Autumn Block 2

Addition and subtraction

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Small steps

Step 1	Apply number bonds within 10
Step 2	Add and subtract 1s
Step 3	Add and subtract 10s
Step 4	Add and subtract 100s
Step 5	Spot the pattern
Step 6	Add 1s across a 10
Step 7	Add 10s across a 100
Step 8	Subtract 1s across a10

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Small steps

Step 9	Subtract 10s across a 100
Step 10	Make connections
Step 11	Add two numbers (no exchange)
Step 12	Subtract two numbers (no exchange)
Step 13	Add two numbers (across a 10)
Step 14	Add two numbers (across a 100)
Step 15	Subtract two numbers (across a 10)
Step 16	Subtract two numbers (across a 100)

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Small steps

Step 17	Add 2-digit and 3-digit numbers
Step 18	Subtract a 2-digit number from a 3-digit number
Step 19	Complements to 100
Step 20	Estimate answers
Step 21	Inverse operations
Step 22	Make decisions

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Apply number bonds within 10

Notes and guidance

In Year 2, children learnt to add and subtract two 2-digit numbers, including with exchanges. Throughout this block children build on that knowledge, working towards adding and subtracting 2-digit and 3-digit numbers with exchanges. To be successful with this, it is essential that children are confident in both using and applying their number bonds to and within 10 and this small step provides opportunity to consolidate this.

By the end of this small step, children should be more confident at recalling all the number bonds up to 10 in a variety of contexts. They will then apply this knowledge to number bonds to 100, for example: 3 + 2 = 5, so 30 + 20 = 50

Children use a variety of representations, including base 10, place value counters, double-sided counters, number lines, part-whole models and bar models.

Things to look out for

- Instead of recalling number facts, children may continue to rely on using fingers or manipulatives to add two numbers together.
- When using related facts of bonds to 10 to find bonds to 100, children may not increase all three numbers by a factor of 10

Key questions

- Which is the whole and which are the parts?
- What needs to be added to this part to make the whole?
- If you take this part from the whole, what will be left?
- Where would this number go in the part-whole model?
- What other number facts do you know if you know this?
- If you multiply both parts by 10 then add them together, what happens to the whole?

Possible sentence stems

- If the whole is _____ and one part is _____, then the other part is _____
- _____ + _____ = 10, so _____ + _____ = 100
- If I know that _____ + _____ = _____, then I also know ...

National Curriculum links

- Add and subtract numbers mentally, including:
  - a 3-digit number and ones
  - a 3-digit number and tens
  - a 3-digit number and hundreds

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Apply number bonds within 10

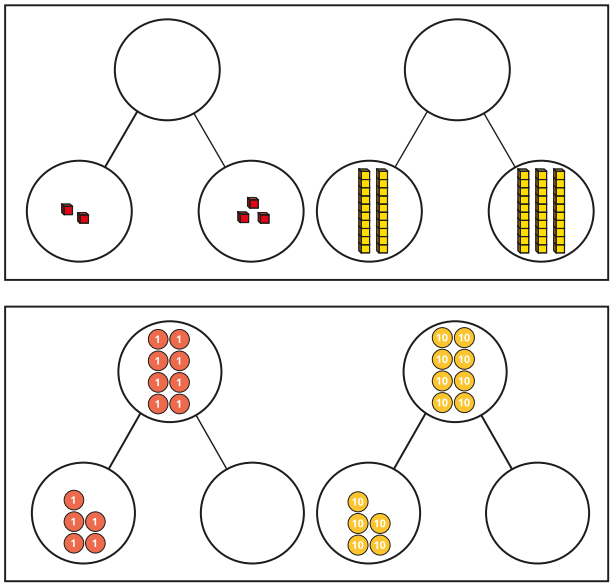
Key learning

- Annie has 9 double-sided counters.

She turns over one counter and sees the number fact 8 + 1 = 9

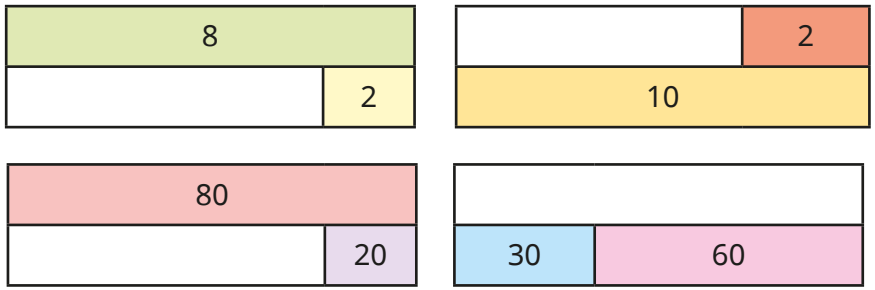
What other number facts are there for the number 9?

- Complete each pair of part-whole models.



Write a number sentence for each part-whole model.

- Complete the bar models.



Write the fact family for each bar model.

- Complete the addition facts.
  - 2 + _____ = 5
  - _____ + 4 = 7
  - _____ = 6 + 3
  - 4 + _____ = 9
  - 50 + 30 = _____
  - 70 = 20 + _____

Write two subtraction facts for each addition fact.

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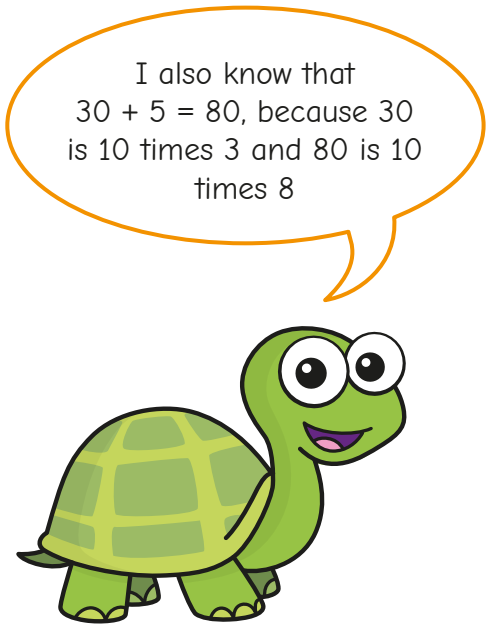
Apply number bonds within 10

Reasoning and problem solving

Tiny knows that 3 + 5 = 8

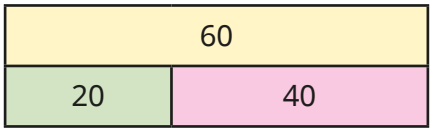


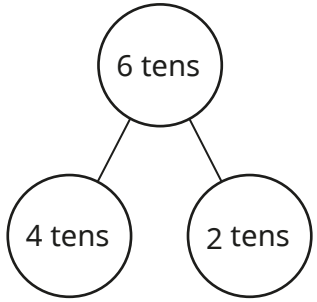
Is Tiny correct?

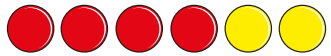
Explain your answer.

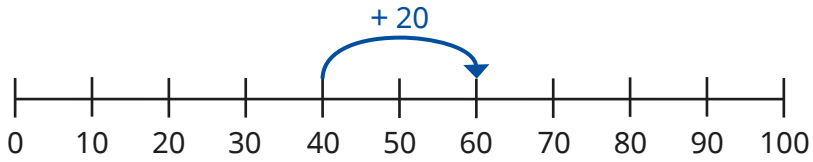
No

Which is the odd one out?









Explain your answer.

The odd one out is the counters.

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Add and subtract 1s

Notes and guidance

In Year 2, children mentally added and subtracted 1s to and from a 2-digit number. In this small step, this skill is developed and extended to include 3-digit numbers.

At this stage of the block, there are no exchanges and therefore the tens and hundreds columns do not change. Using a place value chart alongside their calculations, children see that when 1s are added to or subtracted from a 3-digit number, the ones column changes every time.

Although the examples in this small step involve a change to the ones column only, it is worth asking the question, "Do you have enough ones to make an exchange?" This provides opportunity to reinforce the fact that 1 ten is made up of 10 ones, and since none of the ones columns in this step have more than 9 ones, there are no exchanges, so the tens and hundreds columns do not change.

Things to look out for

- Children may add to or subtract from the incorrect column in a number, for example 123 + 1 = 223
- Children may incorrectly adjust a known number fact when one number is increased by 1, for example 57 – 5 = 52, so 57 – 6 = 53; children may assume that because 5 has increased by 1, the answer should too.

Key questions

- What happens to any number when you add a 1-digit number?
- What happens to any number when you subtract a 1-digit number?
- Which columns change in a number when you add or subtract a 1-digit number?
- Will more than one column ever change?

Possible sentence stems

- _____ ones plus/minus _____ ones is equal to _____ ones.
- When adding or subtracting 1s to or from a number, the digit in the _____ column always changes.
- If I know 3 + 6 = 9, then I know that 123 + 6 = _____

National Curriculum links

- Add and subtract numbers mentally, including:
  - a 3-digit number and ones
  - a 3-digit number and tens
  - a 3-digit number and hundreds

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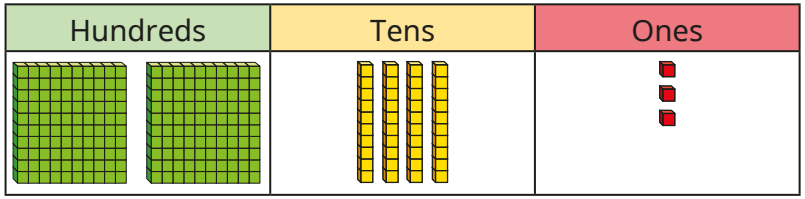
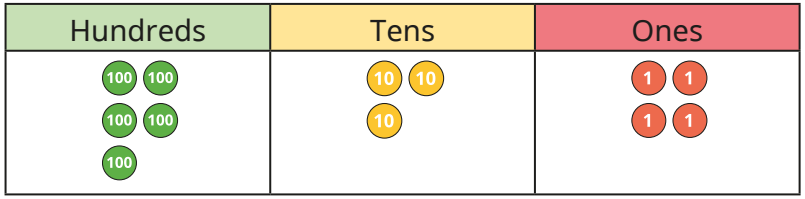
Add and subtract 1s

Key learning

- Use the place value charts to help you work out the calculations.
  - 243 + 5 = _____



  - 534 – 2 = _____



- Complete the table.

  One has been done for you.

– 3	Number	+ 3
290	293	296
	294	
	295	
	296	

- Continue the pattern.

258 = 251 + 7

257 = 251 + _____

256 = 251 + _____

255 = 251 + _____

254 = 251 + _____

253 = 251 + _____

252 = 251 + _____

251 = 251 + _____

Work with a partner.

Create your own pattern using a different number fact.

- Write <, > or = to compare each pair of number facts.

345 + 4 ◯ 349 – 5

825 + 3 ◯ 823 + 2

101 + 5 ◯ 109 – 2

467 – 1 ◯ 467 – 2

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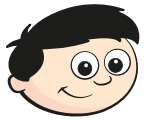
Add and subtract 1s

Reasoning and problem solving

Dexter and Whitney are adding 1s.



Dexter

When adding any 1-digit number to any 3-digit number, the answer will always be even.

Whitney

No, the answer will always be odd.

Who do you agree with?

Explain your answer.

Both are incorrect.

Huan and Dani each have 252 stickers.

Huan is given an extra 6 stickers.

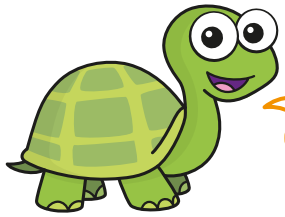
Dani is given an extra 7 stickers.

Who has more stickers?

Is there more than one way of working it out?

Dani

Tiny is working out an addition.



253 + 3 = 283

What mistake has Tiny made?

Tiny has added 3 tens instead of 3 ones.

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Add and subtract 10s

Notes and guidance

Building on the small step in Year 2, when children added or subtracted 10s to and from a 2-digit number, children now extend this learning to 3-digit numbers. In this step, this does not require any crossing of the next or previous hundred.

Children use a range of models and representations, including place value charts, to explore the effect of adding or subtracting multiples of 10. Children should see that in these examples only the tens column changes, with the hundreds and ones columns remaining the same.

It is also important to highlight to children how they can use number bonds both to and within 10 to support this step. For example, 2 + 3 = 5, so 20 + 30 = 50. Using the language of "2 ones/tens plus 3 ones/tens is equal to 5 ones/tens" can support this.

Things to look out for

- Children may identify the incorrect place value column, particularly if using plain counters in a place value chart, for example 230 + 20 = 430 or 232
- Children may not understand placeholders, for example 736 – 30 = 706, not 76

Key questions

- What is the value of the digit _____ in the number _____?
- How many tens are there in _____?
- How many tens are you adding/subtracting?
- Will the value in the tens column increase or decrease? By how much?
- Which place value columns have changed/stayed the same?
- If you know 7 ones minus 3 ones is equal to 4 ones, then what is 7 tens minus 3 tens?
- What is the inverse of adding/subtracting _____?

Possible sentence stems

- There are _____ hundreds, _____ tens and _____ ones.
- _____ tens plus/minus _____ tens is equal to _____ tens.
- The tens column will increase/decrease by _____

National Curriculum links

- Add and subtract numbers mentally, including:
  - a 3-digit number and ones
  - a 3-digit number and tens
  - a 3-digit number and hundreds

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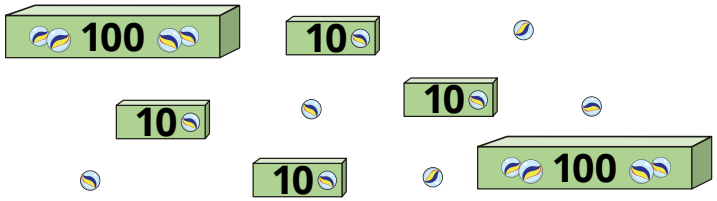
Add and subtract 10s

Key learning

- Aisha has some marbles.



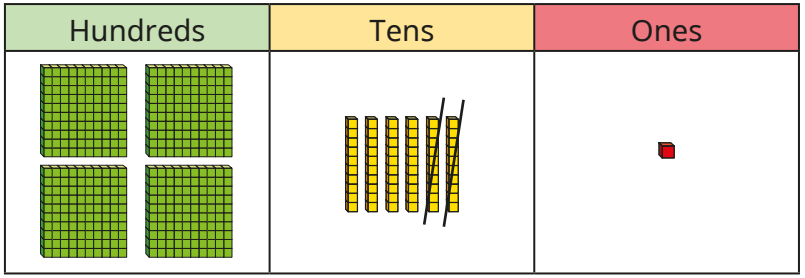
She buys 10 more marbles.

How many marbles does she have now?

How many marbles will Aisha have if she buys another:

- 20 marbles
- 30 marbles
- 40 marbles
- 50 marbles?

- Brett uses a place value chart and base 10 to work out 461 – 20

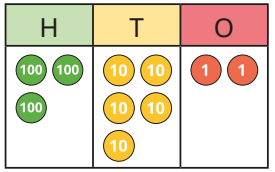


Use Brett's method to work out the subtractions.

461 – 30	561 – 30	561 – 60

What do you notice?

- Complete the table.

– 10	Number	+ 10
		
		
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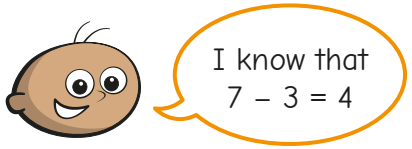
What would happen if the headings in the table changed to – 20 and + 20?

- 

How can Tommy use this fact to work out 879 – 30?

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Add and subtract 10s

Reasoning and problem solving

Tiny is working out a subtraction.

H	T	O
100 100 100 100 100	10 10 10 10	1 1 1 ~~1~~ ~~1~~ ~~1~~

What mistake has Tiny made?

What is the correct answer?

Tiny has subtracted 3 ones rather than 3 tens.

516

Ron makes a 3-digit number using the digit cards.

5	7	9

Ron subtracts 50 from his 3-digit number.

What number could Ron have now?

529 547

709 745

907 925

Fill in the missing digits.

452 – __0 = 422

2__3 + 40 = 273

5__5 – 90 = 505

452 – 30 = 422

233 + 40 = 273

595 – 90 = 505

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Add and subtract 100s

Notes and guidance

Building on the previous small steps, children now explore adding and subtracting multiples of 100. This will not require any crossing of the thousands.

Again, children use a range of models and representations, including place value charts, to explore the effect of adding or subtracting multiples of 100. Children recognise from the examples in this small step that only the hundreds place value column changes and the tens and ones columns remain the same.

It is also important to highlight to children how they can use number bonds to and within 10 to support in this step. For example, 8 – 5 = 3, so 800 – 500 = 300. Using the language of "8 ones/hundreds subtract 5 ones/hundreds is equal to 3 ones/hundreds" can support this.

Things to look out for

- Children may identify the incorrect place value column, particularly if using plain counters in a place value chart, for example 469 – 300 = 439 or 466
- If they are left with zero hundreds, for example 736 – 700, children may write 036. It is important to address why they do not require the leading zero.

Key questions

- What is the value of the digit _____ in the number _____?
- How many hundreds are there in _____?
- How many hundreds are you adding/subtracting?
- Will the value in the hundreds column increase or decrease? By how much?
- Which place value columns have changed/stayed the same?
- If you know 3 + 4 = 7, what is 300 + 400?
- What is the inverse of adding/subtracting _____?

Possible sentence stems

- There are _____ hundreds, _____ tens and _____ ones.
- _____ hundreds plus/minus _____ hundreds is equal to _____ hundreds.
- The hundreds column will increase/decrease by _____

National Curriculum links

- Add and subtract numbers mentally, including:
  - a 3-digit number and ones
  - a 3-digit number and tens
  - a 3-digit number and hundreds

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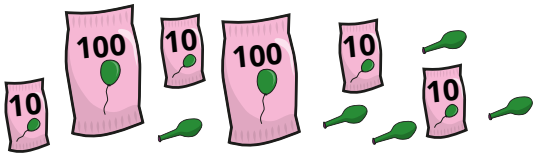
Add and subtract 100s

Key learning

- Kim has some balloons.



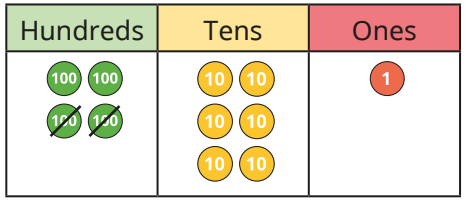
She buys 100 more balloons.

How many balloons does she have now?

How many balloons will Kim have if she buys another:

- 200 balloons
- 300 balloons
- 400 balloons
- 500 balloons?

- Filip uses place value counters and a chart to work out 461 – 200

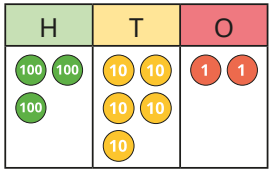


Use Filip's method to work out the subtractions.

461 – 300	561 – 300	561 – 500

What do you notice?

- Complete the table.

– 300	Number	+ 300
		
		
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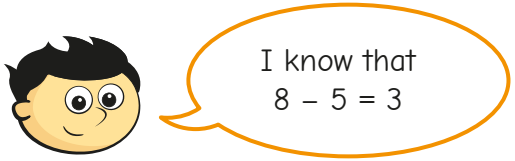
- 

How can Jack use this fact to calculate 894 – 500?

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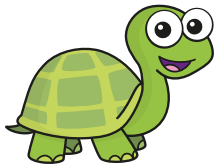
Add and subtract 100s

Reasoning and problem solving

When I subtract a multiple of 100 from a 3-digit number, the answer will always be a 3-digit number.



Do you agree with Tiny?

Explain your answer.

No

Write <, > or = to complete the statements.

976 – 300 ◯ 976 – 500

231 – 200 ◯ 231 + 100

642 – 300 ◯ 42 + 300

>

<

=

Start

378	+ 100	+ 200	– 200	+ 300
– 100	+ 300	– 500	+ 100	– 100
+ 500	– 300	+ 200	+ 200	– 100
– 200	+ 100	+ 100	– 100	+ 200
– 100	+ 300	– 500	+ 200	**778**

Finish

Find a path from the start to the finish so that your end number is 778

Is there more than one path?

What if the finish number is 578?

for example:

Start

378	+ 100	+ 200	– 200	+ 300
– 100	+ 300	– 500	+ 100	– 100
+ 500	– 300	+ 200	+ 200	– 100
– 200	+ 100	+ 100	– 100	+ 200
– 100	+ 300	– 500	+ 200	**778**

Finish

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Spot the pattern

Notes and guidance

In this small step, children consolidate their learning from the previous three steps, exploring the effect of adding or subtracting 1s, 10s or 100s to or from any 3-digit number. As with the examples in previous steps, there are no exchanges.

Children explore what changes and what stays the same when adding multiples of 1, 10 or 100, for example: "If we add/subtract 10s, only the tens place value column changes." It is important to highlight why this is the case, by noting that the additions in this step always use bonds of less than 10, 100 or 1,000; in the subtractions, the digits in the number subtracted are always smaller than digits in the original number.

Children also explore performing multiple calculations to a starting number using a combination of the skills covered in the previous steps. Function machines are a useful representation.

Things to look out for

- Children may identify the incorrect place value column, particularly if using plain counters in a place value chart, for example 469 – 300 = 439 or 466
- Children need to be confident with placeholders left in columns after a subtraction, for example knowing that 736 – 30 = 706, not 76

Key questions

- What is the value of the digit _____ in the number _____?
- Will the value in the ones/tens/hundreds column increase or decrease? By how much?
- Which place value columns have changed/stayed the same? Why?
- If you know 3 + 4 = 7, what else do you know?
- What is the inverse of adding/subtracting _____?
- Will you get the same result if the operations are performed in a different order?

