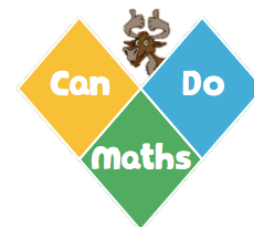


Arithmekit Answers



2



The essential maths toolkit

A 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.



Make sure we have your direct email address so we can send you any updates or additional free resources.

Email: emma@buzzardpublishing.com

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Contents

Activity	Objective
1	Explain about 10s and 1s in 2-digit numbers
2	Compare and order numbers to 100 and position them on a number line
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

Activity	Objective
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 multiplication and division facts for the 2 times table
17	Recall and use multiplication and division facts for the 10 times table
18	Recall and use multiplication and division 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

Teacher notes

Have a look at our short videos on YouTube to get ideas for getting the best out the ArithmeKits

We have provided answers to many of the ArithmeKit activities.

Matching Activity 1

You will find colour coded boxes are used to match calculations and answers in the first Matching activity of each section. Where there are missing calculations or answers these have been inserted in red or blue text – sometimes, although a calculation is given there are other possibilities that would work.



What do you notice? Activity 2

Many of these activities are reliant on discussion and it is hoped that teachers will adjust the calculations and extend them to challenge their learners, so solutions are not always provided.

Empty Box Activity 5

Our videos on YouTube are particularly helpful for showing you how to get the best out of this style of activity. Answers are provided but there may be more than one way to solve the challenge.

Colin and Coco

We have not provided solutions for the Convince Colin or Coco activities as a wide-ranging discussion is key to getting the best from these.

Find the matching pairs:

34	Four tens and one one
14	Three tens
43	Three tens and four ones
12	One ten and two ones
41	Three tens and two ones
40	One ten and three ones
32	Two tens and three ones
13	Four tens
30	One ten and four ones
23	Four tens and three ones

What's missing?

Create your own matching pairs problem involving 10s and 1s in 2-digit numbers.

Fill in the missing numbers:

$$\begin{array}{lcl}
 34 = \boxed{3} \text{ tens and } \boxed{4} \text{ ones} & 25 = \boxed{2} \text{ tens and } \boxed{5} \text{ ones} \\
 43 = \boxed{4} \text{ tens and } \boxed{3} \text{ ones} & 73 = \boxed{7} \text{ tens and } \boxed{3} \text{ ones} \\
 37 = \boxed{3} \text{ tens and } \boxed{7} \text{ ones} & 52 = \boxed{5} \text{ tens and } \boxed{2} \text{ ones}
 \end{array}$$

What do you notice?

Now try these:

$$\begin{array}{ll}
 50 + 2 = 52 & 50 + 7 = 57 \\
 60 + 2 = 62 & 60 + 7 = 67 \\
 50 + 3 = 53 & 50 + 5 = 55 \\
 60 + 4 = 64 & 60 + 3 = 63 \\
 50 + 8 = 58 & 50 + 4 = 54 \\
 60 + 5 = 65 & 60 + 8 = 68
 \end{array}$$

What do you notice?



Colin says, "When you count in 1s only the 1s digit changes."

When is this not true?

Do you agree with Colin?

Using base 10 resources, convince yourself that 1 more than 29 is 30
Convince Coco that 1 less than 40 is 39



Put digits in the empty boxes to make these true:

5	tens and four ones =	54
3	tens and six ones =	3 6
1	tens and	4 ones = 14
7	tens and	9 ones = 7 9
8	tens and	0 ones = 80
Eight tens and 12 ones =		9 2

Is there only one way to solve this problem?

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

Create your own missing digit problem.

Find the matching pairs by working out which number could go in the gap:

62	23, ____, 25
12	29, ____, 40
24	60, ____, 66
96	20, ____, 26
8	45, ____, 51
22	60, ____, 70
69	98, 99, ____,
30	1, ____, 15
100	90, ____, 98
50	11, ____, 14

What's missing?

Create your own matching pairs problem involving comparing and ordering numbers to 100

What numbers could go in the gaps?

23, , 28

33, , 48

13, , 18

63, , 68

What do you notice?

Try again with different numbers.

Put digits in the boxes to find at least 8 ways to make this statement true:

5 < 3

What do you notice?

Coco thinks that a number with 6 ones is bigger than a number with 5 ones.



