

# Arithmekit Sample



## The essential maths toolkit

A small sample of our collection of rich problem solving and reasoning activities designed to deepen children's understanding of the Number strands (place value and calculation) of the National Curriculum for Mathematics and improve their arithmetical proficiency.

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# Teacher notes

Arithmetic 3 offers a range of 120 problem solving and reasoning activities to strengthen and deepen understanding of key number and calculation skills and strategies.

The 24 skills and strategies, essential elements of any successful mathematician's toolkit, have been carefully selected to develop pupils' conceptual understanding. By exploring the structure of mathematics and noticing relationships, the activities aim to improve fluency in calculation, develop a secure and deep understanding, help pupils make connections and address the requirements of the end of Key Stage 1 and 2 Arithmetic national assessments.

Each section has 2 pages containing 5 activities:

An activity to develop fluency – just do it! Then use higher order thinking skills to create your own challenge.

An activity to explore relationships and the structure of an aspect of number. Ask “What do you notice?” to dig deeper.

5 Arithmetic 3

Partition the end number to add, so that 1s including bridging

Find the matching pairs:

117 + 134	412
342 + 276	217
344 + 237	414
127 + 146	342
229 + 244	222
427 + 247	429
229 + 244	429
344 + 237	429
344 + 237	429

What's missing?  
Create your own matching pairs problem.

Fill in the missing numbers:

348 + 152 = 348 + 100 + 50 +  =

348 + 152 = 348 + 100 + 50 +  =

348 + 152 = 348 +  =

348 + 152 =  =

Now try these:

248 + 252 = 248 + 200 + 50 +  =

248 + 252 = 248 + 200 + 50 +  =

248 + 252 =  =

What do you notice?  
What do you notice?

Now try these:

443 + 222 = 443 + 200 + 20 +  =

443 + 222 = 443 + 200 + 20 +  =

443 + 222 =  =

With thanks to Deborah M'Carthy, Chris Tomkins, Suzanne Matthews and Duncan Russell.

A 'true or false' statement to investigate further. Do you agree with Colin or Coco? Explore a conjecture by asking "When is it true?"

A missing number activity to develop fluency – just do it! Then use higher order thinking skills to create your own challenge.

Convince Coco or Colin using resources or jottings.

5 Arithmetic 3

Partition the end number to add, so that 1s including bridging

Colin says: "The best way to add 275 and 354 is to start on 356 add the hundreds then add the tens, then add the ones."

Do you agree with Colin?

Do you disagree with Colin?

Using a number line convince Coco that  $354 + 267 = 621$

Is there only one way to solve this problem?  
Use the digits 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9 once each, to make all the statements true.

<input type="text"/>	7	<input type="text"/>	6
<input type="text"/>	4	6	3
4	6	3	<input type="text"/>
<input type="text"/>	4	6	3

3  1 + 3  5 =

6  3 + 4  2 =

Spot the odd one out in each set:

34	$10 + 24$
$20 + 14$	$30 + 14$

i)

$50 + 15$	$50 + 5$
$30 + 25$	55

ii)

$40 + 6$	$30 + 16$
$10 + 26$	$20 + 10 + 16$

iii)

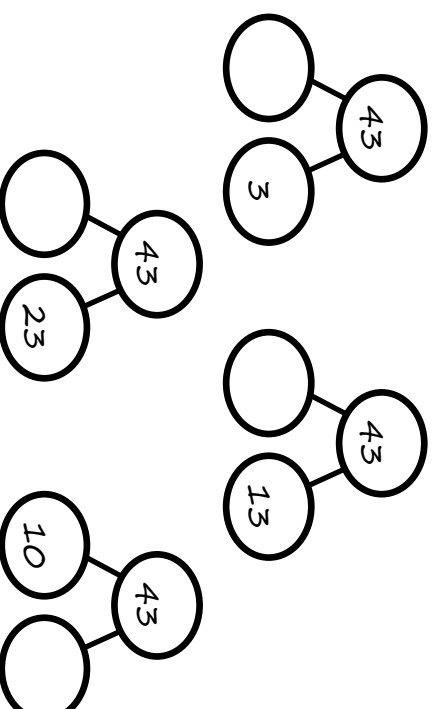
$60 + 3$	63
$20 + 43$	$30 + 23$

iv)

Create your own odd one out puzzle involving partitioning 2-digit numbers in different ways.


Partition some numbers of your own into a multiple of ten and 'the rest'.

Partition 43:



Now try these:

$$64 = \underline{\quad} + 54$$

$$64 = \underline{\quad} + 44$$

$$64 = \underline{\quad} + 34$$

$$64 = 40 + \underline{\quad}$$

$$64 = 50 + \underline{\quad}$$

$$64 = \underline{\quad} + 4$$

What do you notice?

What do you notice?

Partition some numbers of your own into a multiple of ten and 'the rest'.



Colin says, "There are 5 ways of partitioning a 2-digit number into tens and the rest."