Possible sentence stems

- There are _____ hundreds, _____ tens and _____ ones.
- _____ ones/tens/hundreds plus/minus _____ ones/tens/hundreds is equal to _____ ones/tens/hundreds.
- The ones/tens/hundreds column will increase/decrease by _____

National Curriculum links

- Add and subtract numbers mentally, including:
  - a 3-digit number and ones
  - a 3-digit number and hundreds
  - a 3-digit number and tens

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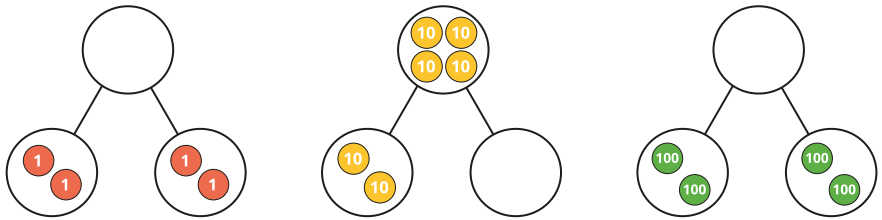
Spot the pattern

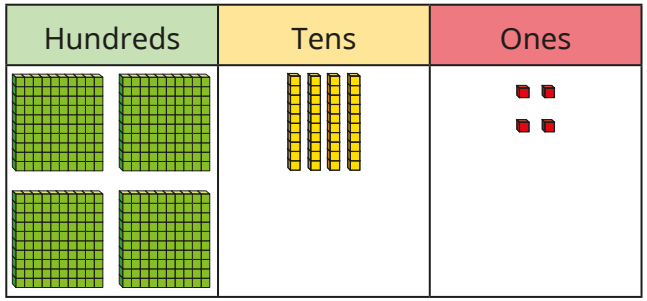
Key learning

- Complete the part whole models.



What do you notice?

-



Use the place value chart to help you complete the number sentences.

- 444 + 3 = _____
- 444 – 3 = _____
- 444 + 30 = _____
- 444 – 30 = _____
- 444 + 300 = _____
- 444 – 300 = _____

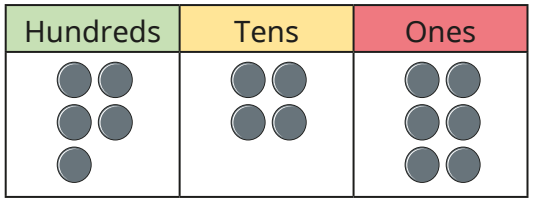
What do you notice? What stays the same and what changes?

-

Use Tiny's fact to complete the number sentences.

- 20 + 50 = _____
- 500 + 200 = _____
- 7 – _____ = 2
- 70 – _____ = 50
- 70 = _____ + 50
- _____ = 700 – 200

-

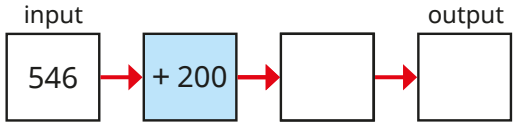


Nijah adds 2 counters to the hundreds column.

She then takes 4 counters from the tens column.

What number does Nijah now have?

Complete the function machine to show Nijah's calculations.



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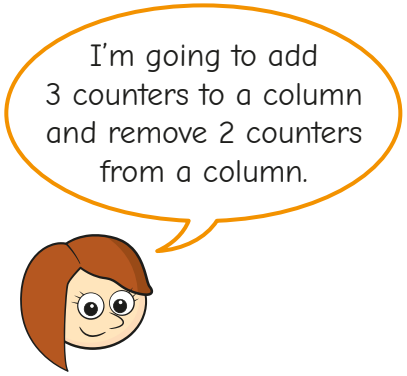
Spot the pattern

Reasoning and problem solving

Rosie makes this number in a place value chart.

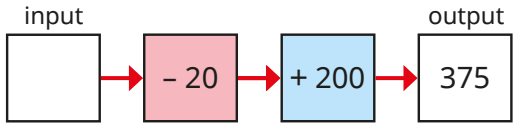
Hundreds	Tens	Ones
100 100	10 10 10 10 10 10	1 1 1 1

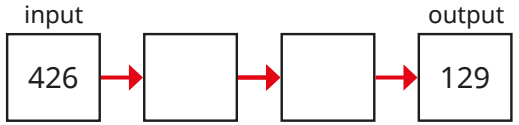


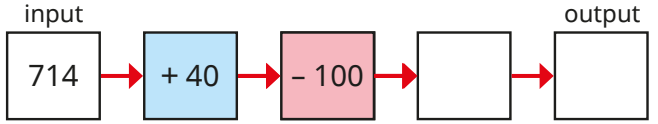
What number could Rosie have now?

544	562	364
292	274	94
265	247	67

Complete the function machines.







Is there more than one way each set of machines can be completed?

195

+ 3, – 300 or – 300, + 3

for example: + 1, 655; + 20, 674

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Add 1s across a 10

Notes and guidance

In Year 2 addition and subtraction, children explored strategies to add 1-digit numbers to a 2-digit number crossing 10. Children build on this to add a 1-digit number to a 3-digit number.

Children may initially rely on counting on in 1s, but the aim of this step is to build towards mental strategies for crossing the 10

It is vital that children are fluent in bonds to 10, so that they are able to identify the jump to the next multiple of 10. They also need to be fluent in their bonds within 10 to allow them to flexibly and efficiently partition numbers to work out how much further they need to jump from a multiple of 10

Number lines are a useful representation to model the process of jumping to and from the next multiple of 10

Things to look out for

- Children need to be able to identify the next multiple of 10
- Children may not be able to fluently partition a 1-digit number to work out how much further they need to jump from the multiple of 10
- Children may rely on counting on in 1s or using fingers, rather than using more efficient strategies to jump to and from the next multiple of 10

Key questions

- What is the next multiple of 10 after _____?
- How can you partition _____?
- What number do you add to _____ to make 10?
- What is the jump from _____ to the next multiple of 10?
- If _____ is a part/jump, what is the other part/jump _____?
- Which columns have changed/stayed the same?
- Which method do you prefer?

Possible sentence stems

- The next multiple of 10 after _____ is _____
- _____ can be partitioned into _____ and _____
- I need to add _____ to get to the next 10, and then add another _____

National Curriculum links

- Add and subtract numbers mentally, including:
  - a 3-digit number and ones
  - a 3-digit number and tens
  - a 3-digit number and hundreds

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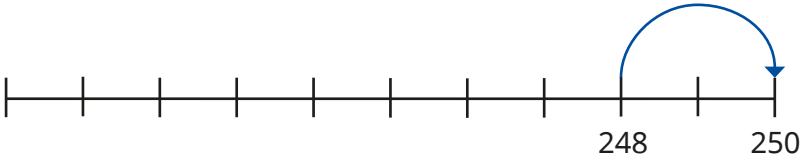
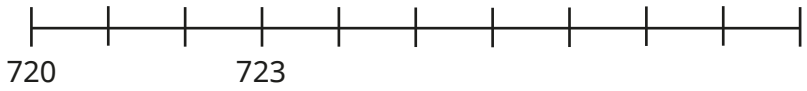
Add 1s across a 10

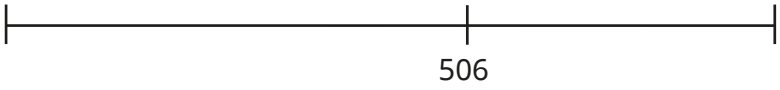
Key learning

- Work out the additions.
  - 237 + 1
  - 237 + 2
  - 237 + 3
  - 237 + 4
  - 237 + 5

- Use the number lines to find the jump to the next multiple of 10





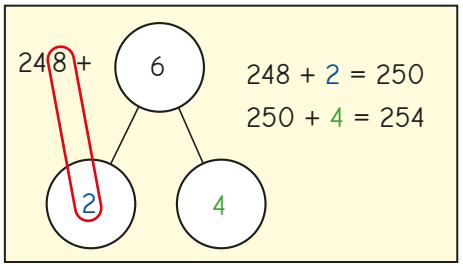


- Work out the additions.

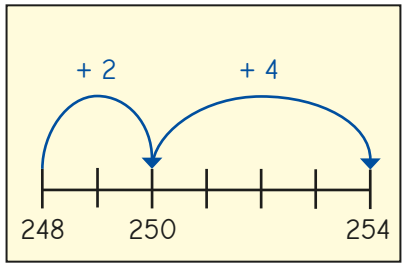
250 + 3	730 + 1	510 + 5
248 + 5	723 + 8	506 + 9

- Tom and Mo are working out 248 + 6

Tom



Mo



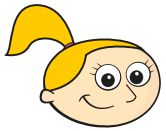
Talk about each method with a partner.

Whose method do you prefer?

Use that method to work out the additions.

248 + 9	638 + 3	579 + 6	589 + 4

- Eva is working out 856 + 7



I know that
6 + 7 = 13, so my tens will increase by 1 and I will have 3 ones.
856 + 7 = 863

Use Eva's method to work out the additions.

865 + 5	438 + 4	713 + 9	564 + 8

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Add 1s across a 10

Reasoning and problem solving

Here are four digit cards.

2	5	7	9

Use three of the digits to complete the addition in as many different ways as you can.

3			+	

Find all the possible totals.

In which additions did you need to cross a 10?

totals without crossing:

359, 377, 397, 399

totals with crossing:

332, 334, 336, 361, 366, 381, 384, 402

Is the statement always, sometimes or never true?

> When 7 and 5 are added together in the ones column, the digit in the ones column of the answer will always be 2

Explain your answer.

always true, because 5 + 7 = 12

Which additions are harder to work out?

234 + 3	506 + 8
455 + 7	521 + 6

Talk about your answer with a partner.

multiple possible answers, e.g.

455 + 7 and 506 + 8, because they cross a 10

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Add 10s across a 100

Notes and guidance

Children build on previous steps to add multiples of 10 to any 3-digit number where they are required to cross the next hundred. This small step focuses on mental strategies.

It is vital that children are fluent in their bonds to 100 so that they are able to identify the jump to the next multiple of 100. They also need to be fluent in their bonds within 100, for example 70 = 30 + 40, to allow them to efficiently and flexibly partition numbers to work out how much further they need to jump after reaching the next 100

It is important to explore with children which place value columns always/sometimes/never change when adding a multiple of 10

Things to look out for

- Children may find it difficult to add 10s over a hundred boundary.
- Children may need help to identify the next multiple of 100 and how far away it is.
- Children may not be able to fluently partition a multiple of 10 to work out how much further they need to jump from the next 100
- Children may omit the ones digit in the answer, for example writing 278 + 60 = 330

Key questions

- What is the next multiple of 100 after _____?
- How can you partition _____?
- What number do you add to _____ to make 100?
- If _____ is a part/jump, what is the other part/jump?
- Which columns have changed/stayed the same?
- Does the _____ column always/sometimes/never change?
- Which method is more efficient? Which method do you prefer?

Possible sentence stems

- _____ can be partitioned into _____ and _____
- The next multiple of 100 after _____ is _____
- I need to add _____ to cross the next 100, and then add another _____

National Curriculum links

- Add and subtract numbers mentally, including:
  - a 3-digit number and ones
  - a 3-digit number and tens
  - a 3-digit number and hundreds

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Add 10s across a 100

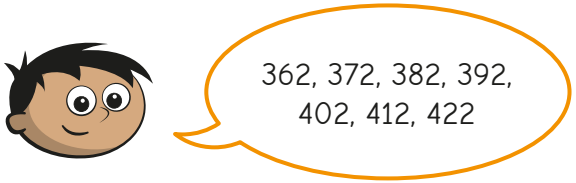
Key learning

- Complete the number tracks.

260	270		290			320	

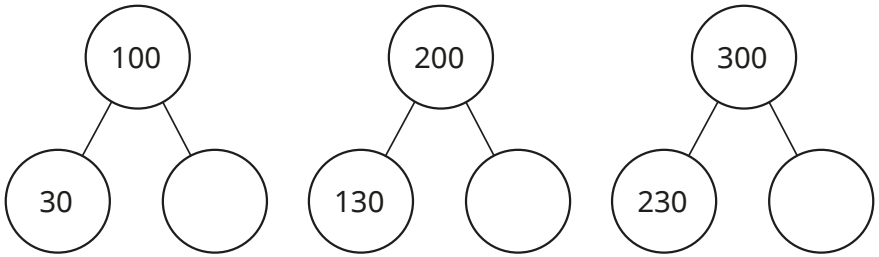
268		288	298				338

- Amir is working out 352 + 70 by counting on in 10s.



Use Amir's method to find 564 + 80

- Complete the part-whole models.

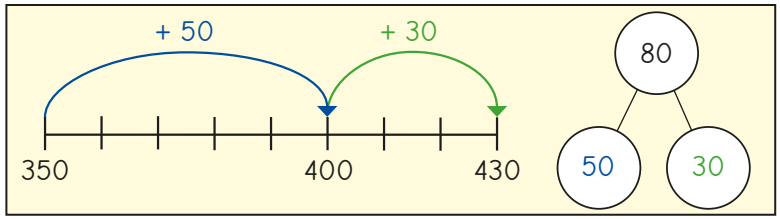


What do you notice?

- Find the missing numbers.

350 + _____ = 400	280 + _____ = 300	830 + _____ = 900
352 + _____ = 402	283 + _____ = 303	839 + _____ = 909

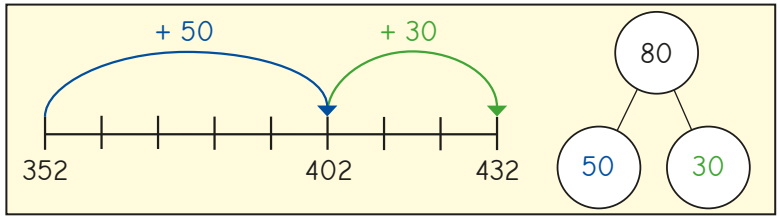
- Dora is working out 350 + 80



Use Dora's method to work out the additions.

240 + 80	690 + 80	690 + 40	90 + 830

- Scott uses a similar method to work out 352 + 80



Use Scott's method to work out the additions.

248 + 80	695 + 80	297 + 30	90 + 237

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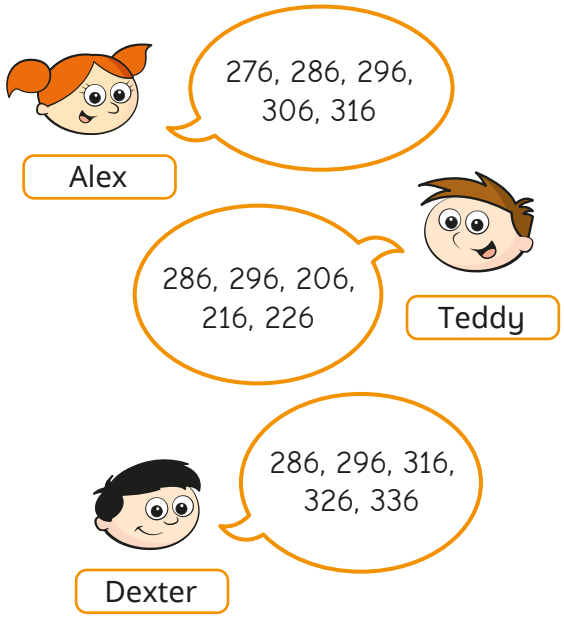
Add 10s across a 100

Reasoning and problem solving

Alex, Teddy and Dexter are working out 276 + 50 by counting on in 10s.

They have each made a different mistake.



What mistakes have they made?

What is the correct answer?

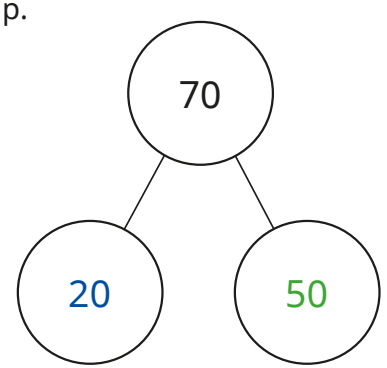
Alex has included 276, the start number.

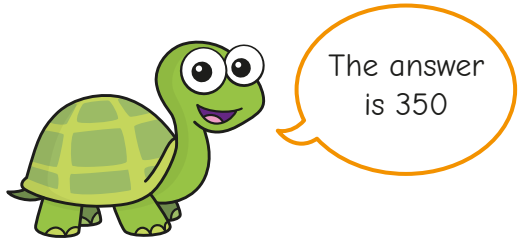
Teddy has not counted into the next hundred correctly.

Dexter has missed 306

326

Tiny is working out 284 + 70 using the part-whole model to help.





What mistake has Tiny made?

Work out the correct answer.

Tiny has partitioned 70 correctly and added the tens correctly, but has forgotten to include the ones.

354

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Subtract 1s across a 10

Notes and guidance

In Year 2, children covered strategies to subtract a 1-digit number from a 2-digit number crossing a 10. Children build on this, working towards subtracting a 1-digit number from a 3-digit number. They focus on mental strategies for crossing a 10

Children may start by counting back in 1s, but it is important to try to move towards the more efficient strategy of jumping to and from the previous multiple of 10

Children need to be fluent in their recall of number bonds to 10 and in applying them, so that they can subtract from a multiple of 10, for example 10 – 3 = 7, so 480 – 3 = 477. They also need to be fluent in their bonds within 10 to allow them to efficiently and flexibly partition numbers to work out how much further they need to jump back from a multiple of 10

Things to look out for

- Children may not be able to fluently partition a 1-digit number to work out how much further they need to jump back from the multiple of 10
- Children may rely on counting back in 1s or using fingers, rather than using more efficient strategies to jump to the previous multiple of 10

Key questions

- What is the previous multiple of 10 before _____?
- How can you partition _____?
- What is the jump from _____ to the previous multiple of 10?
- If _____ is a part/jump, what is the other part/jump _____?
- Which columns have changed/stayed the same?
- Which method do you prefer?

Possible sentence stems

- The previous multiple of 10 before _____ is _____
- _____ can be partitioned into _____ and _____
- I need to subtract _____ to get to the previous multiple of 10, then subtract _____ more.

National Curriculum links

- Add and subtract numbers mentally, including:
  - a 3-digit number and ones
  - a 3-digit number and tens
  - a 3-digit number and hundreds

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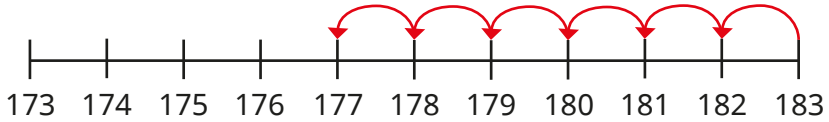
Subtract 1s across a 10

Key learning

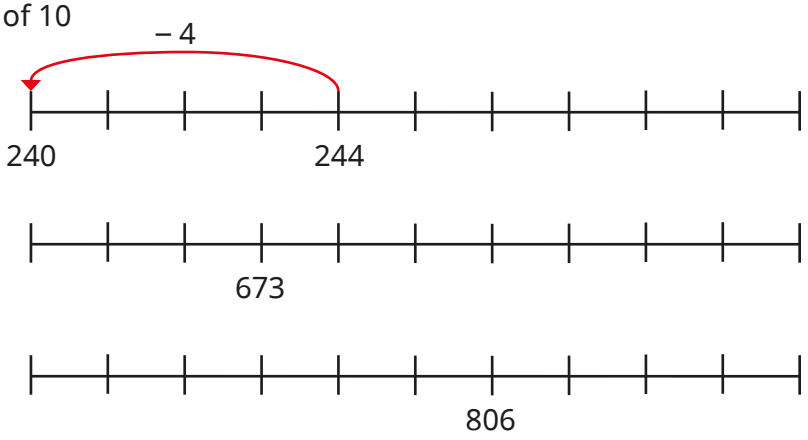
- Use the number line to work out 183 – 6



Use a number line to work out the subtractions.

683 – 6	623 – 6	481 – 7	682 – 5

- Use the number lines to find the jump to the previous multiple of 10

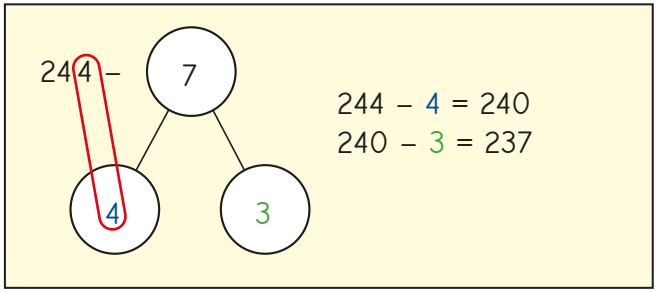


- Work out the subtractions.

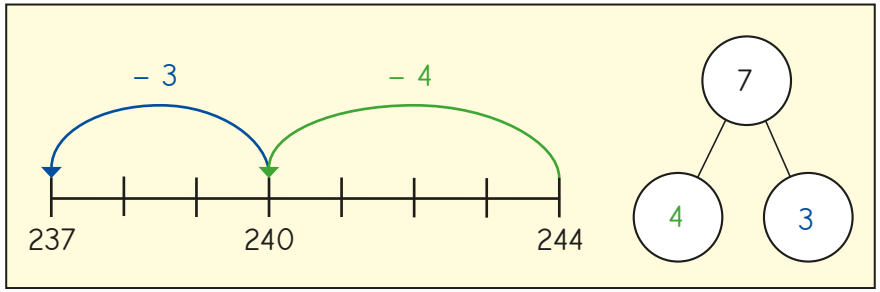
70 – 3	370 – 3	640 – 8	520 – 7

- Scott and Whitney are working out 244 – 7

Scott's method



Whitney's method



Whose method do you prefer?

