

Addition and Subtraction: add and subtract numbers mentally

Learning focus ? Add and subtract any single-digit number to and from a three-digit number

Greater Depth Challenge:

Look at the following calculations.
Which ones do you think are easier to answer?
Which ones are the hardest? Why?

$$410-9$$

$$409-9$$

$$408-9$$

Greater Depth Challenge:

Sarah is given two calculations to work out:

$$101-9$$

$$410-9$$

Sarah says that:

"It's easier to do 101- 9 than 410-9 because 1 is smaller in value than 4."

Do you agree with her?

Greater Depth Challenge:

Sometimes, always or never?

Katie says:

"When you add a one digit number to a three digit number, the only column that changes is the ones column. For example $395 + 3 = 398$ "

Greater Depth Challenge:

What could the digits be?
How many different options are there?

$$395- \square = 38\square$$

Could you ever use the digit 1?

Greater Depth Challenge:

Jamie is adding multiples of 10. He says his answers aloud.

Do you agree with his mental calculations?

$850 + 10 = \text{eight hundred and sixty}$

$860 + 10 = \text{eight hundred and seventy}$

$870 + 10 = \text{eight hundred and eighty}$

$880 + 10 = \text{eight hundred and ninety}$

$890 + 10 = \text{eight hundred and one hundred}$

Greater Depth Challenge:

Sometimes, always or never?

When you subtract a multiple of 10 only the tens column changes because multiples of 10 end with 0.

Greater Depth Challenge:

Who is the winner?

To win the game, Katie and Ahmed need to get the closest score to **234**.

Both are on 170.

Katie earns 60 points. Ahmed scores 70 points.

Who wins the game?

Greater Depth Challenge:

Toby and Tilly are looking at some number sentences. They are trying to decide which ones are the trickiest and which ones are the easiest.

Which equation do you think is the trickiest to solve? Why?


Which is the easiest to solve? Why?

$313 - 10$

$329 - 20$

$903 - 10$

$393 - 20$

Learning focus  Add and subtract any multiple of 100 to or from a three-digit number (might cross the 1,000 boundary).

Greater Depth Challenge:

Sam is adding multiples of 100. He writes his answers down

Do you agree with his mental calculations?
How would you explain the mistake to Sam?

$$700 + 100 = 7100$$

$$800 + 100 = 8100$$

$$900 + 100 = 9100$$

Greater Depth Challenge:

Sometimes, always or never?

Katie says:

I find subtracting multiples of 100 much harder than adding multiples of 100.

Do you agree with her? Can you think of any examples which you could use to disagree with her?





Greater Depth Challenge:

What digits could you put into the box?

Is there more than one option?

$$200 + \square\square\square = \square00 - \square00$$

Greater Depth Challenge:

			
thousands	hundreds	tens	ones

Johnny says that:

“ $919 + 100 = 100019$ because in the hundreds column you are doing $900 + 100 = 1000$ and then add the 19”. How can you use this place value chart to explain his error?

Addition and Subtraction: Add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction.

Learning focus	Decide whether a written method is the best solution by considering the size of numbers and the complexity of calculation
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Greater Depth Challenge:

Mary is deciding which calculation she needs to use a formal written method for.

Which ones would you advise her to do mentally and which ones would you advise her to do using a formal written method?

- 143 - 92**
- 273-20**
- 999-12**

Greater Depth Challenge:

999- 5

107- 38

Joseph is deciding which calculation he needs to use a written method for.

He says: *"I will do 107 - 38 mentally because 107 only has 1 hundreds but 999 has 9 hundreds so that's much harder to do in your head."*

Greater Depth Challenge:



thousands	hundreds	tens	ones

Sally says *"It's really hard to do 184 subtract 13 in my head so I'll just use a written method."*

What strategies would you give her to solve this? You can use a place value chart, a number line- anything you like!

Greater Depth Challenge:

Annie says *"I'm happy to calculate 983 - 261 in my head because it's really easy if I use the place value headings to help me. I don't want to do 983-291 in my head though, that's much harder to do that mentally."*

thousands	hundreds	tens	ones

Why do you think she says that? Can you explain why using the chart?

Learning focus

Recognise the relationship between the vertical presentation and the steps on the number line.

Greater Depth Challenge:

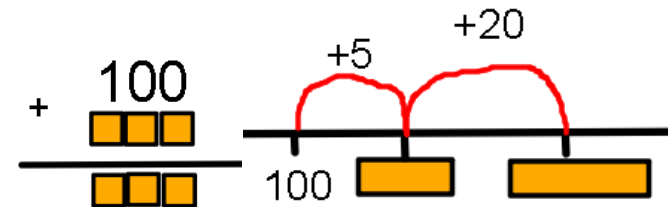
Bert is working on using a formal method to solve $101 + 14$.

He doesn't understand how the vertical method matches using a number line.

Can you provide some top tips to help him understand how the methods relate?

Greater Depth Challenge:

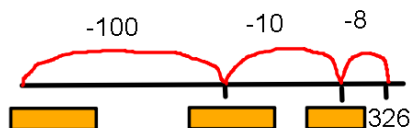
What digits should be in the empty boxes?
Can you explain your strategy for working them out?