When is this true?

Do you agree with Colin?

Using practical resources, convince yourself

$$32 + 20 = 10 + 42$$

Convince Coco

$$24 + 30 = 40 + 14$$



Fill in the missing digits to partition 46.

46		46	
14		<input type="text"/>	<input type="text"/>

46		46	
2 <input type="text"/>		1 <input type="text"/>	

46		46	
<input type="text"/>		4 <input type="text"/>	

		<input type="text"/>		<input type="text"/>	
<input type="text"/>		3 <input type="text"/>			8

Can you do it using the digits 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9 once each?

Create your own bar model diagrams for other numbers.

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ArithmeticKit 4

Recall and use multiplication and division facts for the 6 times table



Colin says, "Only the even multiples of 6 are even."

Do you agree with Colin?

Can you make a true statement?

Using practical resources of jottings convince Coco that  $6 \times 2 = 3 \times 4$   
Convince Coco that even multiples of 3 are also multiples of 6



Put a digit in each box to make the statements true:

$$6 \times \square = \square 4$$

$$2 \square \div 6 = 4$$

$$\square \square = \square \times 6$$

$$5 \times \square = 3 \square$$

$$6 \times 1 \square = \square 2$$

Is there only one way to solve this problem?  
Use the digits 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9 once each, to make all the statements true.  
Create your own missing digit problem.

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ArithmeKit 4

Recall and use multiplication and division facts for the 12 times table

Find the matching pairs:

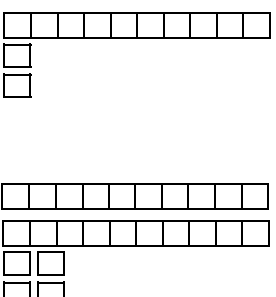
$144 \div 12$	$4 \times 12$
$12 \times 9$	$36$
$5$	$84 \div 12$
$12 \times 3$	$96$
$48$	$12$
$8 \times 12$	$11$
$7$	$108$
$0 \times 12$	$1$
$12 \div 12$	$60 \div 12$

What's missing?

Create your own matching pairs problem..

Build the first five multiples of 12 with

Base 10 resources:



What do you notice?

What happens as you continue to build?

$12 \times 6$		$6 \times 12$
$12 \times 7$		$7 \times 12$
$12 \times 8$		$8 \times 12$

What do you notice?

Find the matching pairs:

$\frac{1}{5}$	75%
0.5	14%
0.75	
0.02	22%
	25%
0.1	5%
0.22	1%
$\frac{4}{10}$	10%
0.05	2%
0.01	20%
$\frac{1}{4}$	50%

What is missing?

Create your own matching pairs problem involving decimals and percentages.

Write the equivalent fractions:

30%

70%

10%

40%

80%

20%

What do you notice?

Write the equivalent fractions as hundredths and then in their lowest form:

0.5

0.75

0.25

What do you notice?





Colin thinks these are all correct.

$$\frac{4}{5} = 0.45$$

$$\frac{1}{5} = 5\%$$

$$\frac{3}{5} = 60\%$$

$$\frac{1}{2} = 50\%$$

$$\frac{1}{4} = 14\%$$

Who do you agree with?

Coco thinks that more are correct than incorrect.



Convince Coco in at least two different

ways that,

$$\frac{2}{5} = 40\%$$



Using the digits 0–9 once, complete

these statements:

$$\frac{\square}{\square} = 100\%$$

$$\frac{\square}{\square} = \square\% \quad 5\%$$

$$\frac{\square}{\square} = 0.\square$$

$$\frac{\square}{\square} = 0.\square\square$$

$$\frac{\square}{\square} = 33.3\% \text{ (to 1 dp)}$$

Is there only one way to solve this problem?

Create your own missing digits problem.

# How am I doing?



	Objective	Can't do yet	Can do
1	Explain about 10s and 1s in 2 digit numbers		
2	Compare and order numbers to 100		
3	Partition a 2 digit number in different ways		
4	Use known facts to 10 to derive other facts		
5	Add multiples of 10 to a 2 digit number		
6	Add a single digit number to a 2 digit number using known facts		
7	Use rounding to add near multiples of 10		
8	Partition the second number to add 10s then 1s		
9	Partition and recombine to add		
10	Use known facts to 10 to derive other facts		
11	Subtract multiples of 10 from a 2 digit number		
12	Subtract a single digit number from a 2 digit number using number facts		
13	Find the difference between two numbers		
14	Partition the second number to subtract 10s then 1s		
15	Use rounding to subtract near multiples of 10		
16	Recall and use facts for the 2 times table		
17	Recall and use facts for the 10 times table		
18	Recall and use facts for the 5 times table		
19	Double numbers		
20	Recognise odd and even numbers		
21	Solve multiplication problems		
22	Halve numbers		
23	Use sharing to solve division problems		
24	Use grouping to solve division problems		