Use that method to work out the subtractions.

242 – 9	633 – 7	171 – 6	581 – 4

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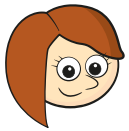
Subtract 1s across a 10

Reasoning and problem solving

Rosie, Annie and Ron are working out 234 – 9



Rosie: I started at 234 in my head and counted back in 1s.

Annie: I subtracted 10 and then added 1 back on.

Ron: I jumped back 4 to the previous 10 and then jumped back 5 more.

Use each method to work out the answer.

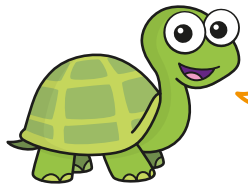
Whose method do you prefer?

225

164

1	2	3	4	5
6	7	8	9	

Tiny is subtracting each of the 1-digit numbers from 164



I will need to cross a 10 five times.

Do you agree with Tiny?

Explain your answer.

Yes

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Subtract 10s across a 100

Notes and guidance

Children extend their knowledge of subtracting 10s from any 3-digit number to include crossing a 100, using similar mental strategies to those covered in the previous small step.

Children may start by initially counting back in 10s, but it is important to try to move towards a more efficient strategy of jumping to and from the previous multiple of 100

Children need to be fluent in their bonds for multiples of 10 within 100 to allow them to efficiently and flexibly partition numbers to work out how much further they need to jump back from the multiple of 100, for example 50 = 30 + 20 and 40 + 10. Children also need to be fluent in their recall of number bonds to 100 and applying them so that they can subtract from a multiple of 100, for example 100 – 40 = 60, so 500 – 40 = 460 and 501 – 40 = 461

Things to look out for

- Children may not be able to fluently and flexibly partition a multiple of 10
- Children may rely on counting back in 10s, rather than using more efficient strategies.
- Children may forget to include the digit in the ones column in the answer, for example 732 – 50 = 680

Key questions

- What is the multiple of 100 before _____?
- How can you partition _____?
- What is the jump from _____ to the previous multiple of 100?
- If _____ is a part/jump, what is the other part/jump?
- Which columns have changed/stayed the same?
- Which method do you prefer? Which is more efficient?

Possible sentence stems

- The multiple of 100 before _____ is _____
- _____ can be partitioned into _____ and _____
- I need to subtract _____ to get to the previous multiple of 100, then subtract _____ more.

National Curriculum links

- Add and subtract numbers mentally, including:
  - a 3-digit number and ones
  - a 3-digit number and tens
  - a 3-digit number and hundreds

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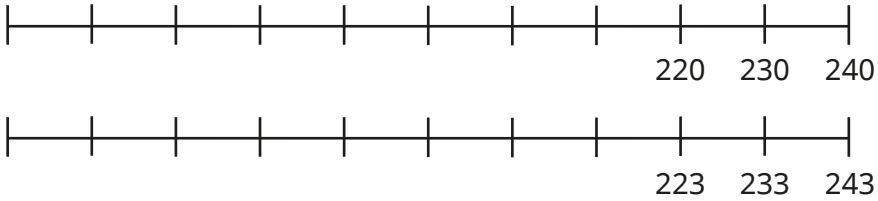
Subtract 10s across a 100

Key learning

- Complete the number lines by counting back in 10s.

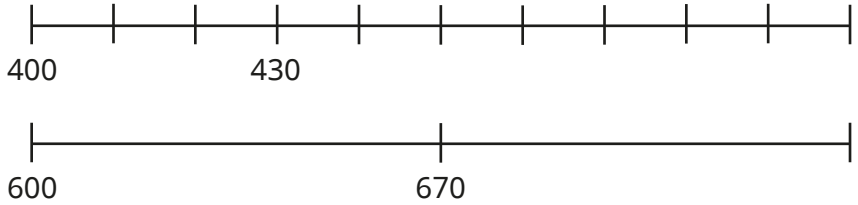


Use the number lines to work out the subtractions.

240 – 60	240 – 70	243 – 70	233 – 70

What do you notice?

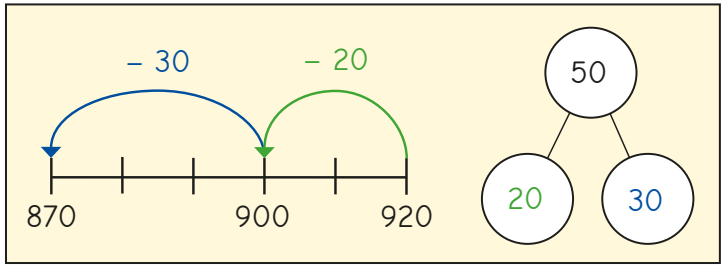
- Use the number lines to find the jump to the previous hundred.



- Work out the subtractions.

800 – 30	500 – 40	509 – 40	202 – 70

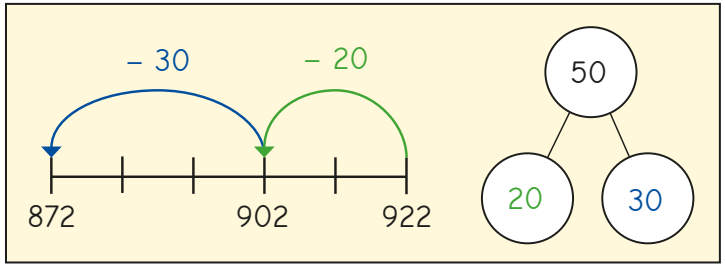
- Dani is working out 920 – 50



Use Dani's method to work out the subtractions.

320 – 50	320 – 70	340 – 70	580 – 90

- Huan is working out 922 – 50



Use Huan's method to work out the subtractions.

322 – 50	564 – 80	149 – 70	819 – 30

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Subtract 10s across a 100

Reasoning and problem solving

What mistake has Tiny made?

Tiny has subtracted 5 ones rather than 5 tens.

Complete the sentences with "always", "sometimes" or "never".

When I subtract a multiple of 10 from a 3-digit number, the ones column _____ changes.

When I subtract a multiple of 10 from a 3-digit number, the tens column _____ changes.

When I subtract a multiple of 10 from a 3-digit number, the hundreds column _____ changes.

never

always

sometimes

Here are some digit cards.

2	5	6	8

Use the digit cards to complete the subtraction in as many different ways as you can.

			–		0

How many times did you need to cross a 100?

Talk about it with a partner.

12 solutions include crossing a 100

12 solutions do not include crossing a 100

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Make connections

Notes and guidance

In this small step, children consolidate what they have learnt so far in this block by adding and subtracting 1s, 10s and 100s to/from 3-digit numbers, both with and without the need to cross a 10 or a 100

The focus is to develop number sense through explicitly exploring the connections between calculations. For example, if children know 5 + 7 = 12, then they also know that 12 – 5 = 7, 120 – 50 = 70 and 50 + 70 = 120

To support children in seeing these links, it is useful to use language such as "5 ones plus 7 ones is equal to 12 ones, so 5 tens plus 7 tens is equal to 12 tens." It is also vital that children have a strong understanding of the fact that 10 tens are equivalent to 1 hundred.

Things to look out for

- Children may not be confident with place value knowledge of 10 ones = 1 ten, 20 ones = 2 tens, 10 tens = 1 hundred and so on.
- Children may not be able to fluently and flexibly partition a multiple of 10 or 100
- Children may rely on counting on or back, or using written methods, rather than using more efficient strategies to jump to the next/previous multiple.

Key questions

- What is the multiple of 10/100 after _____?
- What is the multiple of 10/100 before _____?
- What is the jump from _____ to the next/previous multiple?
- If _____ is a part/jump, what is the other part/jump?
- Which columns have changed/stayed the same?
- Which method do you prefer? Which is more efficient?

Possible sentence stems

- _____ ones + _____ ones = _____ ones,
  so _____ ones – _____ ones = _____ ones
- _____ ones + _____ ones =_____ ones,
  so _____ tens + _____ tens = _____ tens

National Curriculum links

- Add and subtract numbers mentally, including:
  - a 3-digit number and ones
  - a 3-digit number and tens
  - a 3-digit number and hundreds

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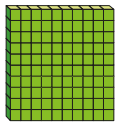
Make connections

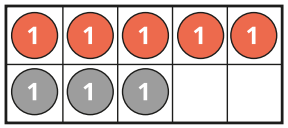
Key learning

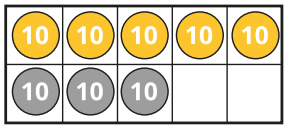
- Use base 10 to help you complete the sentences.

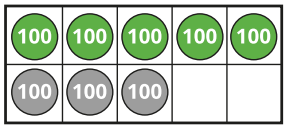
 = 1 hundred  = 1 ten = 1 one

- 10 ones = _____ ten
- 20 ones = _____ tens
- 30 ones = _____ tens
- 10 tens = _____ hundred
- 40 tens = _____ hundreds
- _____ tens = 6 hundreds

- Complete the addition sentences.



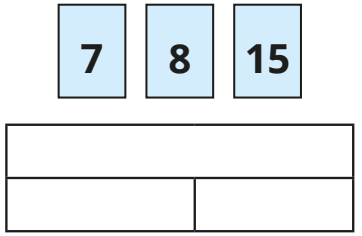


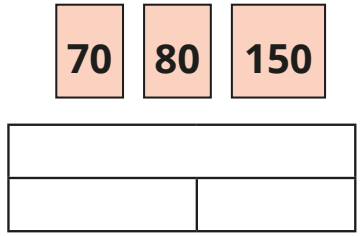


- 5 ones + 3 ones = _____ ones 5 + 3 = _____
- 5 tens + 3 tens = _____ tens 50 + 30 = _____
- 5 hundreds + 3 hundreds = _____ hundreds 500 + 300 = _____

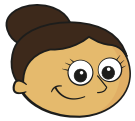
Write a subtraction number sentence for each ten frame.

- Use the number cards to complete the bar models.





Write the fact family for each bar model.

- 

I know that 13 – 6 = 7,
so I also know that 23 – 6 = 17
and 33 – 6 = 27

Use Dora's fact to work out the subtractions.

130 – 60	530 – 60	830 – 70	834 – 70

- 

I know that 90
is 10 away from 100, so
240 + 90 = 240 + 100 – 10

Use Mo's method to work out the calculations.

246 + 90	24 + 9	324 + 9	240 – 90	888 – 9

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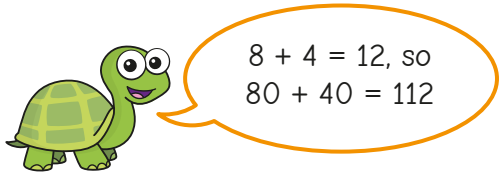
Make connections

Reasoning and problem solving



Do you agree with Tiny?

Explain your answer.

No

What could the missing number be?

263 + 60 < 319 + ☐ < 434 – 80

Find all the possible solutions.

any number between 5 and 34

Which number sentence is incorrect?

5 + 7 = 12	120 = 50 + 70
12 ones – 7 ones = 5 ones	
50 – 70 = 120	12 – 5 = 7
12 tens – 5 tens = 7 tens	

Write the correct sentence.

50 – 70 = 120

120 – 70 = 50 or
120 – 50 = 70 or
50 + 70 = 120

Tiny is working out the addition.

600 + 400

What has Tiny done well?

How could Tiny's answer be improved?

Tiny has found the correct number of hundreds, but 10 hundred is equal to 1,000

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Add two numbers (no exchange)

Notes and guidance

So far in this block, children have mentally added and subtracted 1s, 10s and 100s with 3-digit numbers. The focus now moves to written addition and subtraction. By the end of this small step, children will be able to add two numbers, either both 2-digit or both 3-digit, using the formal written method.

Children should be confident at placing 3-digit numbers into a place value chart before attempting to add and subtract numbers using the written method.

Base 10 and place value counters are used in a place value chart alongside the written method. No exchanges take place in this step, but it is a good idea to ask, "Do you have enough ones/tens to exchange for a ten/hundred?" as this will support their learning in future steps.

Things to look out for

- Children may not line the digits up correctly.
- Children may start adding from the hundreds or tens column, i.e. work from left to right – this will work in this small step, but should be avoided as it will not work when exchanges are required.
- Children may need help with placeholders when there are no tens or ones.

Key questions

- How can you represent the question using base 10?
- How can you put these numbers into a place value chart?
- Does it matter which columns you add together first?
- Do you have enough ones/tens to make an exchange?
- What do you put in the tens column if there are no tens?

Possible sentence stems

- _____ ones plus _____ ones is equal to _____ ones.
- _____ tens plus _____ tens is equal to _____ tens.
- _____ hundreds plus _____ hundreds is equal to _____ hundreds.
- _____ hundreds, _____ tens and _____ ones is equal to _____

National Curriculum links

- Add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction
- Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction

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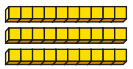
Add two numbers (no exchange)

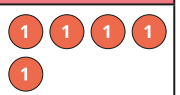
Key learning

- Find the sum of 34 and 23

	Tens	Ones
		
+		

	T	O
	3	4
+	2	3

- Find the sum of 345 and 432

	Hundreds	Tens	Ones
			
+			

	H	T	O
	3	4	5
+	4	3	2

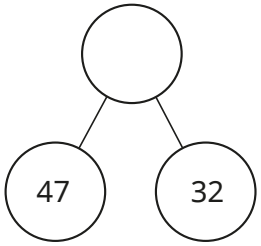
- Work out the additions.

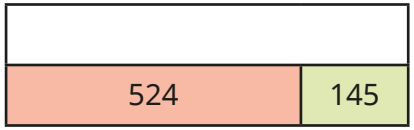
	T	O
	7	3
+	2	5

	H	T	O
	5	2	4
+	3	7	3

	H	T	O
	1	0	7
+	4	0	1

- Fill in the missing numbers.

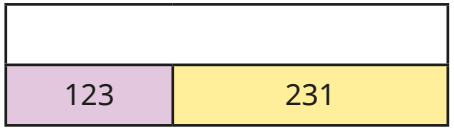




- Dora scores 123 points in a game.

  Ron scores 231 points in the same game.

  How many points do they score in total?



- 562 people go to a museum on Saturday.

  317 people go to the museum on Sunday.

  How many people altogether went to the museum at the weekend?

- The mass of a book is 145 g.

  A box is 230 g heavier than the book.

  What is the mass of the box?

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Add two numbers (no exchange)

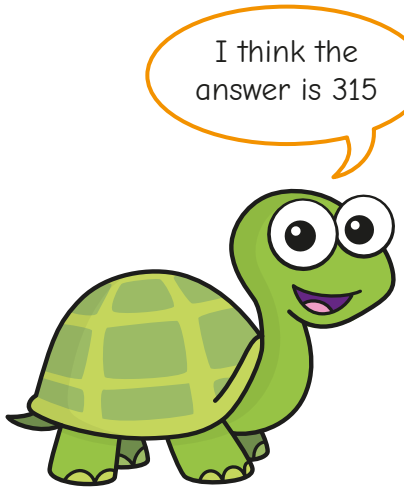
Reasoning and problem solving

Brett and Jack are playing a game.

Brett has 213 points.

Jack has 102 more points than Brett.

How many points do they have altogether?



What mistake has Tiny made?

528

Find the missing digits.

	2	3	+	4	5		=	6	7	9

What could the missing digits be?

	3	6	+		3	2	=	5	6	8

What could the missing digits be?

3	4	1	+	5	3		=	8	7	

2, 6

4, 1; 3, 2; 2, 3; 1, 4

1, 2; 2, 3; 3, 4; 4, 5; 5, 6; 6, 7; 7, 8; 8, 9

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Subtract two numbers (no exchange)

Notes and guidance

In the previous step, children used base 10 and place value counters in place value charts to add two 2-digit or 3-digit numbers. In this small step, they explore subtraction of 2-digit numbers and 3-digit numbers.

It is important that children continue to work with concrete resources alongside the formal written method. When using concrete resources, the key difference in this step is that they do not need to make the number they are subtracting, but instead physically remove it from the representation of the number they are subtracting from.

There are no exchanges in this step, but it is still worth asking the children, "Do you need to make an exchange?" in order to support future learning. The next few small steps involve addition and subtraction where exchanges are necessary.

Things to look out for

- Children may make the number incorrectly with base 10 or place value counters in a place value chart.
- Children may not line the digits up correctly in the formal written method.
- Children may physically create the second number (that is being subtracted), which could lead to confusion.

Key questions

- How can you put this number into a place value chart?
- Do you need to make both numbers before you can subtract?
- Does it matter which column you subtract from first?
- Do you have enough ones/tens to subtract _____ ones/tens?
- Do you need to make an exchange?
- Does it matter which number you write at the top when using the column method for subtraction?

Possible sentence stems

- _____ ones/tens/hundreds minus _____ ones/tens/hundreds is equal to _____ ones/tens/hundreds.
- Now there are _____ hundreds, _____ tens and _____ ones. The answer is _____

National Curriculum links

- Add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction
- Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction

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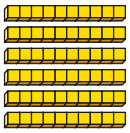
Subtract two numbers (no exchange)

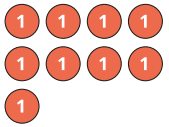
Key learning

- Work out 63 – 51

Tens	Ones
	

		T	O
		6	3
–		5	1

- Work out 769 – 147

Hundreds	Tens	Ones
		

		H	T	O
		7	6	9
	–	1	4	7

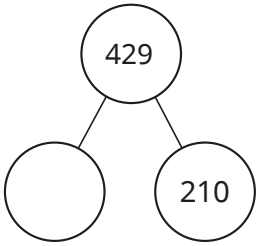
- Work out the subtractions.

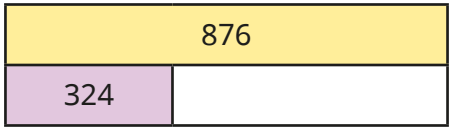
		T	O
		8	5
	–	2	4

		H	T	O
		3	2	8
	–	1	0	7

		H	T	O
		7	2	9
	–	3	0	9

- Work out the missing numbers.

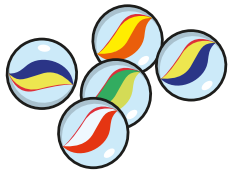




- Tom has 75 marbles.

  He gives 35 marbles to Amir.

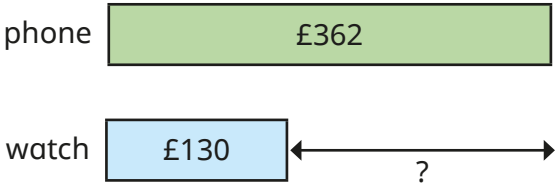
  How many marbles does Tom have left?



- A phone costs £362

  A watch costs £130

  How much more money does the phone cost than the watch?



What is the total cost of the phone and the watch?

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Subtract two numbers (no exchange)

Reasoning and problem solving

What could the missing digits in the subtraction be?

Find all the possible answers.

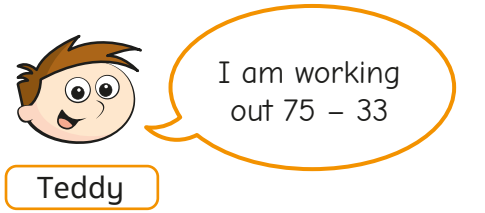
		H	T	O	
		6		6	
	–	2		4	
		4	2	2	

What is the pattern for the two missing digits?

Explain your answer.

9, 7; 8, 6; 7, 5; 6, 4; 5, 3; 4, 2; 3, 1; 2, 0

Teddy and Eva are both working out a subtraction.



Teddy's answer is double Eva's answer.

What could Eva's other number be?

Compare answers with a partner.

74 or 32

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Add two numbers (across a 10)

Notes and guidance

Children have already used the formal written method to add and subtract 2- and 3-digit numbers with no exchanges. In this small step, they again add two numbers, but now with exchanges into the tens: when the ones are added together, they will (sometimes) total more than 9

Both numbers are made using base 10 or place value counters in a place value chart. Children need to begin adding in the ones column, working from right to left. The use of manipulatives helps children to understand that if they have 10 or more ones, they can exchange them for a ten, which is added to the tens column. Exchanging with base 10 in a place value chart alongside the formal written calculation helps children to understand the value of the 1 that has been added to the tens column in the written method.

Things to look out for

- Children may start adding from the hundreds or tens column, i.e. working from left to right.
- When two digits sum to more than 10, children may put this number in the ones column instead of exchanging 10 ones for 1 ten.
- Children may forget to add the ten that has been exchanged for 10 ones.

Key questions

- Does it matter which column's numbers you add together first?
- Do you have enough ones to make an exchange?
- Where do you put the ten that you made from exchanging 10 ones in your model?
- How can you show that you have exchanged 10 ones in your written calculation?

Possible sentence stems

- _____ ones + _____ ones = _____ ones
- If I have _____ ones, I can exchange them for _____ ten and _____ ones.
- I have _____ hundreds, _____ tens and _____ ones, so altogether I have _____

National Curriculum links

- Add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction
- Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction

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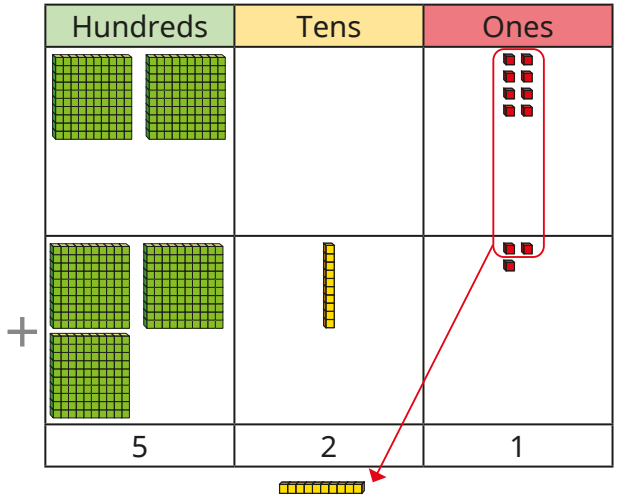
Add two numbers (across a 10)

Key learning

- Dexter uses base 10 to work out 208 + 313



	H	T	O
	2	0	8
+	3	1	3
	5	2	1
		1	

Use Dexter's method to work out the additions.

