 1,831 =

When is it useful to use difference to solve subtractions?

2,451 – 1,831
Added one to each number
2,500 – 1,880
Added 50 to both numbers
2,449 – 1,829
Subtracted one from each number

Difference is 620

# Estimate Answers

## Notes and Guidance

It is an important skill for children to see the reasonableness of their answer.

While rounding is not formally introduced until Y4, it is helpful that children can refer to 'near numbers' to see whether an estimate is sensible.

## Mathematical Talk

What would you estimate this to be? Why did you choose this number?

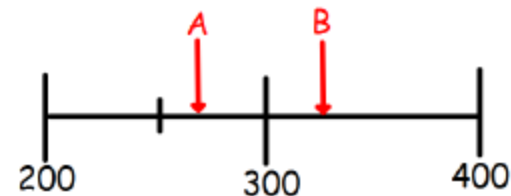Why is /isn't this a sensible estimation to an answer?

How did they work out this answer?

Could you do it in a different/better way?

## Varied Fluency

**1** Estimate the position of arrows A and B on the number line.



**2** Which of these is a sensible estimation to the number of sweet in a jar?

.

602  597  600



**3** Match each number to it's 'near number'.

497    200

304    500

684 ——— 700

217    300

# Estimate Answers

## Reasoning and Problem Solving

Amrish

> I estimate 143 − 95 will be 50 because I will subtract 100 from 150

Is this a good estimate? Why?

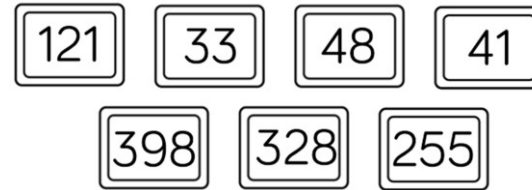Are there any other ways he could have estimated?

Yes, because he found two numbers close to the original numbers.

He could have rounded to the nearest 10 and calculated

140 − 100 (= 40)

Use the number cards to make different calculations with an estimated answer of 70

| 121 | 33 | 48 | 41 |

| 398 | 328 | 255 |

Possible answers:

121 − 48
(120 − 50)

41 + 33
(40 + 30)

398 − 328
(400 − 330)

# Estimate Answers

## Notes and Guidance

In this step, children use their knowledge of rounding to estimate answers for calculations and word problems.

They build on their understanding of near numbers in Year 3 to make sensible estimates.

## Mathematical Talk

Which numbers shall I round my numbers to?

Why should I round to this number? Why should an

estimate be quick?

When, in real life, would we use an estimate?

## Varied Fluency

1. Match the calculations with a good estimate for the number sentence.

| 345 + 1,234 | | 3,000 + 6,000 |
| 2,985 + 6,325 | | 3,500 + 1,200 |
| 3,541 + 1,179 | | 350 + 1,200 |
| 2,135 + 6,292 | | 2,000 + 6,000 |

2. Sita is estimating her number sentences. She rounds her numbers to the nearest thousand, hundred and ten to give different estimates.

> Original calculation: $3,625 + 4,277 =$
> Thousands: $4,000 + 4,000 = 8,000$
> Hundreds: $3,600 + 4,300 = 7,900$
> Tens: $3,630 + 4,280 = 7,910$

Which is the best estimate?

An estimate is supposed to be quick, which is the least effective estimate?

Decide whether to round to the nearest 10, 100 or 1000 for the following calculations.

$4,623 + 3,421 = \qquad 9,732 - 6,489 = \qquad 8,934 - 1,187 =$

# Estimate Answers

## Reasoning and Problem Solving

**A game to play for two people.**

The aim of the game is to get a number as close to 5,000 as possible.
Each child rolls a 1-6 die and chooses where to put the number on their grid. Once they have each filled their grid, they add up their totals to see who is the closest.

| | ? | ? | ? | ? |
|---|---|---|---|---|
| + | ? | ? | ? | ? |

$$\begin{array}{r} 2,345 \\ +\,2,666 \end{array}$$

In the example above the total is 5,011

The aim of the game could be changed, e.g. Aim for a number above/below 5,000 Aim to make the highest/lowest number possible etc

The estimated answer to a calculation is 3,400.
The numbers in the calculation were rounded to the nearest 100 to find an estimate.
What could the numbers be in the original calculation?

Children find any pair of numbers that round to the nearest hundred to make 3,400 altogether. e.g.