Greater Depth Challenge:

What digits should go in the missing boxes?
How do you know?

$$\begin{array}{r} 326 \\ - \\ \hline \end{array} = \begin{array}{r} 300 + 20 + 6 \\ - + + \\ \hline + + \end{array}$$



Greater Depth Challenge:

How would you represent $998 + 12$ using a column method?

Now how would you show it on a number line? Using dienes?

Which would you say is easiest to demonstrate what is happening to a younger child?

Learning focus

Use an expanded layout that underpins the standard written method, recognising that the digits are always worked from smallest to largest.

Greater Depth Challenge:

Hundreds	Tens	Ones
9	2	1
+	8	2

Annie is using an expanded layout

to solve **921 + 82**.

She says "I should add the hundreds column first because 9 is the largest value digit." Do you agree or disagree? Why?

Greater Depth Challenge:

1	0	1	=	100	+	60	+	1
+	6	9	=	600	+	90	+	2
				700 + 150 + 3 = ?				

Katy is looking at this calculation. She thinks it doesn't matter which column you start adding from? Do you agree with her? Can you give her an example which might help her to change her mind?

Greater Depth Challenge:

9	9	5	=	900	+	90	+	5
-	3	3	=	300	+	30	+	9
				600 + 50 + 6 = ?				

Ali is looking at this calculation. He thinks you could easily start subtracting from either the hundreds column or the ones column.

Can you explain, using this example, which column you would start from and why?

Greater Depth Challenge:

Hundreds	Tens	Ones
7	7	6
-	2	1
5		
	6	1

Joe explains how he calculated the equation.

"First I subtracted the hundreds column because that's the greatest value column. Then I did the tens and then when I got the ones I can't do 6-7 so I just did 7-6. Simple"

Do you think he is right? What errors did he make? How can you explain that?

Learning focus

- Understand that, in subtraction, numbers need to be partitioned if the lower number is larger than the upper number in the same column, e.g., $75 - 28$: partition 75 into $60 + 15$ to subtract 8 from 15, etc.
- Recognise the place value of digits when subtracting, e.g., in the tens column although we say 9 subtract 3 we really mean 90 subtract 30.

Greater Depth Challenge:

$$\begin{array}{r} 75 = _ 70 + 5 \\ - 28 = _ 20 + 8 \\ \hline \end{array}$$

Annie says that there is no way to solve this problem using a formal method because 5 is smaller in value than 8.

Can you show her how this would work? What top tips do you have to explain?

Greater Depth Challenge:

$$\begin{array}{r} 75 = \cancel{70} + \square \\ - 28 = \square + 8 \\ \hline 40 + 7 = \square \end{array}$$

What are the missing digits?

How can you prove it?

Greater Depth Challenge:

$$\begin{array}{r} 9\square = \cancel{90} + \square \\ - \square 8 = \square + 8 \\ \hline 60 + 4 = \square \end{array}$$

What is the missing numbers?

How can you prove it?

Greater Depth Challenge:

Hundreds	Tens	Ones
7	7	5
-	2	1
<hr/>		
5	6	2

Matt is explaining to his teacher what each column is showing.

He says:

"You do 5 - 3 then 7 - 1 and then 7 - 2."

His teacher isn't very happy with his explanation. Can you explain why? How would you improve the explanation?

Addition and Subtraction: Estimate the answer to a calculation and use inverse operations to check answers.

Learning focus	<ul style="list-style-type: none"> 🔗 Use approximation to estimate an answer 🔗 Begin to check addition and subtraction with a calculation that uses the inverse operation.
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Greater Depth Challenge:

Always, sometimes or never?

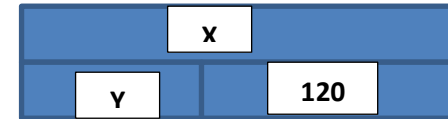
If you know that $109 + 34 = 143$

Then you can also prove that this is not correct:

$$143 - 34 = 108.$$

How?

Greater Depth Challenge:



What could X and Y be?

What different number sentences could you create?

Greater Depth Challenge:

Sally says that *"950 – 420 is 800."*

Sam says "That can't possibly be right!"

How can you prove Sam is right by using estimating?

You can't use a formal method to prove this!

Greater Depth Challenge:

Look at the equation **$463 + 495 = 958$**

Which approximation would you do mentally to check the reasonableness of the answer?

$400 + 400$

$470 + 500$

$500 + 500$

$450 + 500$

Addition and Subtraction: solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction

Learning focus	<ul style="list-style-type: none"> 🔍 Find all possibilities problems 🔍 Use and apply addition and subtraction, including inverse operations 🔍 Solve missing number problems
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Greater Depth Challenge:

For her party, Alisha spent £2.88 on apples, £3.39 on bananas and £3.76 on oranges. Will a £10 note be enough to pay for all these items?

Greater Depth Challenge:

Consecutive numbers are numbers which follow each other in order e.g. 12, 13, 14.

Which numbers up to 150 can you make by adding three consecutive numbers?

E.g. $34, 35, 36 = 105$

Greater Depth Challenge:

Using the numbers:

32 45 78 83

Can you complete the statements?

$$? + ? = 115$$

$$? - ? = 32$$

Greater Depth Challenge:

How many different ways can you complete this number sentence?

$$7\square\square + \square\square 8 = 1\square\square\square$$