345 + 437	365 + 126	328 + 517

- Use place value counters to help you work out the additions.

	T	O
	6	4
+	2	8

	H	T	O
	7	1	9
+	1	5	3

	H	T	O
	5	6	1
+	2	1	9

- Scott cycles 204 miles in the first week of his summer holiday.

He cycles another 117 miles in the second week.

How many miles does he cycle in the first two weeks of his holiday?

- A tablet costs £329
  - A laptop costs £154 more than the tablet.

    How much does the laptop cost?
  - A TV costs £107 more than the laptop.

    How much does the TV cost?

- Fill in the missing digits.

	H	T	O
	2		3
+	1	6	
	3	7	0

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Add two numbers (across a 10)

Reasoning and problem solving

Is the statement true or false?

In this calculation, there will be no tens in the answer, because there are no tens in the numbers being added together.

		H	T	O	
		3	0	5	
	+	6	0	7	

Explain your answer.

False

Tiny is working out 325 + 417

		H	T	O	
		3	2	5	
	+	4	1	7	
		7	3	12	

Explain Tiny's mistake.

What is the correct answer?

742

Is the statement true or false?

If you add two numbers and there are enough ones to make an exchange, the answer will never have the digit 9 in the ones column.

Explain your answer.

True

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Add two numbers (across a 100)

Notes and guidance

In Year 2, children added two 2-digit numbers, exchanging 10 ones for 1 ten. In the previous small step, they did the same with 3-digit numbers. In this small step, they exchange 10 tens for 1 hundred.

Children make both numbers using base 10 or place value counters. They need to begin adding in the ones column, working from right to left. After adding each column, ask whether they need to make an exchange. Seeing 10 tens physically swapped for 1 hundred, alongside the formal written method, will deepen children's understanding of this step.

The main focus is on exchanging into the hundreds column, but children should continue to check for any exchanges from the ones into the tens column.

Things to look out for

- Children may forget to add the hundred that has been exchanged for 10 tens.
- When an exchange is needed, writing the 1 (the 1 hundred that comes from exchanging 10 tens) in the incorrect place could cause confusion.
- If two exchanges are needed, children may struggle to know what each digit they have "carried" represents.

Key questions

- Does it matter which column you add together first?
- Do you have enough ones/tens to make an exchange?
- Where do you put the hundred that you made from exchanging 10 tens in your model?
- How can you show that you have exchanged 10 tens in your written calculation?

Possible sentence stems

- _____ tens + _____ tens = _____ tens
- If I have _____ tens, I can exchange them for _____ hundred and _____ tens.
- I have _____ hundreds, _____ tens and _____ ones, so altogether I have _____

National Curriculum links

- Add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction
- Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction

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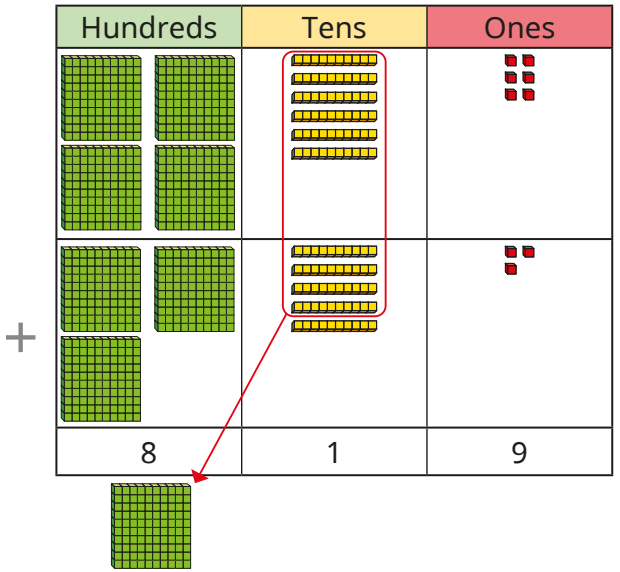
Add two numbers (across a 100)

Key learning

- Nijah uses base 10 to work out 466 + 353



		H	T	O
		4	6	6
+		3	5	3
		8	1	9
		1		

Use Nijah's method to work out the additions.

		H	T	O
		2	8	4
+		1	3	5

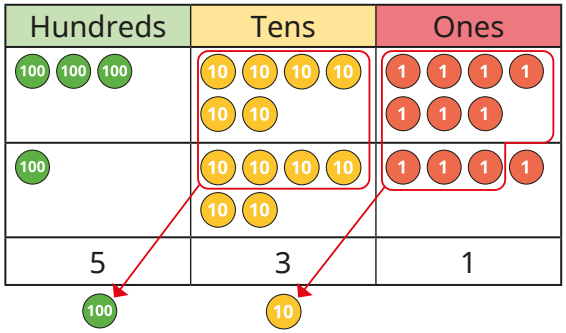
		H	T	O
		3	6	7
+		2	9	1

		H	T	O
		3	7	2
+		1	3	1

- Mrs Trent has £582 and Ms Rose has £136

  How much money do they have altogether?

- Ron uses place value counters to work out 367 + 164



		H	T	O
		3	6	7
+		1	6	4
		5	3	1
		1	1	

Use Ron's method to work out the additions.

		H	T	O
		2	5	6
+		1	8	3

		H	T	O
		6	2	5
+		2	9	4

		H	T	O
		3	5	3
+		2	4	7

- Work out 784 + 156

  How is this calculation different from 780 + 156?

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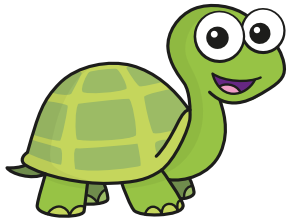
Add two numbers (across a 100)

Reasoning and problem solving

Tiny has completed an addition.

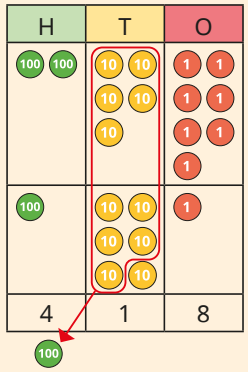


		H	T	O	
		2	5	7	
	+	1	6	1	
		3	1	8	

Is Tiny correct?

Explain your answer using base 10 or place value counters.

No



What could the missing digits be?

		H	T	O	
		4		3	
	+	1		5	
		6		8	

Explain your answer.

various possible answers, e.g. (from top to bottom)

5, 6, 1

3, 9, 2

Is the statement true or false?

> When adding 245 to 356 there will not be an exchange in the tens column because there are only 9 tens.

Talk about your answer with a partner.

False

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Subtract two numbers (across a 10)

Notes and guidance

So far in this block, children have completed the formal written method for addition with exchanges in both the tens and hundreds columns. They now move on to the written method for subtraction with exchanges. In Year 2, they subtracted a 2-digit number from a 2-digit number, exchanging 1 ten for 10 ones. In this small step, they subtract both 2- and 3-digit numbers, exchanging 1 ten for 10 ones.

As with addition in the previous steps, they use base 10 alongside the written calculation, but for subtraction they only need to make the number being subtracted from. For each calculation, prompt children to think about whether they need to make an exchange or not, and why.

Things to look out for

- When using base 10, children may create both numbers and simply remove the second number, leaving the original number unchanged.
- Children may find the difference between the two digits in a column instead of subtracting the second digit from the first, for example 1 – 3 becomes 3 – 1
- When no tens are left in a number due to an exchange, children may not know what to put in the tens column.

Key questions

- How can you show this question using base 10?
- Can you subtract 2 ones from 5 ones?
- Can you subtract 5 ones from 2 ones?
- Do you need to make an exchange?
- How can you show an exchange using base 10 or place value counters?
- How can you show an exchange using the written method?

Possible sentence stems

- _____ ones subtract _____ ones is equal to _____ ones.
- I will exchange 1 ten for _____ ones.
- Now I have _____ hundreds, _____ tens and _____ ones.
  The answer is _____

National Curriculum links

- Add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction
- Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction

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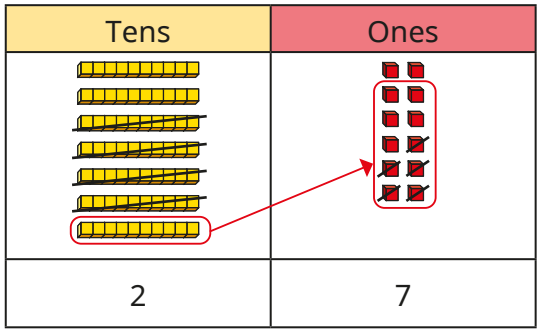
Subtract two numbers (across a 10)

Key learning

- Annie uses base 10 to work out 72 – 45



	T	O
	~~6~~ 7	12
–	4	5
	2	7

Use Annie's method to work out the subtractions.

	T	O
	6	2
–	1	8

	H	T	O
	3	2	5
–	1	1	9

	H	T	O
	3	2	1
–	2	0	3

- Tommy has £258

  He spends £139 on a new bike.

  How much money does he have left?

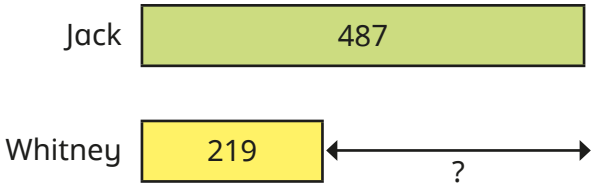
  Draw a bar model to help you solve the problem.

- Jack and Whitney are playing a game.

  Jack scores 487 points.

  Whitney scores 219 points.

  How many more points has Jack scored than Whitney?



  How many points have they scored in total?

- What are the missing digits in the subtractions?

	H	T	O
	4	~~6~~ 7	16
–	2	4	☐
	2	2	8

	H	T	O
	7	4	☐
–	☐	2	5
	5	1	6

	H	T	O
	4	1	8
–	3	0	☐
	1	☐	9

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Subtract two numbers (across a 10)

Reasoning and problem solving

Amir is working out 215 – 106

		H	T	O	
		2	1	5	
	–	1	0	6	
		1	1	1	

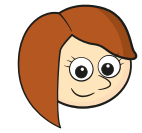
The answer is 111

What mistake has Amir made?

What is the correct answer?

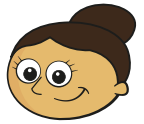
Amir has subtracted the 5 from the 6 in the ones column.

109



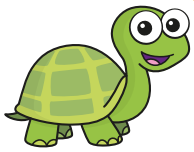
I have 534p.

Rosie



Rosie has 218p more than me.

Dora



I think Dora has 752p because "more" means "add" and 534 + 218 = 752

Is Tiny correct?

Explain your answer using a bar model.

No

Rosie has 218p more, so Dora has 218p less.

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Subtract two numbers (across a 100)

Notes and guidance

This small step will be children's first experience of subtraction across a 100, and they will use base 10 and place value counters to represent calculations alongside the written method. At each step of the subtraction, children should be asking whether they need to make an exchange.

This will be the first time children have seen multiple subtraction exchanges in the same calculation and extra care should be taken when modelling this. At this stage, both numbers are 3-digit numbers. In this small step, avoid subtracting from a number with no tens (causing an exchange from the hundreds down to the ones) as this will be covered later in the block.

Things to look out for

- When using base 10, children may create both numbers and simply remove the second number, leaving the original number unchanged.
- Children may find the difference between the two digits in a column instead of subtracting the second digit from the first, for example 1 – 3 becomes 3 – 1
- Children need to take extra care when two exchanges are happening in the same calculation. They may write digits in the wrong column.

Key questions

- How can you show this question using base 10?
- Can you subtract 2 tens from 5 tens?
- Can you subtract 5 tens from 2 tens?
- Do you need to make an exchange?
- How can you show an exchange from the hundreds using base 10?
- How can you show an exchange from the hundreds using the written method?

Possible sentence stems

- _____ tens subtract _____ tens is equal to _____
- I will exchange 1 hundred to make _____ tens.
- Now there are _____ hundreds, _____ tens and _____ ones.

  The answer is _____

National Curriculum links

- Add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction
- Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction

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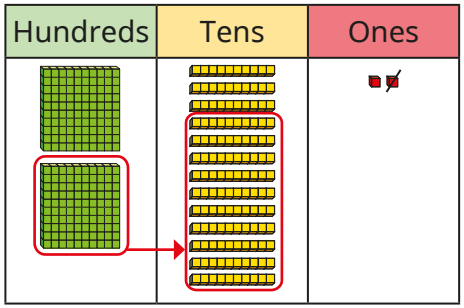
Subtract two numbers (across a 100)

Key learning

- Dani has started working out 232 – 141

  Complete the calculation.



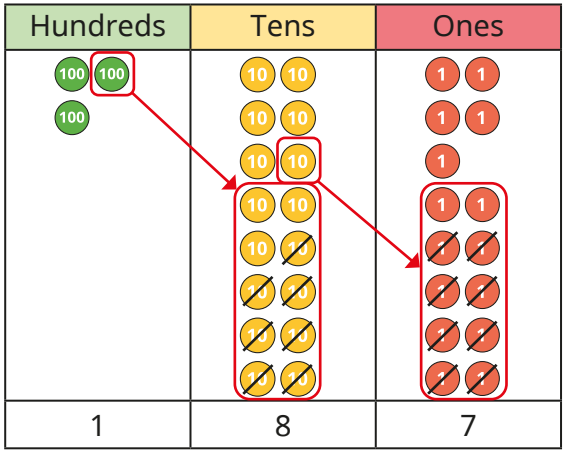
	H	T	O
	~~1~~2	~~1~~3	2
–	1	4	1
			1

  Use Dani's method to work out the subtractions.

  428 – 153 | 354 – 281 | 685 – 294 | 407 – 123

- Tom is using place value counters to work out 365 – 178

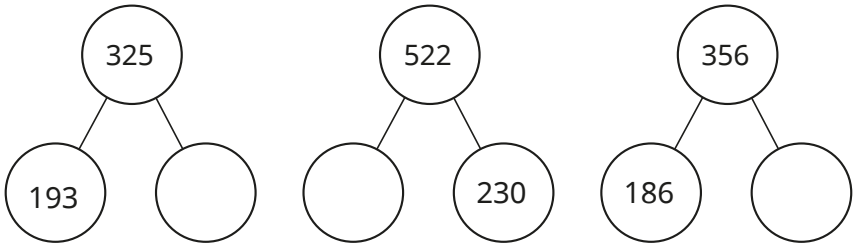
  He needs to make two exchanges.



	H	T	O
	~~2~~3	~~15~~6	~~15~~5
–	1	7	8
	1	8	7

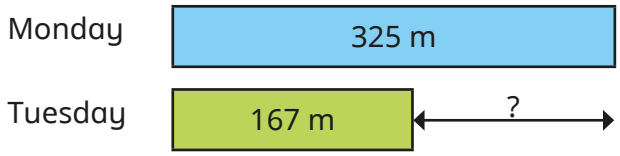
  Use this method to work out 435 – 159

- Complete the part-whole models.



- Alex walks 325 m on Monday and 167 m on Tuesday.

  How much further does she walk on Monday?



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Subtract two numbers (across a 100)

Reasoning and problem solving

Is the statement true or false?

In this calculation, there will be 1 hundred in the answer because 3 hundreds subtract 2 hundreds is equal to 1 hundred.

Hundreds	Tens	Ones
100 100 100	10	1 1 1 1 1

		H	T	O	
		3	1	5	
	–	2	2	1	

Explain your answer.

False

Annie, Mo and Ron are playing a game.

I have 437 points. I have 163 points more than Mo.

Annie

I have 182 points more than Ron.

Mo

How many points does Ron have?

92

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Add 2-digit and 3-digit numbers

Notes and guidance

Children should now be confident with the formal written method of addition of numbers with up to three digits and exchanges taking place from the ones and the tens. So far in this block, the numbers have all been both 2-digit or both 3-digit numbers. In this small step, children add a 2-digit number to a 3-digit number.

The different sizes of numbers can sometimes confuse children, especially when lining up the digits in place value columns. Some children may find it helpful to write a zero placeholder in the absence of any hundreds.

As before, the written calculation is done alongside concrete representations. When forming the 2-digit number with concrete resources, make sure children do not assume the greatest digit is in the hundreds column.

Things to look out for

- Children may line up the 2-digit number incorrectly below the 3-digit number, placing tens in line with the hundreds column.
- Children may be confused by a zero or no digit in any place value column.

Key questions

- How can you show this question using base 10/place value counters?
- How can you write this calculation using the formal written method?
- Have you put all the digits in the correct columns?
- Do you need to make an exchange?
- What could you write in the hundreds column if there are no hundreds?

Possible sentence stems

- _____ hundreds added to _____ hundreds is equal to _____ hundreds.
- I put _____ in the _____ column because ...

National Curriculum links

- Add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction
- Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction

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Add 2-digit and 3-digit numbers

Key learning

- Work out the additions.

Hundreds	Tens	Ones
+		

		H	T	O	
		1	5	6	
	+		6	3	

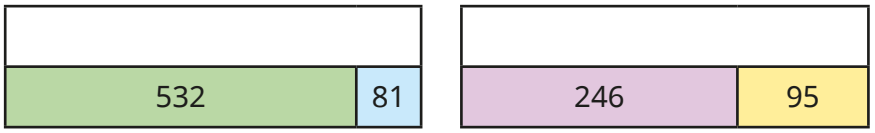
Hundreds	Tens	Ones
+		

		H	T	O	
		2	5	5	
	+		5	4	

- Work out the additions.

537 + 82	434 + 49	58 + 365	19 + 799

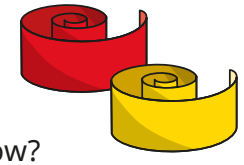
- Complete the bar models.



- Kim has 132 cm of ribbon.

  Her teacher gives her another 83 cm.

  What total length of ribbon does Kim have now?



- Tom has £283 and Esther has £68

  How much money do they have altogether?

- Nijah scores 376 points in a game.

  Scott scores 53 more points than Nijah.

  How many points do they score altogether?

- The mass of a mango is 175 g.

  An apple is 106 g lighter than the mango.

  What is the total mass of the mango and the apple?

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Add 2-digit and 3-digit numbers

Reasoning and problem solving

Which addition is the odd one out?

336 + 80	556 + 60
533 + 80	586 + 80

Explain your answer.

Children could choose any card with correct justification.

In jug A there is 261 ml of juice.

In jug B there is 143 ml of juice.

In jug C there is 89 ml of juice.

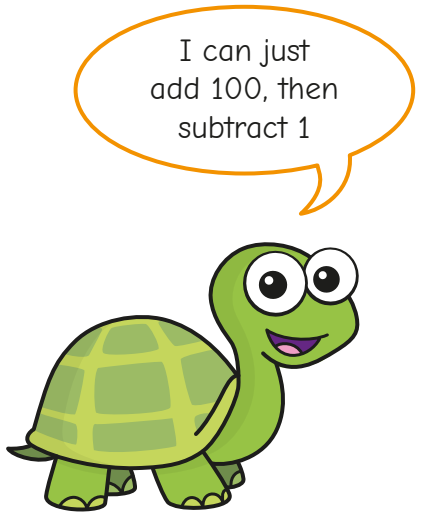
All the juice is poured into jug D.

How much juice is there in jug D?

In which order did you add them?

493 ml

Tiny is working out 546 + 99



Is Tiny correct?

Does this always work for adding 99?

How could Tiny use this method to add 98?

Yes

It will always work because 99 is one less than 100

To add 98, Tiny could add 100, then subtract 2

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Subtract a 2-digit number from a 3-digit number

Notes and guidance

Children should now be confident with the formal written method of subtraction of numbers with up to three digits and exchanges from the tens and hundreds. So far when subtracting in this block, the numbers have all been both 2-digit or both 3-digit numbers. In this small step, children subtract 2-digit numbers from 3-digit numbers.

The different sizes of numbers can sometimes confuse children, especially when lining up the digits in place value columns. Some children may find it helpful to write a zero placeholder.

This step will also be the first time that children exchange from the hundreds column to the ones column in a two-part exchange because there are no tens in the original number. Make sure children exchange 1 hundred for 10 tens before exchanging one of those tens for 10 ones.

Things to look out for

- Children may line up the 2-digit number incorrectly below the 3-digit number, placing tens in line with the hundreds column.
- When an exchange is needed from the tens, but there are no tens, children may try to exchange directly from the hundreds to the ones.

Key questions

- How can you show this question using base 10?
- How can you write this calculation using the formal written method?
- Have you put all the digits in the correct columns?
- Do you need to make an exchange?
- If you cannot exchange from the tens, what should you do?
- What could you write in the hundreds column if there are no hundreds?

Possible sentence stems

- _____ hundreds subtract _____ hundreds is equal to _____
- I will exchange 1 hundred for _____ tens, then 1 ten for _____ ones.

National Curriculum links

- Add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction
- Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction

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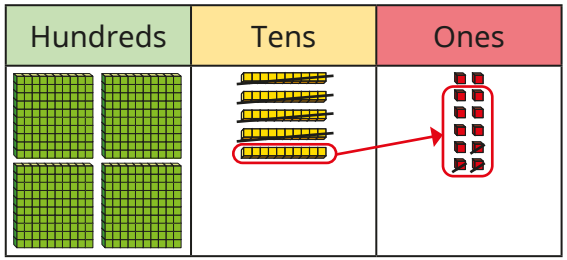
Subtract a 2-digit number from a 3-digit number

Key learning

- Teddy uses base 10 to work out 452 – 43



	H	T	O
	4	~~5~~ 4	12
–		4	3
	4	0	9

Use Teddy's method to work out the subtractions.