$2,343 + 1,089 =$

$4,730 – 1,304 =$

Use the number cards

and + or - to make three calculations with an

estimated answer of 2,500

1,295

1,120

4,002

1,489

3,812

1,449

$3,812 – 1,295$ can be estimated as $3,800 – 1,300 = 2,500$

$4,002 – 1,489$ can be estimated as $4,000 – 1,500 = 2,500$

$1,449 + 1,120$ can be estimated as $1,400 + 1,100 = 2,500$

# Check Answers

## Notes and Guidance

In this step, children need to explore ways of checking to see if an answer is reasonable.

Checking using inverse is to be encouraged so that children are using a different method and not just potentially repeating an error, for example, if they add in a different order.

## Mathematical Talk

How can you tell if your answer is sensible?

Does knowing if a number is close to a multiple of 100 help when adding and subtracting 3-digit numbers?
How does it help?

Does it help to check your answer if you spot which numbers are near to multiples of 10?
How does counting 10's, 50's and 100's help?

## Varied Fluency

1
$$34 + 45 = 79$$

Use a subtraction to check the answer to the addition.

2 Hannah has baked 45 cakes for a bun sale. She sells 18 cakes. How many does she have left?

Show your answer using a bar model and check your answer by using an addition.

3 Write all the calculations you could make using these cards.

| 660 | 120 | 540 | + | - | = |

# Check Answers

## Reasoning and Problem Solving

James

If I add two numbers together, I can check my answer by using a subtraction of the same numbers after e.g.

To check $23 + 14$
I can do $14 - 23$

Is he always right?
Explain why.

No, because you cannot have part subtract whole. The whole (greatest number) needs to be at the start of the subtraction then you subtract a part to find the remaining part.

I completed an addition and then used the inverse to check my calculation.

When I checked my calculation, the answer was 250

One of the other numbers was 355

What could the calculation be?

$$\boxed{?} + \boxed{?} = \boxed{?}$$

$$\boxed{\phantom{0}} - \boxed{\phantom{0}} = \boxed{250}$$

Possible answers:

$355 - 105 = 250$

$605 - 355 = 250$

So the calculation could have been:

$250 + 105 = 355$

$250 + 355 = 605$

# Checking Strategies

## Notes and Guidance

In this step, children need to explore ways of checking to see if an answer is reasonable.

Checking using inverse is to be encouraged so that children are using a different method and not just potentially repeating an error, for example, if they add in a different order.

## Mathematical Talk

How can you tell if your answer is sensible?

What is the inverse of addition? What is the inverse of subtraction?

## Varied Fluency

**1** $2,300 + 4,560 = 6,860$
Use a subtraction to check the answer to the addition. Is there more than one subtraction we can do to check the answer?

**2** If we know $3,450 + 4,520 = 7,970$, what other addition and subtraction facts do we know?
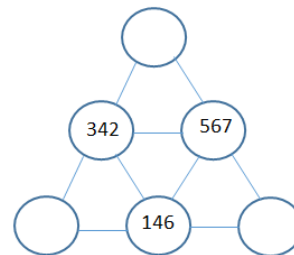
_____ + _____ = _____

_____ - _____ = _____

_____ - _____ = _____

Does the equal sign have to go at the end? Could we write an addition or subtraction with the equals sign at the beginning? How many more facts can you write now?

**3** Complete the pyramid.
Which calculations do you use to find the missing numbers? Which strategies do you use to check your calculations?

# Checking Strategies

## Reasoning and Problem Solving

Here is a number sentence.

$$350 + 278 + 250$$

Add the numbers in different orders to find the answer.
Is one order of adding easier? Why?

Create a rule when adding more than one number of what to look for in a number.

It is easier to add 350 and 250 to make 600 and then add on 278 to make 878.
We can look for making number bonds to 10, 100 or 1000 to make it easier to add more than one number.

I completed an addition and then used the inverse to check my calculation.
When I checked my calculation, the answer was 3,800
One of the other numbers was 5,200
What could the calculation be?



Possible answers:
5,200 – **1,400** = 3,800
**9,000** – 5,200 = 3,800

In the number square below, each horizontal row and vertical column adds up to 1,200
Find the missing numbers.
Is there more than one option?



Check the rows and columns using the inverse and adding the numbers in different orders.

Possible answers:
There are many correct answers
Top row missing boxes need to total 303.
Middle row total 368 Bottom row total 438

| 897 | 270 | 33 |
|-----|-----|-----|
| 200 | 168 | 832 |
| 103 | 762 | 335 |

This grid could be adapted to contain more numbers to help children access it more easily.