243 – 28 | 354 – 62 | 564 – 75 | 153 – 64

- Write <, > or = to compare the number sentences.

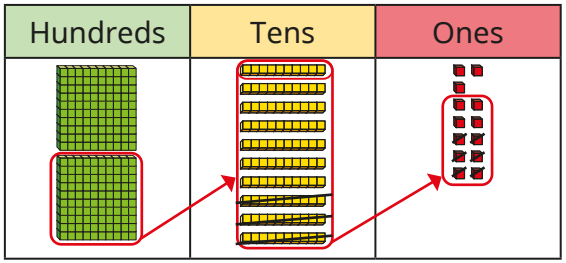
301 ◯ 327 – 28

522 – 131 ◯ 522 – 31

375 – 93 ◯ 324 – 51

243 – 58 ◯ 253 – 68

- Eva uses base 10 to work out 203 – 36



	H	T	O
	~~2~~ 1	~~0~~ 9	13
–		3	6
	1	6	7

Talk to a partner about Eva's method.

Use this method to work out the subtractions.

305 – 56 | 708 – 69 | 804 – 89 | 401 – 42

- Jack is 135 cm tall.

  Rosie is 27 cm shorter than Jack.

  How tall is Rosie?

- A computer costs £558

  Mrs Singh has £89

  How much more money does Mrs Singh need to buy the computer?

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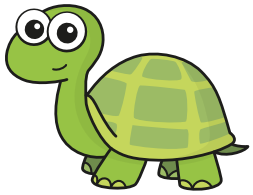
Subtract a 2-digit number from a 3-digit number

Reasoning and problem solving

Tiny is working out 526 – 31

		H	T	O	
		5	2	6	
	–	3	1		
		2	1	6	



Explain the mistake Tiny has made.

Find the correct answer.

Tiny has not put the 31 in the correct columns.

495

What are the missing digits?

13__ – 52 = 85

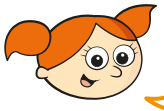
334 – __2 = 292

545 = 6__8 – 73

7

4

1



The rule for the function machine is "subtract 60".

input		output
567	→	497

Is Alex correct?

Explain your answer.

No

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Complements to 100

Notes and guidance

In this small step, children focus on fluently finding complements to 100

Previously in this block and in Year 2, children covered number bonds for ones to 10 and tens to 100, and this understanding can support finding complements to 100

A common misconception when finding a complement to 100 is to think that the ones digits bond to 10 and the tens digits bond to 100, which leads to a total of 110 rather than 100, for example 36 + 74. Using a hundred square can help children to avoid this misconception and to identify that they actually need to find a bond to 10 and a bond to 90. A number line can also support the development of efficient mental strategies to find complements to 100

This small step provides a good opportunity to recap prior learning on money, specifically the fact that there are 100p in £1

Things to look out for

- Children need to be able to fluently recall bonds to 10 and multiples of 10
- Children may find a bond to 10 and a bond to 100 and then add them together, leading to a total of 110

Key questions

- How many squares are there altogether? How do you know?
- How many full rows of each colour are there?
- What do you notice about the row with both colours in it?
- What do you notice about the total of the tens?
- What do you notice about the total of the ones?
- What is the jump to the next multiple of 10?
- What is the jump to 100?

Possible sentence stems

- I add _____ to get to the next 10, then _____ to get to 100
- This means _____ is the complement to 100 of _____
- _____ plus _____ is equal to 100

National Curriculum links

- Add and subtract numbers mentally, including:
  - a 3-digit number and ones
  - a 3-digit number and tens
  - a 3-digit number and hundreds

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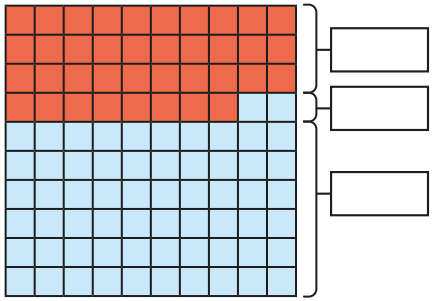
Complements to 100

Key learning

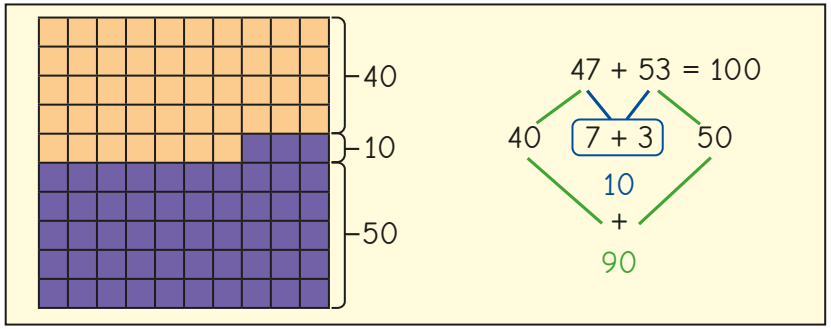
- Fill in the totals for the hundred square.



Use the hundred square to complete the number sentence.

38 + 62 = _____ + _____ + _____ = _____

- Dexter uses a hundred square to show that 47 + 53 = 100

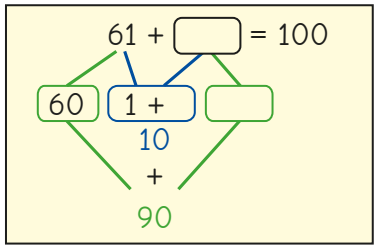


Use Dexter's method to show that the total of each addition is 100

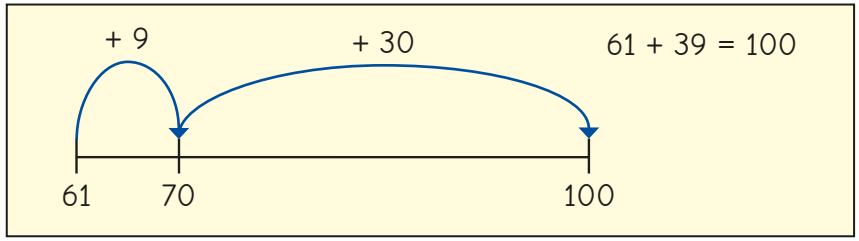
32 + 68	19 + 81	76 + 24

- Rosie is finding the complement of 61 to 100

Complete her workings.



Tommy uses a number line to find the complement of 61 to 100



Whose method do you prefer?

Use that method to find the complement of 58 to 100

- Complete the complements to 100

▸ 84 + 1__ ▸ 35 + __5 ▸ __7 + 53 ▸ 26 + _____

- A carpenter has a plank of wood that is 100 cm long.

She cuts off a piece of wood that is 39 cm long.

What length of wood is left?

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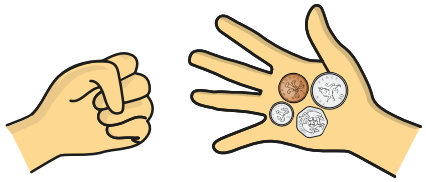
Complements to 100

Reasoning and problem solving

Annie has £1 in total in her hands.



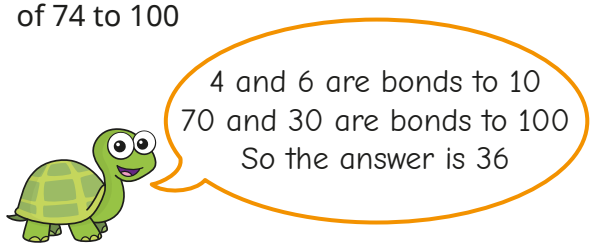
What coins could be in Annie's closed hand?

for example:

50p, 10p, 2p, 1p

The total is 63p.

Tiny is trying to work out the complement of 74 to 100



What mistake has Tiny made?

What is the correct answer?

26

Sort the additions into the table.

32 + 78	83 + 17	55 + 55	49 + 16
66 + 34	91 + 19	52 + 47	7 + 93

Bond to 100	Not a bond to 100

Explain your thinking to a partner.

Bond to 100	Not a bond to 100	
83 + 17 66 + 34 7 + 93	32 + 78 55 + 55 49 + 16	91 + 19 52 + 47

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Estimate answers

Notes and guidance

Although children have not explicitly been introduced to rounding, they have explored estimating the position of numbers on number lines in both Year 2 and Year 3 and will use this knowledge to support the learning in this small step.

Discuss with children why estimates are important, particularly in real-life situations such as population statistics. They allow us to quickly and easily get an idea of what an answer should be near to, or if an already calculated answer is appropriate.

It is important to discuss whether an actual answer will be greater or less than an estimate. For example, 33 + 54 may be estimated as 30 + 50, and we would expect the precise answer to be greater than the estimate because the actual numbers from the calculation are both greater than the "near numbers" used in the estimate.

Things to look out for

- Children may need support to identify the multiples of 10 or 100 either side of a number and to decide which multiple a number is closer to.
- Children may not always use the most appropriate values when estimating.

Key questions

- What are the multiples of 10/100 before and after _____?
- Where would _____ be on this number line?
- Which multiple is _____ closer to?
- How far from _____ is _____?
- Which calculation is easier/quicker to perform?
- Which calculations can you do mentally?
- Why do we use estimates?
- Is the estimate less than or greater than the actual answer? Why?

Possible sentence stems

- _____ is near to _____
- The estimated answer will be less/greater than the actual answer because ...

National Curriculum links

- Estimate the answer to a calculation and use inverse operations to check answers

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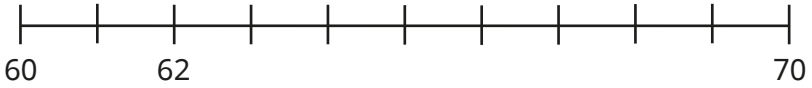
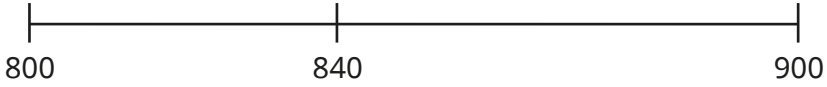
Estimate answers

Key learning

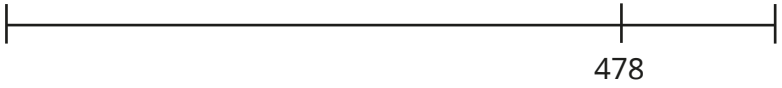
- Use the number lines to help you complete the sentences.



62 is closer to _____ than _____



840 is closer to _____ than _____



478 is closer to _____ than _____

- Work out the calculations.

▸ 80 + 30	78 + 33	
▸ 700 – 500	670 – 480	
▸ 200 + 100	240 + 120	237 + 118

In each set, which calculation was easiest to work out?

- Tommy is estimating the answer to 482 – 194

Use Tommy's method to estimate the answers to the calculations.

482 is close to 500
194 is close to 200
500 – 200 = 300

132 + 724	561 – 289	909 – 375	443 + 459

- Mr Hall has £560

Estimate whether Mr Hall can afford to buy both the laptop and the printer.

- Write < or > to complete the statements.

27 ◯ 30	27 + 49 ◯ 30 + 50
44 ◯ 40	44 + 72 ◯ 40 + 70
132 ◯ 130	400 – 132 ◯ 400 – 130
138 ◯ 140	400 – 138 ◯ 400 – 140

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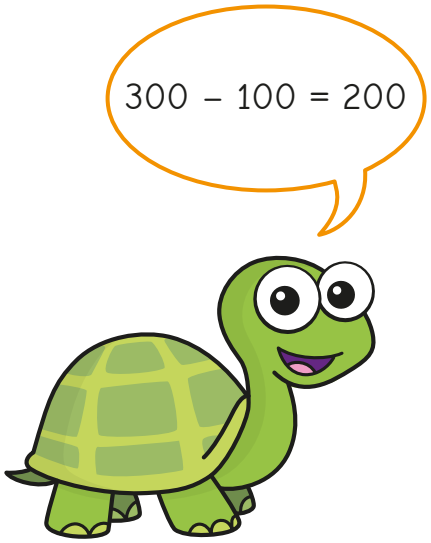
Estimate answers

Reasoning and problem solving

Tiny is estimating the answer to 382 – 114



Find a better estimate.

Work out 382 – 114

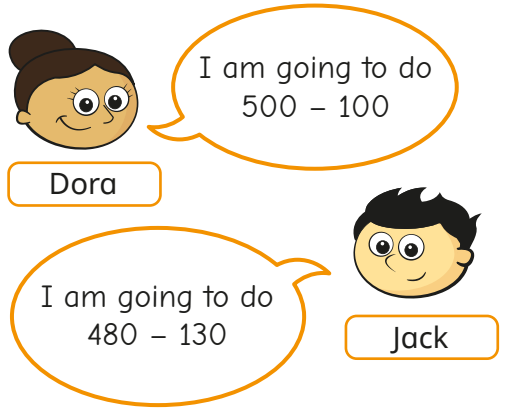
Which estimate is closer to the exact answer?

400 – 100 = 300, as 382 is closer to 400 than 300

268

400 – 100 = 300

Dora and Jack are estimating the answer to 476 – 128



Work out each estimate.

Whose estimate is easier to work out?

Work out 476 – 128

Whose estimate is closer to the actual answer?

Dora: 400
Jack: 350

352

Jack's estimate

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Inverse operations

Notes and guidance

In this small step, children explore the inverse relationship between addition and subtraction and how both relate to the part-whole structure.

In addition to part-whole models, bar models are excellent for highlighting these relationships. It is important to draw children's attention to the fact that they can perform two different subtractions as the inverse to an addition, due to addition's commutative property, but there is only one possible addition as the inverse to a subtraction.

Building on the previous small step, where children began to look at strategies to check answers using estimation, they can now use inverse operations as another method of checking, rather than simply redoing the same calculation and potentially repeating the same error.

Things to look out for

- Children may mix up the wholes and the parts.
- Children may subtract a part from a part rather than a part from the whole.
- When asked to check an answer, children may just repeat the same calculation instead of using the inverse operation.

Key questions

- What do you notice about the part-whole models?
- What are the two parts? What is the whole?
- What does "inverse" mean?
- What is the inverse of add/subtract _____?
- What does commutative mean?
- Is addition/subtraction commutative?
- What estimate could you use to check?

Possible sentence stems

- If _____ is a part and _____ is a part, then _____ is the whole.
- If _____ is the whole and _____ is a part, then _____ is the other part.
- The inverse of _____ is _____

National Curriculum links

- Estimate the answer to a calculation and use inverse operations to check answers

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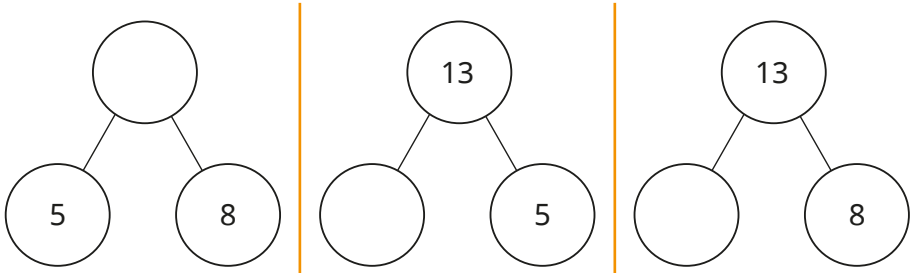
Inverse operations

Key learning

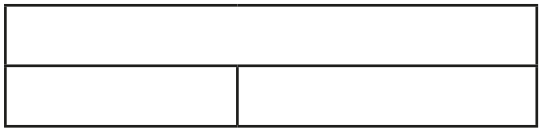
- Complete the part-whole models and number sentences.



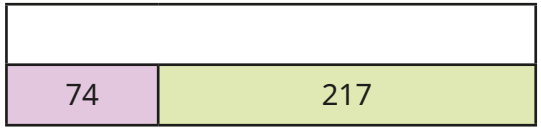
5 + 8 = _____ 13 – 5 = _____ 13 – 8 = _____

What do you notice?

- Complete the bar model for 561 – 236 = 325

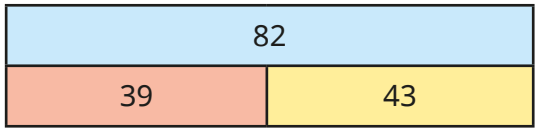


- Find the whole.



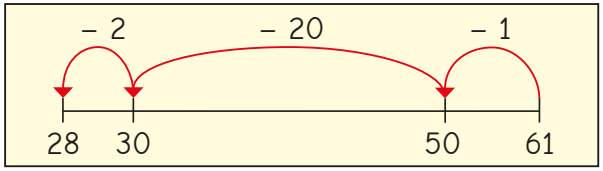
Write the fact family for the bar model.

- Dani works out 39 + 43 = 82



What two subtractions could Dani do to check her answer?

- Tiny uses a number line to work out 61 – 23



What addition could Tiny do to check the answer?

Find Tiny's mistake and correct it.

- Brett has answered this problem.
  - What two subtractions could Brett do to check his answer?
  - Work out the subtractions to check Brett's answer.
  - What estimate could Brett also use to check his answer?

Mr Rose is 198 cm tall.

Mrs Rose is 145 cm tall.

What is their combined height?

343 cm

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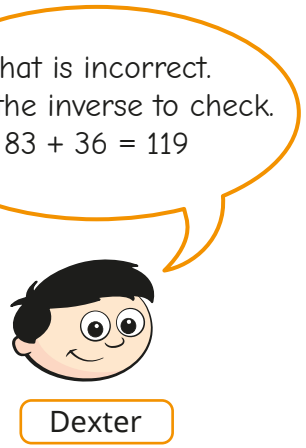
Inverse operations

Reasoning and problem solving

Aisha works out 83 – 47 and gets the answer 36



What mistake has Dexter made?

Complete an inverse operation to check that Aisha's answer is correct.

What estimate could Aisha and Dexter use to check their answers?

Dexter added the whole and a part, instead of adding the two parts, 47 and 36

47 + 36 = 83

80 – 50 = 30

Here are some calculations.

112 + 125	362 + 125	200 – 100	362 – 125
362 – 237	200 + 300	237 – 112	125 – 112
130 + 240	237 + 362	300 – 100	240 – 130

Which calculations can be used to check 125 + 237?

Which calculations can be used to check 237 – 125?

What could the other calculations be used to check?

check for 125 + 237:

362 – 125

362 – 237

130 + 240

check for 237 – 125:

112 + 125

200 – 100

237 – 112

240 – 130

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Make decisions

Notes and guidance

This small step provides the opportunity to consolidate and bring together all the learning from this block. Children are asked to make decisions about what operation and what method is appropriate to solve a problem.

Word problems, including mult-step problems, can be used to assess whether children are able to successfully identify the correct operation and information to use. Bar models can be an excellent tool to support children in this process, encouraging children to think about what is the whole and what are the parts.

It is also important to encourage children to make decisions around what is the most appropriate method to find an answer once the correct operation has been identified. The skills developed in the previous small steps should be revisited for children to check their answers.

Things to look out for

- Children may select the incorrect operation.
- Children may need support to identify the first step in a multi-step problem.
- Children may use written methods when mental methods would be more appropriate.

Key questions

- Do you know the whole?
- What parts do you know?
- Which operation do you need to use?
- Can you use a mental method or do you need to use a written one?
- Which method is more efficient?
- What does this arrow represent on the bar model?
- Where is the whole/total on the bar model?
- What is the first step you need to do?
- Do you have to complete the calculations in a specific order?

Possible sentence stems

- _____ is a part and _____ is a part, so I need to _____
- _____ is the whole and _____ is a part, so I need to _____

National Curriculum links

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

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Make decisions

Key learning

- A machine packs 86 boxes on Saturday.

  Another 57 boxes are packed on Sunday.

  How many boxes are packed altogether?

  Draw a bar model to match the problem.

- There are 86 boxes in a factory.

  57 boxes are sent to a shop.

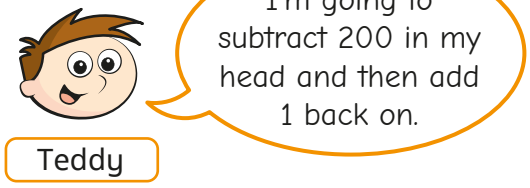
  How many boxes are left in the factory?

  Draw a bar model to match the problem.

- Kim and Teddy are working out 436 – 199

Kim's workings

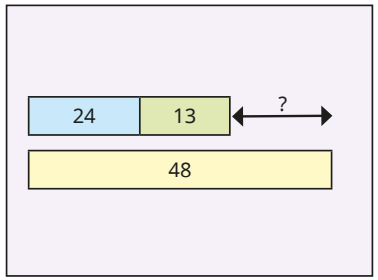
		H	T	O	
		4	3	6	
	–	1	9	9	



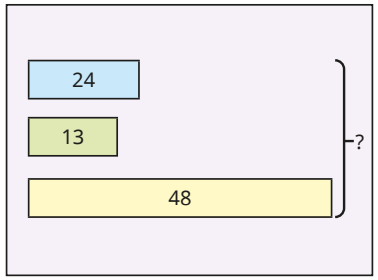
Use both methods to work out the answer.

Whose method is more efficient?

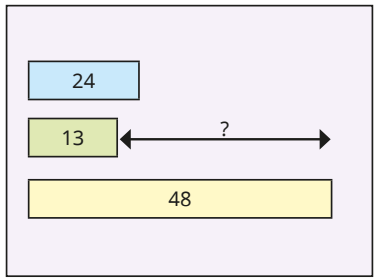
- Match the bar models to the problems.



Esther has 24 stickers.
Filip has 13 stickers.
Tom has 48 stickers.
How many stickers do they have altogether?



Esther has 24 stickers.
Filip has 13 stickers.
Tom has 48 stickers.
How many more stickers does Tom have than Esther and Filip combined?



Esther has 24 stickers.
Filip has 13 stickers.
Tom has 48 stickers.
Find the difference between Filip and Tom's numbers of stickers.

Solve each problem.

What else could you work out?

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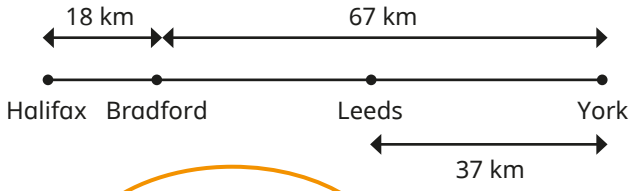
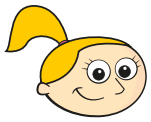
Make decisions

Reasoning and problem solving

Eva, Alex and Amir want to find the distance from Halifax to Leeds.





Eva

I'm going to use the written method to do 18 + 67 and then subtract 37

I can use mental strategies to subtract 37 from 67 first, and then add 18

Alex

You need to add 18, 67 and 37 together.

Amir

Whose method is incorrect?

What is the distance from Halifax to Leeds?

Alex's | 48 km

0	1	2	3	4
5	6	7	8	9

+	−

						=

Use the cards to create additions and subtractions that give an answer between 200 and 300

Compare answers with a partner.

various possible answers, e.g.

152 + 98 315 – 40 179 + 47 324 – 78

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Autumn Block 3

Multiplication and division A

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Small steps

Step 1	Multiplication – equal groups
Step 2	Use arrays
Step 3	Multiples of 2
Step 4	Multiples of 5 and 10
Step 5	Sharing and grouping
Step 6	Multiply by 3
Step 7	Divide by 3
Step 8	The 3 times-table

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Small steps

Step 9	Multiply by 4
Step 10	Divide by 4
Step 11	The 4 times-table
Step 12	Multiply by 8
Step 13	Divide by 8
Step 14	The 8 times-table
Step 15	The 2, 4 and 8 times-tables

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Multiplication – equal groups

Notes and guidance

In Year 2, children recognised, made and added equal groups. This small step revisits and consolidates this learning in order to prepare children for the next steps.

It is important that children understand the word "equal" and the use of stem sentences can support this.

Concrete resources and images can be used to support understanding when explaining the link between repeated addition and multiplication. Ensure children are exposed to examples where groups are equal but look different, such as a series of objects that are spaced differently. The examples included in this small step refer only to the times-table facts that children will have learned in Year 2

Things to look out for

- Children may be able to recognise equal groups, but not be able to explain why a group is equal or unequal.
- Children may think that groups are unequal if they are not represented in exactly the same way.
- Children need to use the correct language of addition or multiplication to match the picture they are describing.

Key questions

- How can you tell if groups are equal?
- What does the 2 represent? What does the 8 represent?
- How can you show the groups?
- What is the same and what is different about the groups?
- How else can you show the equal groups?
- How many ways can you show this?
- Do these two groups look the same? Why or why not?

Possible sentence stems

- There are _____ equal groups with _____ in each group.

  There are _____ altogether.
- The groups are equal because ...

National Curriculum links

- Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for 2-digit numbers times 1-digit numbers, using mental and progressing to formal written methods

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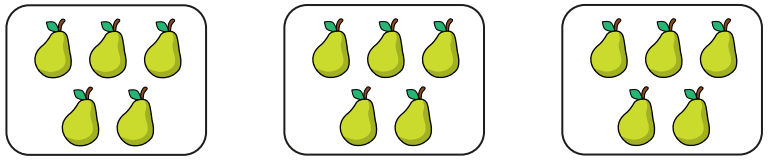
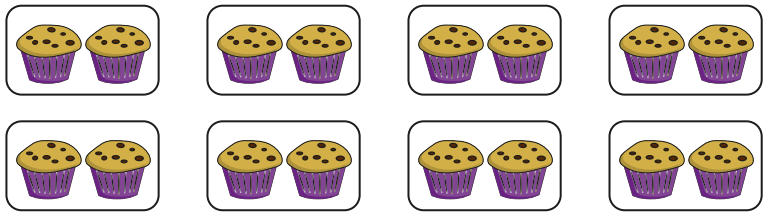
Multiplication – equal groups

Key learning

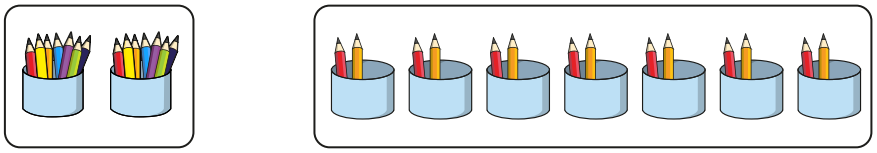
- Complete the sentences to describe the groups.

  There are _____ equal groups with _____ in each group.

  There are _____ altogether.

  - 
  - 

- Describe the equal groups.

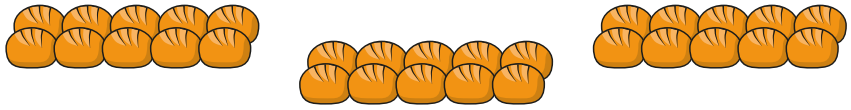


What is the same and what is different about the two groups?

- Use counters to make the groups.

3 equal groups with 5 in each group	5 groups of 3

- Complete the sentences to describe the picture.



  - There are _____ equal groups with _____ in each group.

    There are _____ altogether.

  - _____ + _____ + _____ = _____

  - _____ × _____ = _____

- Use 20 counters.

  How many different ways can you make equal groups?

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Multiplication – equal groups

Reasoning and problem solving

Which set of money is the odd one out?

A

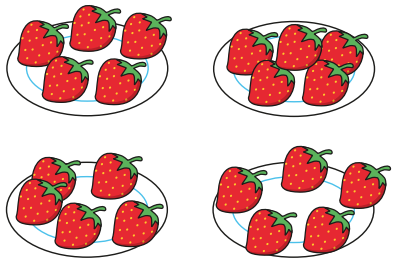
B

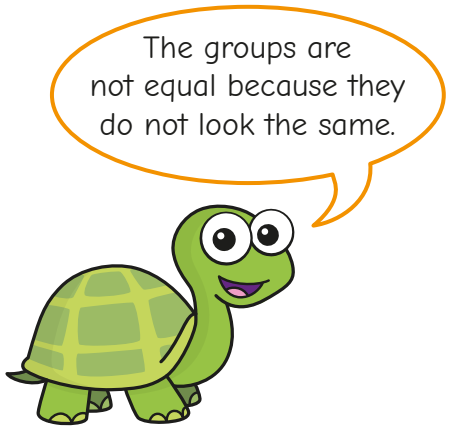
C

Explain your answer.

C

Here are some groups.





Do you agree with Tiny?

Explain your answer.

No

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Use arrays

Notes and guidance

In this small step, children build and use arrays to enhance their knowledge of the link between repeated addition and multiplication and to explore commutativity. For example, they recognise that 3 lots of 5 is equal to 5 lots of 3

As this small step appears at the start of the Year 3 multiplication block, the only examples included refer to the times-table facts that children should know from Year 2, but can be revisited later in the block as children are introduced to more times-table facts.

The use of arrays will be built on in future steps to help children complete multiplications. When teaching multiplication, the multiplication symbol and language such as "lots of" and "groups of" should be used interchangeably to support children's understanding.

Things to look out for

- Children need to ensure that the arrays are drawn or constructed accurately, using straight rows and columns to clearly show repeated addition.
- Children may not complete the rectangle when building an array. For example, when representing 4 × 5 they may only show the 14 counters that would form the outside of the array and not fill in the middle.

Key questions

- How many lots of 2 do you have?
- How many lots of 5 do you have?
- What does this array show?
- What number sentences can you write to describe this array?
- How does this array show repeated addition and multiplication?
- What happens if you change the order of the numbers in a multiplication?

Possible sentence stems

- There are _____ lots of _____
- _____ × _____ = _____ × _____

National Curriculum links

- Show that multiplication of two numbers can be done in any order (commutative) and division on one number by another cannot (Y2)
- Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for 2-digit numbers times 1-digit numbers, using mental and progressing to formal written methods

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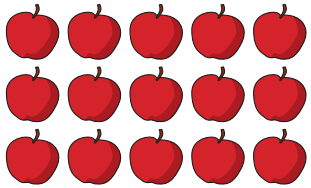
Use arrays

Key learning

- Complete the sentences.



  - There are _____ rows of _____ apples.

    There are _____ lots of _____ apples.

    _____ × _____ = _____

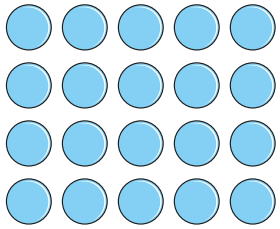
  - There are _____ columns of _____ apples.

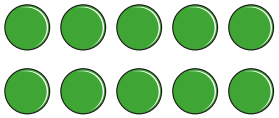
    There are _____ lots of _____ apples.

    _____ × _____ = _____

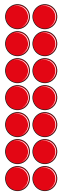
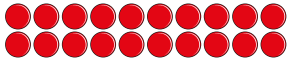
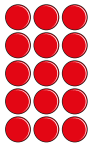
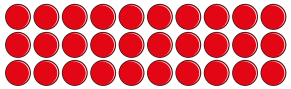
  Write two addition sentences to describe the array.

- Write two additions and two multiplications for each array.





- Match the multiplications, additions and arrays.

2 × 10	10 + 10 + 10	
7 × 2	5 + 5 + 5	
3 × 10	7 + 7	
5 × 3	10 + 10	

- Make and draw arrays to match the statements.

4 × 5 = 5 × 4	6 lots of 2 = 2 lots of 6

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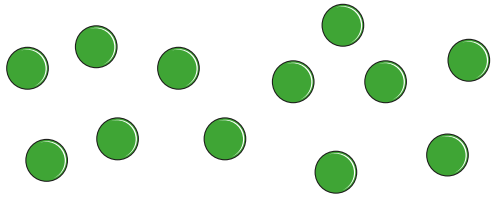
Use arrays

Reasoning and problem solving

How many different arrays can you make with 12 counters?



1 × 12

12 × 1

2 × 6

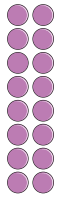
6 × 2

3 × 4

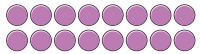
4 × 3

Tommy and Sam are making an array to show 8 × 2

Tommy



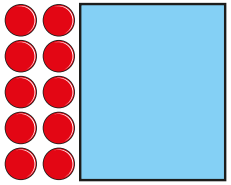
Sam



Who is correct?

Tommy and Sam are both correct.

Part of this array is hidden.



There are fewer than 35 counters in total.

What could the array be?

3 × 5

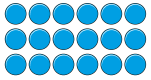
4 × 5

5 × 5

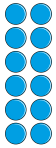
6 × 5

Which array is the odd one out?

A



B



C

Explain your reasoning.

multiple possible answers, e.g.

array A, because B and C each have a total of 12 counters

array B, because A and C have rows of 6 counters

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Multiples of 2

Notes and guidance

In Year 2, children explored the link between counting in 2s and the 2 times-table. This small step provides the opportunity to revisit and consolidate this learning while focusing on multiples of 2

Children should be able to identify whether or not a number is a multiple of 2. They should understand that, by definition, multiples of 2 are numbers that can be divided into two equal groups.

Children use their knowledge of multiples of 2 to decide if a number is even or odd. They learn to recognise that a whole number is even if it has an even number of ones, regardless of whether the tens and hundreds digits are odd. For example, 576 is even because there are 6 ones and 6 is even.

Things to look out for

- Children may not be confident with the 2 times-table facts.
- Children may not just focus on the ones digit when identifying if a number is odd or even.
- Children may need reminding what the term "multiple" means.

Key questions

- What is the next multiple of 2?
- What is the multiple of 2 before _____?
- How do you know that all multiples of 2 are even?
- What do you notice when you add two even numbers together? Is this always true?
- What do you notice when you add two odd numbers together? Is this always true?

Possible sentence stems

- The next multiple of 2 is _____
- The previous multiple of 2 is _____
- I know _____ is even because ...

National Curriculum links

- Count in steps of 2, 3 and 5 from 0, and in 10s from any number, forward and backward (Y2)
- Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers (Y2)

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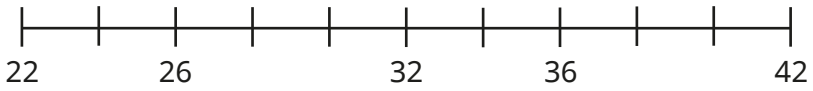
Multiples of 2

Key learning

- Complete the number tracks.

2	4		8		12			
16	18		22		26			
32		28			22			

- Complete the number line.

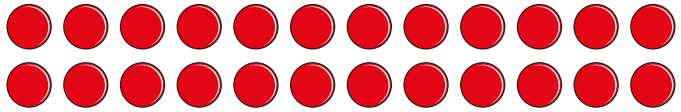


- Colour the multiples of 2 in the grid.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50

What do you notice?

- Here is an array made of 24 counters.



How does the array show that 24 is a multiple of 2?

Is 24 an even number? How do you know?

- Use arrays to decide whether 21 is a multiple of 2

Explain your answer to a partner.

- Write three multiples of 2 that are between 40 and 50

Write three multiples of 2 that are between 100 and 200

Write three multiples of 2 that are greater than 500

- Decide whether each number is odd or even.

730	661	502	225

Explain your answers to a partner.

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Multiples of 2

Reasoning and problem solving

Here are some number cards.

682	176	88	185

Find a reason why each number could be the odd one out.

682: all even digits

176: only number without an 8 in the tens column

88: only 2-digit number

185: only odd number

If I add two odd numbers together, the total is a multiple of 2

Is this always true, sometimes true or never true?

How do you know?

always true

Without working out each side, write <, > or = to compare the statements.

3×2 ◯ 7×2

$5 \times 2 + 3 \times 2$ ◯ 8×2

9×2 ◯ $2 \times 2 + 6 \times 2$

Explain your reasoning.

<

=

>

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Multiples of 5 and 10

Notes and guidance

In Year 2, children counted in 5s and 10s and looked at these multiplication times-tables. In this small step, they revisit and consolidate this learning by focusing on multiples of 5 and 10 and the connections between them.

Children should recognise that a whole number is a multiple of 5 if the ones digit is either 5 or 0. Similarly, they should recognise that a whole number is a multiple of 10 if the ones digit is 0

Children could use arrays or hundred squares to help them if needed, but they should be moving towards fluency with the facts in these times-tables.

Things to look out for

- When counting in 5s, children may miss numbers out, particularly with numbers over 50
- Children may need reminding what the term "multiple" means.
- Children may think that because all multiples of 10 are multiples of 5, then all multiples of 5 are also multiples of 10

Key questions

- What is the next multiple of 5/10?
- What is the multiple of 5/10 before _____?
- What do you notice about the multiples of 5 and 10?
- When is a multiple of 5 also a multiple of 10?
- Is _____ a multiple of 5/10? How can you tell?
- Are all multiples of 10 even? How do you know?

Possible sentence stems

- The next multiple of 5/10 is _____
- The previous multiple of 5/10 is _____
- I know _____ is a multiple of 5/10 because ...

National Curriculum links

- Count in steps of 2, 3 and 5 from 0, and in 10s from any number, forward and backward (Y2)
- Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers (Y2)

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Multiples of 5 and 10

Key learning

- Complete the number tracks.

0	5		15		25			
60	55		45					
110		90		70				

- Here is a hundred square.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Circle the multiples of 5

Colour the multiples of 10

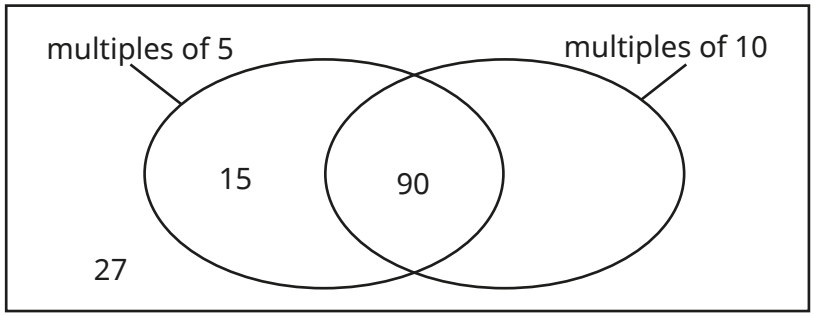
What do you notice?

- Sort the numbers into the diagram.

15 90 27 95 105 40

700 740 57 605 406 50

The first three have been done for you.



What do you notice?

- Annie and Teddy each have some money.

  - Annie has eight £5 notes.

    How much money does Annie have?

  - Teddy has four £10 notes.

    How much money does Teddy have?

What do you notice?

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Multiples of 5 and 10

Reasoning and problem solving

Is the statement always true, sometimes true or never true?

A multiple of 5 is a multiple of 10

Explain your answer.

sometimes true

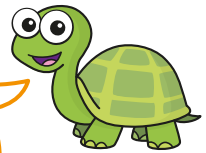
Dani buys three books and two teddies.

How much does she spend?

£35

Tiny thinks of a number.

My number is
is less than 9 lots of 5
It is greater than
4 lots of 10
It is a multiple of 2



What number could Tiny be thinking of?

42 or 44

Is the statement true or false?

A multiple of 2 cannot be a multiple of 5

Explain your answer.

False

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Sharing and grouping

Notes and guidance

In Year 2, children experienced division as both sharing and grouping. For example, they shared 10 counters equally into 2 groups, but also grouped 10 counters into 2s. In this step, children revisit and consolidate their understanding of these key skills.

Children identify whether the question involves sharing or grouping and use appropriate concrete manipulatives or pictorial representations to support their understanding. A bar model is a particularly useful pictorial representation when sharing and grouping and can help children make sense of what the question is asking, as well as what the answer represents.

The examples in this small step use the 2, 5 and 10 times-tables, as the children should be familiar with these from Year 2

Things to look out for

- Children may not understand the difference between sharing and grouping.
- Support may be needed so that children use the correct language of sharing or grouping to match the picture they are describing.
- Children may not be able to correctly interpret their answers in the context of the question.

Key questions

- How can you share _____ into _____ equal groups?
- How can you put the number of _____ into equal groups of _____?
- What is the difference between sharing and grouping?
- Is the question asking you to share or group? How do you know?
- What does your answer mean?

Possible sentence stems

- _____ has been shared equally into _____ equal groups.
- There are _____ groups of _____ in _____
- This question is sharing/grouping because ...

National Curriculum links

- Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for 2-digit numbers times 1-digit numbers, using mental and progressing to formal written methods

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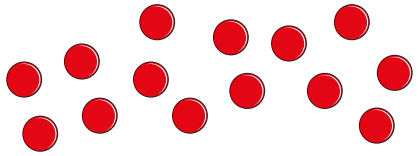
Sharing and grouping

Key learning

- Here are 14 counters.



  - Share the counters equally into 2 groups.

    Complete the sentences.

    There are _____ counters altogether.

    There are _____ groups.

    There are _____ counters in each group.

    14 ÷ _____ = _____

  - Put the counters into groups of 2

    Complete the sentences.

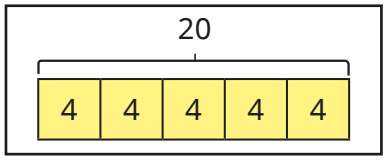
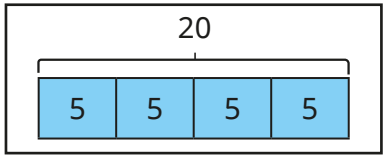
    There are _____ counters altogether.

    There are _____ groups of 2 in 14

    14 ÷ _____ = _____

  What is the same? What is different?

- Match the statements to the bar models.

20 pencils are shared equally between 5 people.	
20 pencils are grouped into packs of 5	

- Eva puts 30 apples into bags.

  Each bag has 5 apples in it.

  How many bags are there?

  Draw a bar model to show this problem.

- Ms Rose has 60 balloons.

  She shares them equally between 10 classrooms.

  How many balloons are in each classroom?

  Draw a bar model to represent this problem.

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Sharing and grouping

Reasoning and problem solving

Are the statements about sharing or grouping?

Teddy puts pencils into pots.
He has 25 pencils and puts
5 pencils in each pot.

Filip has 15 books.
He gives each of his friends
an equal number of books.

Annie has 12 sweets.
She puts the same number
of sweets in each party bag.

grouping

sharing

sharing

Explain your reasoning.

$15 \div 5 = 3$

Write two number stories to show this division.

One should be about sharing and the other should be about grouping.

Draw pictures to match your stories.

Sharing number story	**Drawing to show sharing**
Grouping number story	**Drawing to show grouping**

Compare answers as a class and discuss why they are sharing or grouping.

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Multiply by 3

Notes and guidance

Children use their knowledge of counting in 3s from Year 2 to make the link between repeated addition and multiplication and begin to calculate multiples of 3

They apply their knowledge of equal groups and use a range of concrete and pictorial representations to deepen their understanding of multiplying by 3. Initially, this is through counting in multiples of 3. They then draw on ideas from previous steps to explore flexible partitioning to show, for example, $7 \times 3 = 5 \times 3 + 2 \times 3$

Things to look out for

- Some children may not understand commutativity for multiplication, for example that 3 groups of 7 are equal to 7 groups of 3
- Children may need support with partitioning to aid their understanding of multiplication. For example, children may know $5 \times 3 = 15$ but not realise that to find 6×3 they can just add 3 to 15
- Some children find all multiplication facts by reciting their times-table facts from 1×3. Encourage them to use facts they know to find the facts they do not know.

Key questions

- How many equal groups are there?
- How many are in each group?
- How could you show this multiplication using a bar model?
- How could you use counters to explore the problem?
- How many lots/groups of 3 do you have?

Possible sentence stems

- There are _____ groups.
- There are _____ in each group.
- There are _____ altogether.
- ___ × 3 = ___ × 3 + ___ × 3

National Curriculum links

- Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables
- Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for 2-digit numbers times 1-digit numbers, using mental and progressing to formal written methods

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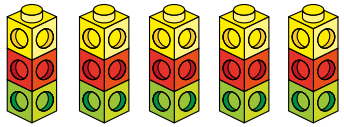
Multiply by 3

Key learning

- There are 5 towers.

  Each tower has 3 cubes.

  Complete the sentences.



  There are _____ equal groups with _____ in each group.

  There are _____ altogether.

  _____ + _____ + _____ + _____ + _____ = _____

  _____ × _____ = _____

- There are 3 vases.

  There are 9 flowers in each vase.

  How many flowers are there in total?

  Draw a bar model to show your answer.

  Write an addition and multiplication sentence to match your bar model.

- Tiny has 7 bags of apples.

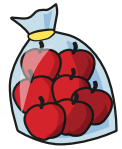
  Each bag has 3 apples.

  How many apples does Tiny have?

  Eva has 3 bags of apples.

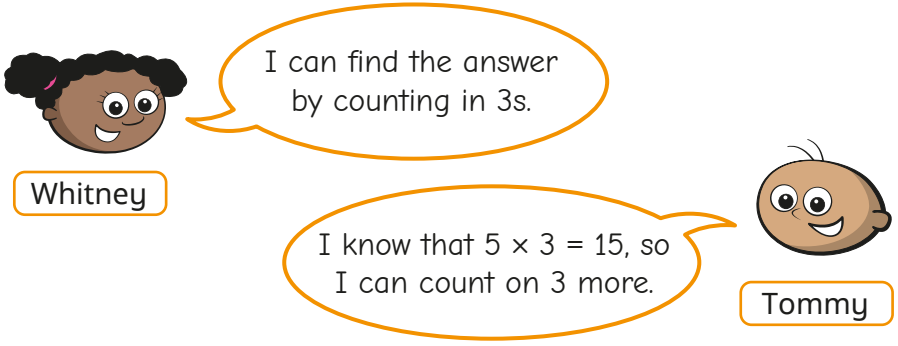
  Each bag has 7 apples.

  How many apples does Eva have?



  What do you notice?

- Whitney and Tommy are working out 6 × 3



  Whose method is more efficient?

  Explain your answer.

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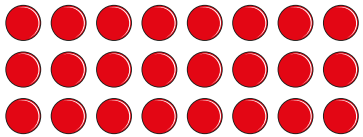
Multiply by 3

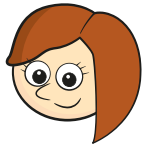
Reasoning and problem solving



I can see 5 groups of 3 and 3 groups of 3

Mo

I can see 4 groups of 3 and 4 more groups of 3



Rosie

Show a partner the groups that Mo and Rosie can see.

Use counters to make arrays for

4 × 3 5 × 3 6 × 3 7 × 3 9 × 3

How can you partition each array to find different groups of 3?

Children should explore this question practically.

5 × 3 = 15

Which calculations find the answer to 6 × 3?

5 × 3 + 6

5 × 3 + 3

15 + 3

15 + 6

3 × 6

Use counters to show your answer.

5 × 3 + 3

15 + 3

3 × 6

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Divide by 3

Notes and guidance

Building on the previous small step, children explore dividing by 3 through sharing into 3 equal groups and by grouping into 3s.

Using learning from previous steps, children identify whether a question involves sharing or grouping and use appropriate concrete manipulatives or pictorial representations to support their understanding. Encourage children to check their answers using inverse operations.

This small step will help children to become more familiar with the numbers that are multiples of 3

Things to look out for

- Children may not recognise that groups have to be equal.
- Children may not recognise the difference between dividing by sharing and dividing by grouping.
- Children may not be able to identify which number in a number sentence corresponds with which number in a context.
- Children may not be able to correctly interpret their answers in the context of the question.

Key questions

- How many will go into each group?
- How many groups of 3 can you make?
- How can you show me sharing?
- How can you show me grouping?
- Is the question sharing or grouping? How do you know?

Possible sentence stems

- There are _____ groups.
- There are _____ in each group.
- _____ has been shared equally into _____ equal groups.
- There are _____ groups of _____ in _____

National Curriculum links

- Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables
- Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for 2-digit numbers times 1-digit numbers, using mental and progressing to formal written methods

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Divide by 3

Key learning

- Here are some strawberries.

Complete the sentences.

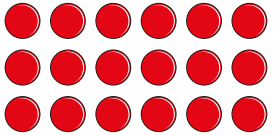
There are _____ strawberries altogether.

There are _____ plates.

There are _____ strawberries on each plate.

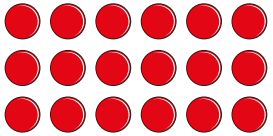
_____ ÷ 3 = _____

- Arrange the counters in groups of 3 and complete the division.



_____ ÷ 3 = _____

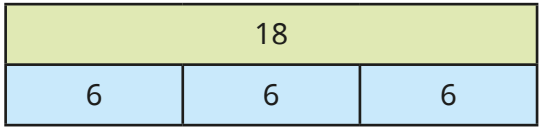
Arrange the counters in 3 equal groups and complete the division.



_____ ÷ 3 = _____

What is the same and what is different about the way you arranged the counters?

- Tiny has drawn a bar model to show 18 ÷ 3 = 6



Draw bar models to show these divisions.

27 ÷ 3 = 9	36 ÷ 3 = 12	15 ÷ 5 = 3	21 ÷ 7 = 3

- Aisha is putting balloons into bunches of 3 for a birthday party.

She has 24 balloons altogether.

How many bunches of balloons can she make?

Draw a picture to show Aisha's balloons.

- Hair bands come in packs of 3

There are 21 hair bands altogether.

How many packs of hair bands are there?

- 33 grapes are shared equally between 3 children.

How many grapes does each child get?

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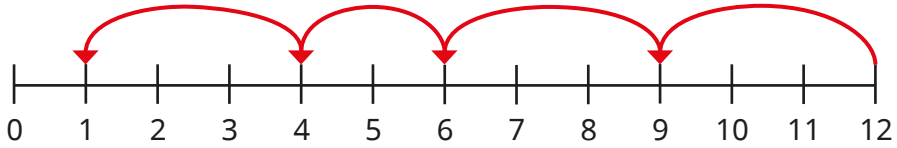
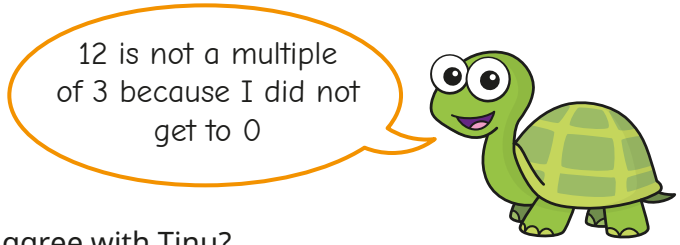
Divide by 3

Reasoning and problem solving

Tiny has drawn jumps on the number line to work out 12 divided by 3





Do you agree with Tiny?

Explain your answer.

Use a number line to show that 15 is a multiple of 3

No

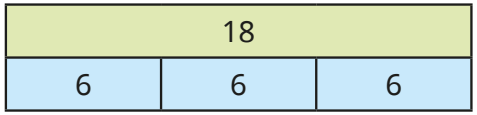
15 ÷ 3 = 5

Brett has 18 seeds and some plant pots.

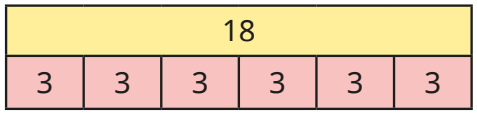
He plants 3 seeds in each pot.

Which bar model shows this?

A



B



Write a word problem to match the other bar model.

Compare answers with a partner.

What is the same?

What is different?

B

Children's word problems will vary, but should represent 18 ÷ 3

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The 3 times-table

Notes and guidance

In this small step, children bring together their knowledge of multiplying and dividing by 3 in order to become more fluent in the 3 times-table.

They construct fact families and use manipulatives and pictorial representations to make links between multiplication and division. It is important that children understand the structure of the times-table and can derive unknown facts from known facts by using strategies such as doubling/halving and partitioning, as well as using commutativity and the inverse operation. Examples focus on number facts up to 3 × 12, although this may be extended to other 2-digit numbers, such as 3 × 17, when exploring strategies, if appropriate.

Things to look out for

- Children may not know how to use the multiplication facts that they know well to find the ones they do not know as well.
- When judging inequalities, such as deciding which is greater, 5 × 3 or 7 × 3, children may try to calculate each separately and then compare, rather than recognising how many groups of 3 there are.

Key questions

- How can you show this using an array?
- What would one more lot be?
- What would double the number of lots be?
- If you know this, what else do you know?
- How could you partition the array to show different groups of 3?

Possible sentence stems

- There are _____ lots of 3
- There are _____ altogether.
- _____ lots of 3 is equal to _____
- If I know _____ × 3 is _____, then I can find _____ × 3 by ...

National Curriculum links

- Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables
- Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for 2-digit numbers times 1-digit numbers, using mental and progressing to formal written methods

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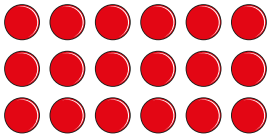
The 3 times-table

Key learning

- Complete the sentences.



  - There are 3 rows of 6 counters.

    There are 18 counters altogether.

    _____ × _____ = _____

  - There are _____ columns of _____ counters.

    There are _____ counters altogether.

    _____ × _____ = _____

  - _____ counters are arranged in _____ columns of _____ counters.

    _____ ÷ _____ = _____

  - _____ counters are arranged in _____ rows of _____ counters.

    _____ ÷ _____ = _____

- Complete the bar model.

15		

- Complete the number sentences.

  - 1 × 3 = _____
  - 2 × _____ = 6
  - _____ = 5 × 3
  - 9 × 3 = _____
  - 24 = _____ × 8
  - _____ × 3 = 21

- Match the statements.

5 × 3	4 × 3 + 2 × 3
3 × 8	3 × 4 × 2
6 × 3	6 × 3 + 3
7 × 3	half of 10 × 3

- Write <, > or = to complete the statements.

9 × 3 ◯ 2 × 3

6 × 3 ◯ 5 × 3 + 1 × 3

5 × 3 + 2 × 3 ◯ 7 × 3 + 1 × 3

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The 3 times-table

Reasoning and problem solving

Start at box A: 18 – 3

The answer gives you the starting number of the card that should come next.

Work out the order of the cards.

A	D	G	J
18 – 3	21 ÷ 3	15 ÷ 3	8 – 5
B	**E**	**H**	**K**
5 × 2	10 × 2	20 + 1	4 × 2
C	**F**	**I**	**L**
14 – 2	12 ÷ 3	3 × 6	7 × 2

A, G, B, E, H, D, L, C, F, K, J, I

Start this rhythm.

clap	clap	click	clap	clap	click
1st	2nd	3rd	4th	5th	6th

Continue the rhythm.

What will you do on the 15th beat?

What will you do on the 20th beat?

Explain your answer.

15th beat: click 20th beat: clap

How many ways can you find the product of 15 and 3?

Compare answers with a partner.

multiple possible answers

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Multiply by 4

Notes and guidance

In this small step, children build on their knowledge of the 2 times-table to multiply by 4. They draw arrays to recognise that multiplying by 4 is the same as doubling then doubling again. They could also use arrays to make links between the 4 times-table and the 5 times-table, recognising that, for example, 4 lots of 7 is 5 lots of 7 minus 7

Throughout this step, children apply their knowledge of equal groups and use concrete manipulatives and pictorial representations to explain the link between counting in 4s and multiplying by 4. They also explore the commutativity of multiplication, understanding, for example, that 4 groups of 6 is equal to 6 groups of 4

Things to look out for

- Children should use the correct language of addition and multiplication to match the picture they are describing.
- Children need to use a range of terminology to describe multiplication such as "equal groups", "lots of", "times", "multiples" and so on.
- When counting in 4s, children may miscount.

Key questions

- How many equal groups are there?
- How many are in each group?
- How can you write a number sentence to show this?
- How many lots of 4 do you have?
- How can you show why multiplying by 4 is the same as multiplying by 2 and then by 2 again?

Possible sentence stems

- There are _____ equal groups with _____ in each group.
- There are _____ altogether.
- Double _____ is _____ and double _____ is _____, so 4 lots of _____ is _____

National Curriculum links

- Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables
- Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for 2-digit numbers times 1-digit numbers, using mental and progressing to formal written methods

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Multiply by 4

Key learning

- Complete the sentences.

There are _____ pots with _____ pencils in each pot.

There are _____ pencils altogether.

_____ + _____ + _____ + _____ + _____ = _____

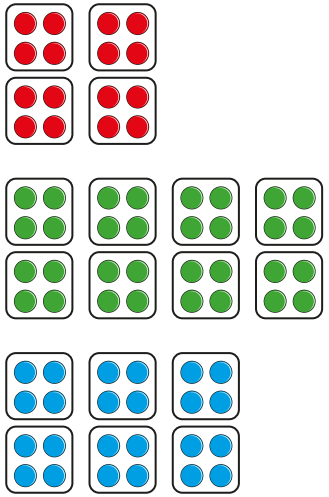
_____ × _____ = _____

- Match the multiplications to the pictures.

4 × 4

4 × 6

8 × 4

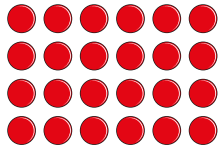


- There are 4 pens in a pack.

How many pens are there in 7 packs?

Draw a picture to show the problem.

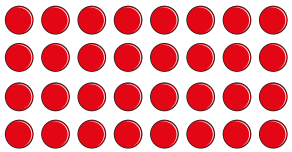
- Write two additions and two multiplications for the array.

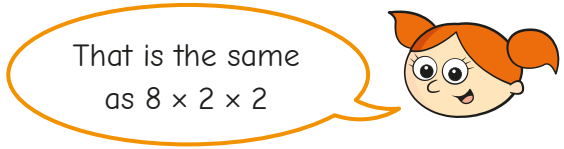


What do you notice?

- Alex is working out 8 × 4

She has made arrays to help her.





Use Alex's method to work out the multiplications.

5 × 4

9 × 4

12 × 4

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Multiply by 4

Reasoning and problem solving

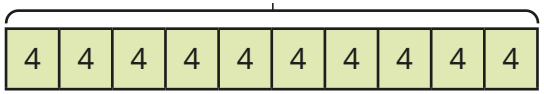
There are 10 pencils in a pack.

Jack has 4 packs.

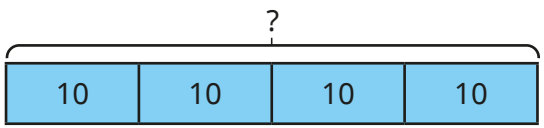
Which bar model matches the statements?

How do you know?

A



B



Think of a problem to match the other bar model.

B

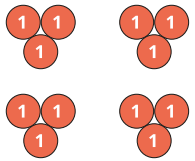
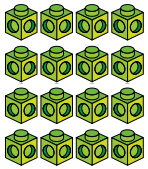
Jack has 4 equal groups (packs) with 10 pencils in each pack.

Use counters to help you show that

$$7 \times 4 = 7 \times 2 \times 2$$

Children should use counters to show this.

Which part does not show counting in 4s?

4 + 4 + 4 + 4	
	4 4 4

Explain your answer.

place value counters

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Divide by 4

Notes and guidance

From previous steps, children should be confident with the understanding of division as sharing and grouping. In this small step, they apply this knowledge and explore dividing by 4 through sharing into 4 equal groups and grouping into 4s.

Children identify whether the question involves sharing or grouping and use appropriate concrete manipulatives or pictorial representations to support their understanding. Encourage children to explain what their answer represents to support understanding of the differences between sharing and grouping.

Children build on their knowledge from the previous step and recognise that if multiplying by 4 is the same as doubling the number and then doubling again, then dividing by 4 is the same as halving the number and halving it again.

Things to look out for

- Children may need support using a range of terminology to describe division, such as "sharing", "grouping", "equal groups", "divide" and so on.
- Children may not use the correct language of sharing or grouping to match the picture they are describing.

Key questions

- How can you share _____ into 4 equal groups?
- How can you put _____ into equal groups of 4?
- What is the difference between sharing and grouping?
- Is this question asking you to share the _____ or group them? How do you know?
- How can you show that dividing by 4 is the same as dividing by 2 and then by 2 again?
- What does your answer represent?

Possible sentence stems

- _____ has been shared into _____ equal groups.
- There are _____ groups of _____ in _____

National Curriculum links

- Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables
- Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for 2-digit numbers times 1-digit numbers, using mental and progressing to formal written methods

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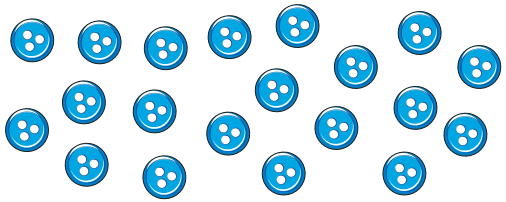
Divide by 4

Key learning

- Here are 20 buttons.



  - Share the buttons into 4 equal groups and complete the sentence.

    20 shared into _____ equal groups is _____

  - Circle groups of 4 buttons and complete the sentence.

    There are _____ groups of 4 in 20

  What is the same? What is different?

- 28 children are put into 4 equal teams.

  How many children are in each team?

  28 children are put into teams of 4

  How many teams are there?

  What is the same about the questions?

  What is different?

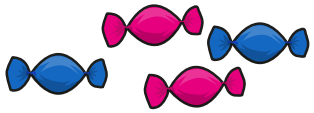
- There are some cars in a car park.

  Each car has 4 wheels.

  In the car park, there are 32 wheels altogether.

  How many cars are there?

- Scott has 20 sweets and some bags.



  He puts 4 sweets in each bag.

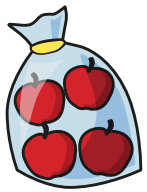
  Use the number line to help you work out how many bags Scott can fill.

- A shop sells apples in bags of 4

  Each bag of apples costs £2

  Rosie buys 36 apples.

  How much does Rosie spend?



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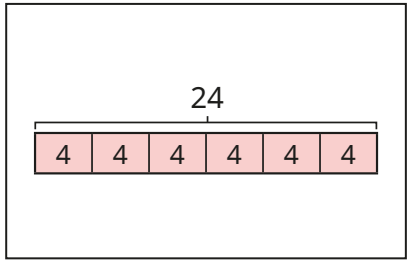
Divide by 4

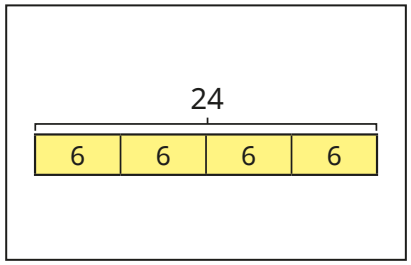
Reasoning and problem solving

Match the word problems to the bar models.

Amir has 24 biscuits.
He shares them equally into 4 boxes.
How many biscuits are in each box?



Amir has 24 biscuits.
He puts them into boxes with 4 biscuits in each box.
How many boxes will he need?

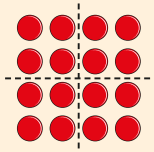


Explain your thinking.

The first problem goes with the second bar model, and the second problem with the first bar model.

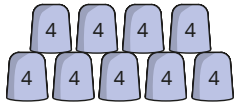
Use counters to help you show that

$$16 \div 4 = 16 \div 2 \div 2$$



Four children are playing a game.

They score 4 points for every cup they knock down.



Here are their scores.

Huan	16
Nijah	28
Kim	12
Tom	32

How many cups did they each knock down?

Huan: 4 cups

Nijah: 7 cups

Kim: 3 cups

Tom: 8 cups

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The 4 times-table

Notes and guidance

In this small step, children draw together their knowledge of multiplying and dividing by 4 in order to deepen their understanding of the 4 times-table.

Children continue to use concrete manipulatives and pictorial representations within this step. They use arrays to support their understanding of partitioning, for example $13 \times 4 = 10 \times 4 + 3 \times 4$. Children continue to explore the commutativity of multiplication: if $3 \times 4 = 12$, then $4 \times 3 = 12$

As in earlier steps, links could be made between the 4 times-table and the 5 times-table. Children should recognise that multiplying a number by 4 is the same as multiplying that number by 5 and then subtracting 1 lot of it.

Things to look out for

- Children may need support using a range of terminology to describe multiplication such as "equal groups", "lots of", "times", "multiples" and so on.
- Children may need support using a range of terminology to describe division such as "sharing", "grouping", "equal groups", "divide" and so on.
- Some children may be over-reliant on inefficient methods for multiplying.

Key questions

- How many equal groups are there?
- How many lots of 4 do you have?
- What can you partition _____ into to help you multiply _____ by 4?
- What strategy can you use when multiplying by 4?
- What strategy can you use when dividing by 4?

Possible sentence stems

- There are _____ groups of 4 in _____
- There are 4 groups of _____ in _____
- _____ × 4 = _____ × 4 + _____ × 4

National Curriculum links

- Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables
- Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for 2-digit numbers times 1-digit numbers, using mental and progressing to formal written methods

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The 4 times-table

Key learning

- Colour the multiples of 4

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50

What do you notice?

- Complete the number sentences.
  - 1 × 4 = _____
  - 2 × _____ = 8
  - _____ = 5 × 4
  - 9 × 4 = _____
  - 32 = _____ × 4
  - _____ × 4 = 48

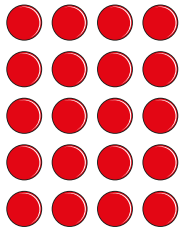
- 8 children go to the cinema.

  One ticket costs £4

  How much does it cost altogether?

- What multiplications and divisions does the array show?

  Complete the number sentences.



_____ × _____ = _____

_____ × _____ = _____

_____ ÷ _____ = _____

_____ ÷ _____ = _____

- Write <, > or = to compare the statements.

6 × 4 ◯ 40 ÷ 4

8 ÷ 4 ◯ 8 × 4

9 × 4 ◯ 4 × 9

- Complete the number sentences.
  - 4 × 9 = 5 × 9 – _____ × 9
  - 4 × 9 = 2 × 9 + _____ × 9
  - 4 × 9 = _____ × 2 × 9

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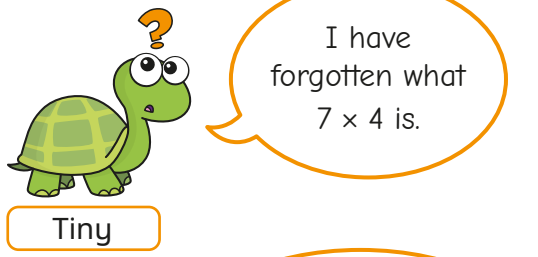
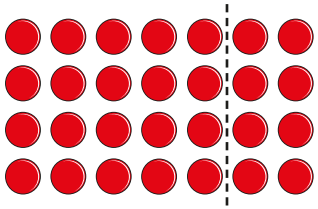
The 4 times-table

Reasoning and problem solving

Tiny and Eva are working on the 4 times-table.





Use counters to explore other methods that Tiny can use.

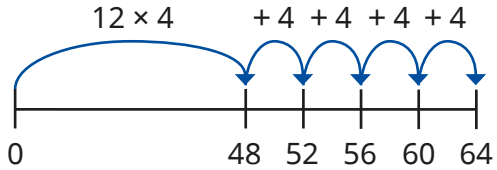
multiple possible answers, e.g.

7 × 2 × 2

4 × 4 + 3 × 4

Amir is working out 16 × 4

He starts from 12 × 4 and counts up four more 4s.



How many different methods can you think of to calculate 16 × 4?

multiple possible answers, e.g.

10 × 4 and 6 × 4 to make 64

16 × 2 × 2 = 64

Esther buys 8 toy cars and 4 packs of stickers.

How much does she spend in total?

£40

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Multiply by 8

Notes and guidance

In this small step, children build on their knowledge of the 4 times-table to multiply by 8

Children apply their knowledge of equal groups and use concrete manipulatives and pictorial representations to explain the link between counting in 8s and multiplying by 8

Through this, children should recognise that each multiple of 8 is double its equivalent multiple of 4, and may take this further to realise that multiplying by 8 is the same as doubling three times. Children may also recognise that calculating 8 lots of a number is the same as calculating 10 lots of the same number and subtracting 2 lots of it. Children also explore the commutativity of multiplication. For example, they should have an understanding that 8 groups of 6 is equal to 6 groups of 8

Things to look out for

- Children may not use the correct language of addition and multiplication to match the picture they are describing.
- Children may need support using a range of terminology to describe multiplication such as “equal groups”, “lots of”, “times”, “multiples” and so on.
- When counting in 8s, children may miscount.

Key questions

- How many equal groups are there?
- How many are in each group?
- How can you write a number sentence to show this?
- How many lots of 8 do you have?
- What is the relationship between multiplying by 4 and multiplying by 8?

Possible sentence stems

- There are _____ equal groups with _____ in each group.
- There are _____ altogether.
- If _____ × 4 = _____, then _____ × 8 = _____

National Curriculum links

- Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables
- Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for 2-digit numbers times 1-digit numbers, using mental and progressing to formal written methods

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Multiply by 8

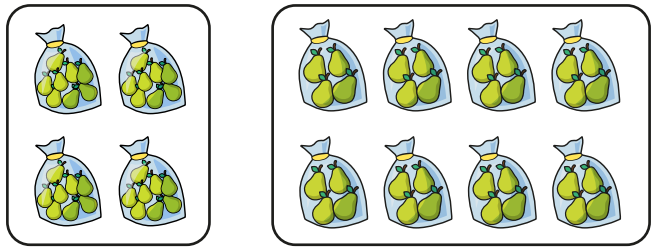
Key learning

- Complete the sentences to describe each picture.

  There are _____ bags of pears.

  There are _____ pears in each bag.

  There are _____ pears in total.



  What is the same about your answers? What is different?

- 

  Complete the sentences.

  How many legs do 5 spiders have altogether?

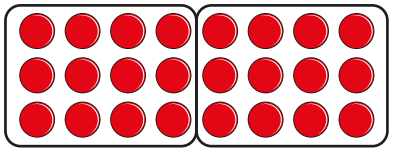
  There are _____ legs on each spider.

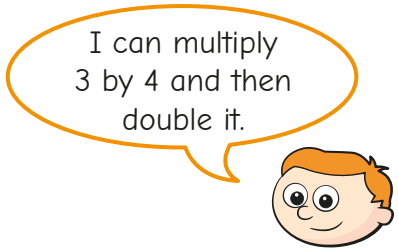
  _____ + _____ + _____ + _____ + _____ = _____

  _____ × 8 = _____

  _____ spiders have _____ legs altogether.

- Ron has drawn an array to help him work out 3 × 8

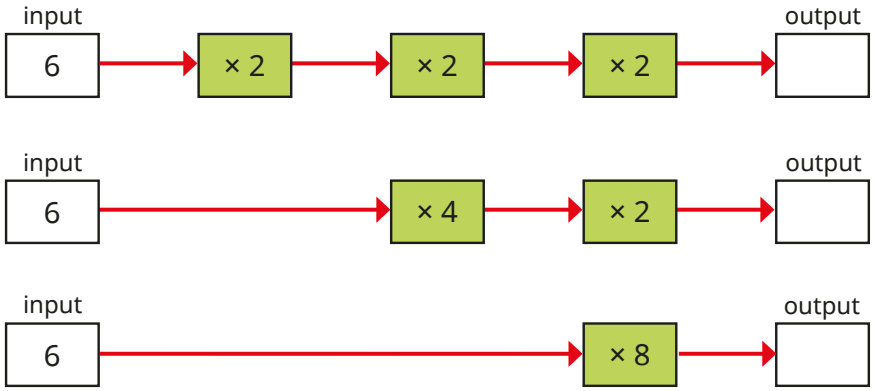




  Use Ron's method to work out the multiplications.

5 × 8	9 × 8	7 × 8

- Complete the function machines.



  What do you notice about each output?

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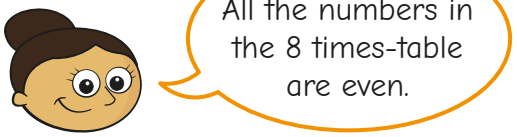
Multiply by 8

Reasoning and problem solving

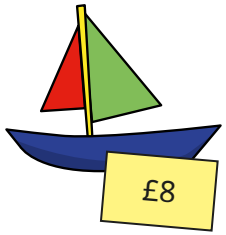


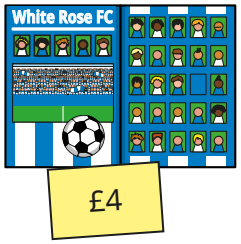
Explain why Dora is correct.

Numbers in the 8 times-table are all multiples of 2 and all multiples of 2 are even.

Jack buys 6 toy boats and 8 sticker books.

How much does he spend in total?





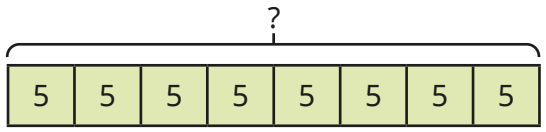
£80

Rosie has 8 packs of crayons.

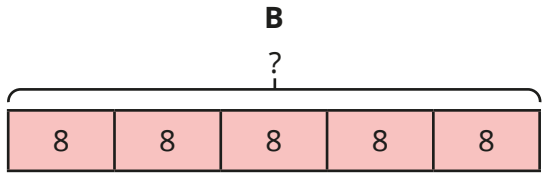
There are 5 crayons in a pack.

Which bar model matches the statements?

A



B



How do you know?

Write a problem to match the other bar model.

A

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Divide by 8

Notes and guidance

From previous steps, children will be confident with the understanding of division as sharing and grouping. In this small step, children apply this knowledge and explore dividing by 8 through sharing into 8 equal groups and grouping into 8s.

Children identify whether the question involves sharing or grouping and use appropriate concrete manipulatives or pictorial representations to support their understanding. Encourage children to discuss what their answers represent and to interpret them in context.

Children build on their knowledge from previous steps and recognise that dividing by 8 is the same as dividing by 2 three times, or halving three times.

Things to look out for

- Children may need support using a range of terminology to describe division such as “sharing”, “grouping”, “equal groups”, “divide” and so on.
- Children may not use the correct language of sharing and grouping to match the picture they are describing.
- Children may think that to divide by 8 they can divide by 4 twice.

Key questions

- How can you share _____ into 8 equal groups?
- How can you put _____ into equal groups of 8?
- What is the difference between sharing and grouping?
- Is this question asking you to share the _____ or group them? How do you know?
- How can you show that dividing by 8 is the same as dividing by 2 three times?

Possible sentence stems

- _____ has been shared into _____ equal groups.
- There are _____ groups of _____ in _____

National Curriculum links

- Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables
- Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for 2-digit numbers times 1-digit numbers, using mental and progressing to formal written methods

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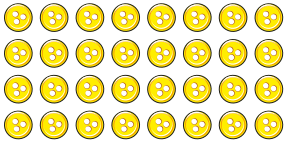
Divide by 8

Key learning

- Here are 32 buttons.



  - Share the buttons into 8 equal groups and complete the sentence.

    32 shared into _____ equal groups is _____

  - Circle groups of 8 buttons and complete the sentence.

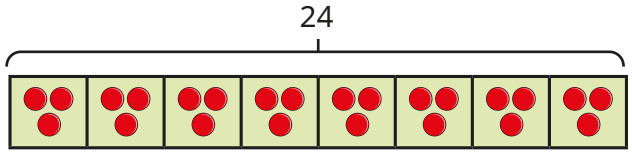
    There are _____ groups of 8 in 32

  What is the same? What is different?

- 24 sweets are shared equally into 8 bags.

  Dani is working out how many sweets there will be in each bag.

  She uses a bar model and counters to share 24 into 8 equal groups.



  Use Dani's method to work out 16 ÷ 8

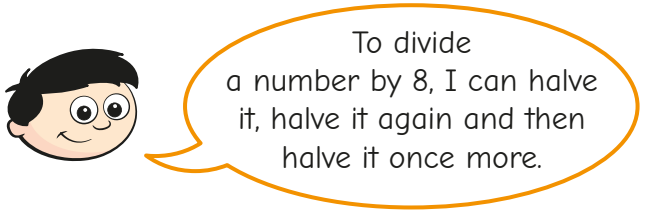
- 48 children are eating lunch in the school hall.

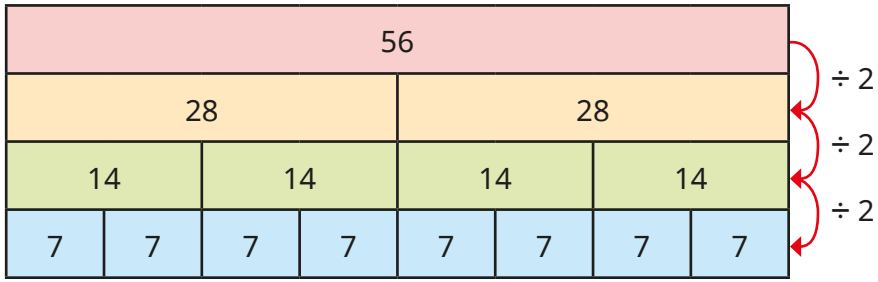
  Each table can seat 8 children.

  How many tables are needed?

  Use a number line to help you work out the answer.

- Dexter is working out 56 ÷ 8





  Use Dexter's method to work out the divisions.

88 ÷ 8	72 ÷ 8	96 ÷ 8	200 ÷ 8

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Divide by 8

Reasoning and problem solving

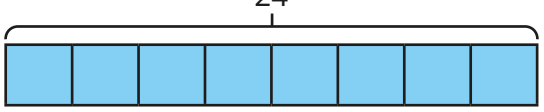
Amir has 24 sweets.

He shares them equally between 8 friends.

How many does each friend get?

Which bar model would you use to show this problem?

A



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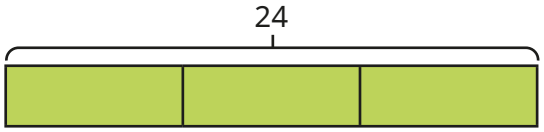

Explain your answer.

Write a problem to match the other bar model.

3 sweets

A

Whitney has £30 pocket money.

She buys some of these books and gets £6 change.

How many books does she buy?

3 books

Complete the divisions.

48 ÷ 2 = _____

48 ÷ 4 = _____

48 ÷ 8 = _____

What do you notice about the answers?

Can you predict the answer to 48 ÷ 16?

24, 12, 6

48 ÷ 16 = 3

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The 8 times-table

Notes and guidance

In this small step, children draw together their knowledge of multiplying and dividing by 8 in order to deepen their understanding of the 8 times-table.

Children continue to use concrete manipulatives and pictorial representations within this step. They use arrays to support their understanding of partitioning, for example 7 × 8 = 5 × 8 + 2 × 8. Children continue to explore the commutativity of multiplication: if 3 × 8 = 24, then 8 × 3 = 24

Children could be stretched to consider finding numbers in the 8 times-table that are greater than 96. They should use their understanding of partitioning to support them with this, for example 10 × 8 + 6 × 8 = 128 so 128 is in the 8 times-table.

Things to look out for

- Children may need support using a range of terminology to describe multiplication such as "equal groups", "lots of", "times", "multiples" and so on.
- Children may need support using a range of terminology to describe division such as "sharing", "grouping", "equal groups", "divide" and so on.

Key questions

- How many lots of 8 do you have?
- How many groups of 8 are there in _____?
- What can you partition _____ into to help you multiply _____ by 8?
- What can you partition _____ into to help you decide whether it is in the 8 times-table?
- What strategy can you use when multiplying/dividing by 8?

Possible sentence stems

- _____ × 8 = _____
- There are 8 groups of _____ in _____
- _____ × 8 = _____ × 8 + _____ × 8

National Curriculum links

- Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables
- Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for 2-digit numbers times 1-digit numbers, using mental and progressing to formal written methods

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The 8 times-table

Key learning

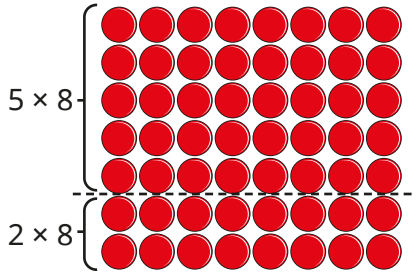
- Complete the table.

×	4	8
3		
7		
8		
11		

What do you notice?

- Teddy is using partitioning to help him work out 7 × 8

$$7 \times 8 = 5 \times 8 + 2 \times 8$$
$$= 40 + 16$$
$$= 56$$

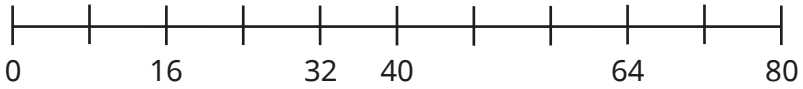


Use Teddy's method to work out the multiplications.

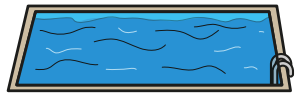
6 × 8 | 9 × 8 | 13 × 8

- Complete the calculations.
  - 1 × 8 = _____
  - 2 × _____ = 16
  - _____ ÷ 8 = 11
  - 72 ÷ 8 = _____
  - 64 = _____ × 8
  - _____ × 8 = 48

- Complete the number line.



- 9 children go swimming.
  It costs £8 for one child to go swimming.
  How much does it cost altogether?



- 56 children are going on a school trip.
  Each minibus can take 8 children.
  How many minibuses are needed?

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The 8 times-table

Reasoning and problem solving

Colour the multiples of 8 on the hundred square.

Circle the multiples of 4 on the hundred square.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Use your hundred square to decide whether each statement is always true, sometimes true or never true.

Multiples of 4 are also multiples of 8

Multiples of 8 are also multiples of 4

sometimes true

always true

Rosie has some packs of drink.

Some packs have 4 cans in them, and some packs have 8 cans in them.

Rosie has 64 cans.

How many packs of 4 cans and how many packs of 8 cans could there be?

multiple possible answers e.g.

2 packs of 4 and 7 packs of 8

Do you agree with Tiny?

Explain your answer.

Yes

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The 2, 4 and 8 times-tables

Notes and guidance

So far, children have explored multiplying by 2, 4 and 8 in detail, but focused on one particular skill at a time. Although they may have begun to make links between them, this small step provides children with explicit opportunities to make connections between the 2, 4 and 8 times-tables.

They link multiplying by 4 to doubling then doubling again, and multiplying by 8 to doubling three times. They should also recognise that dividing by 4 is the same as halving then halving again, and dividing by 8 is the same as halving three times. By the end of this step, children will be able to apply their knowledge of known facts to support them; for example, to work out 7 × 8, children can do 7 × 2 × 2 × 2, or to calculate 56 ÷ 8, they can do 56 ÷ 2 ÷ 2 ÷ 2

Things to look out for

- Children may not recognise how to use different terminology to describe multiplication, for example "equal groups", "lots of", "times", "multiples" and so on.
- Children may not see the link between multiplying by 2 and doubling.
- When multiplying by 8, children may multiply by 4 and then by 4 again, or multiply by 2 four times.

Key questions

- How does knowing _____ × 2 help you work out _____ × 4 and _____ × 8?
- What is the relationship between multiplying by 4 and multiplying by 8?
- How can you show that multiplying by 4 is the same as multiplying by 2 and then by 2 again?
- How can you show that dividing by 4 is the same as dividing by 2 and then by 2 again?

Possible sentence stems

- _____ × 4 = _____ × 2 × 2
- _____ × 8 = _____ × 2 × 2 × 2
- _____ × 8 = _____ × 2 × 4

National Curriculum links

- Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables
- Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for 2-digit numbers times 1-digit numbers, using mental and progressing to formal written methods

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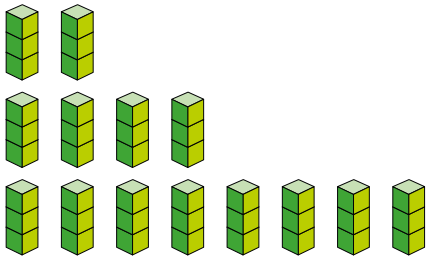
The 2, 4 and 8 times-tables

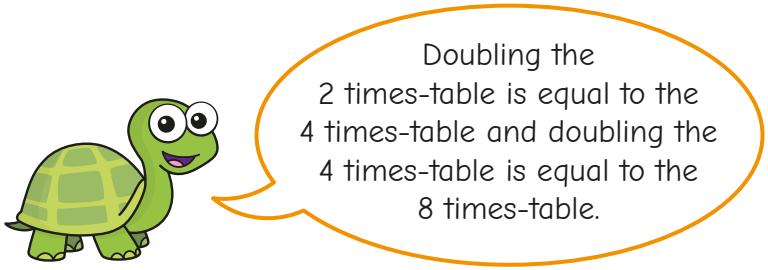
Key learning

- Complete the multiplications.
  - 3 × 2 = _____
  - 3 × 4 = _____
  - 3 × 8 = _____



What do you notice?

- Tiny has been looking at the 2, 4 and 8 times-tables.



Use Tiny's method to complete the calculations.

7 × 2 = _____	9 × 2 = _____	12 × 2 = _____
7 × 4 = _____	9 × 4 = _____	12 × 4 = _____
7 × 8 = _____	9 × 8 = _____	12 × 8 = _____

- Complete the table.

×	2	4	8
3	6		
	10	20	
			72

What do you notice?

- 100 ÷ 2 = 50, so 100 ÷ 4 = _____

Which is the correct answer?

50	75	25	20

- Match the equivalent calculations.

6 × 8	64 ÷ 2 ÷ 2 ÷ 2
6 × 4	6 × 4 × 2
64 ÷ 8	half 64, then half it again
64 ÷ 4	6 × 2 × 2

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The 2, 4 and 8 times-tables

Reasoning and problem solving

Is the statement true or false?

Multiples of 8 are also multiples of 4 and 2

Explain your answer.

True

A shop sells books, packets of stickers and teddy bears.

Filip spends exactly £20 in the shop.

What could Filip have bought?

Is there more than one answer?

multiple possible answers, e.g.

2 books and 1 bear

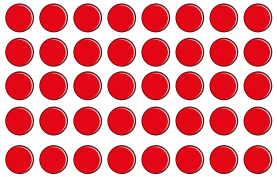
1 book and 3 bears

1 book, 2 bears and 2 packs of stickers

10 packs of stickers

5 bears

Here is an array.



Make the array using counters.

What else can you see?

multiple possible answers, e.g.

2 lots of 20

20 lots of 2

4 lots of 10

4 lots of 2 × 5

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