When is this not true?

Do you agree with Coco?

Using resources, convince yourself that a number with 3 tens is smaller than a number with 4 tens.

Convince Colin that 51 is more than 39



Fill in the missing digits to make a list of numbers in order from smallest to largest:

$\boxed{7}$, $\boxed{1}$ 4, 1 $\boxed{8}$, $\boxed{2}$ $\boxed{0}$, $\boxed{3}$ 4, 4 $\boxed{4}$,
 46, $\boxed{5}$ $\boxed{6}$, $\boxed{9}$ 3

Can you do it in different ways?

Can you do it using only two different digits?

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

How close could the numbers be on a number line?

How far apart could they be?

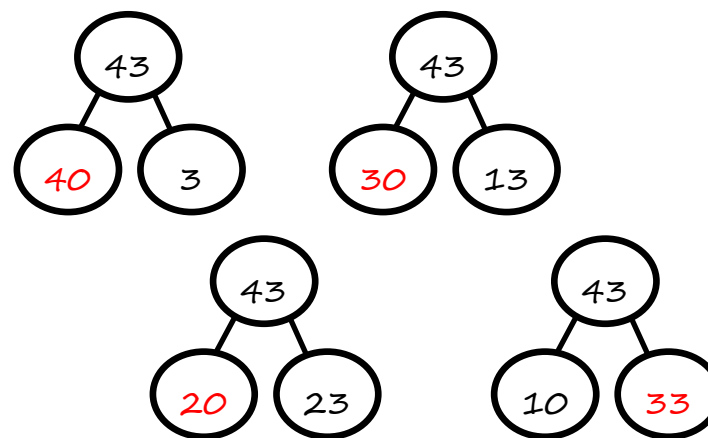
Spot the odd one out in each set:

i)	34	$10 + 24$
	$20 + 14$	$30 + 14$
ii)	$50 + 15$	$50 + 5$
	$30 + 25$	55
iii)	$40 + 6$	$30 + 16$
	$10 + 26$	$20 + 10 + 16$
iv)	$60 + 3$	63
	$20 + 43$	$30 + 23$

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:

$$64 = 10 + 54$$

$$64 = 30 + 34$$

$$64 = 50 + 14$$

$$64 = 20 + 44$$

$$64 = 40 + 24$$

$$64 = 60 + 4$$

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			
14		3	2

46			
2	9		1 7

46			
1		4	5

8		4 6	
		3 0	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.

Find the matching pairs by starting with a known fact.

$17 + 5 =$	20
$45 + 5 =$	22
$34 + 6 =$	31
$12 + 8 =$	39
$26 + 4 =$	50
$32 + 7 =$	29
$25 + 6 =$	40
$13 + 8 =$	21
$34 + 7 =$	30
$23 + 6 =$	41

What's missing?

Create your own matching pairs problem using facts to 10

What's missing? Fill in the numbers.

If $7 + 3 = 10$ then $7 + 4 =$ 11

If $6 + 4 = 10$ then $6 + 5 =$ 11

If $3 + 7 = 10$ then 4 + 7 = 11

If $4 + 6 = 10$ then 5 + 6 = 11

What do you notice?

If $7 + 3 = 10$ then $70 + 30 =$ 100

If $6 + 4 = 10$ then $60 + 40 =$ 100

If $3 + 6 = 9$ then $30 +$ 60 = 90

If $4 + 5 = 9$ then $40 +$ 50 = 90

What do you notice?

Coco thinks that when you add two numbers, if one gets bigger and the other gets smaller the total stays the same.



Is this ever true?

What could you try first?

Using practical resources and jottings, convince yourself if

$$5 + 5 = 10 \text{ then } 5 + 6 = 11$$

$$\text{Convince Colin } 7 + 4 = 11$$



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

$$\text{If } 8 + 2 = 10 \text{ then } \boxed{8}0 + 20 = 100$$

$$\text{If } \boxed{6} + 4 = 10 \text{ then } 60 + 40 = 100$$

$$\text{If } \boxed{1} + \boxed{3} + \boxed{6} = 10 \text{ then } \boxed{1}0 + \boxed{3}0 + \boxed{6}0 = 100$$

$$\text{If } 2 + \boxed{7} = 9 \text{ then } \boxed{2}0 + 70 = \boxed{9}\boxed{0}$$

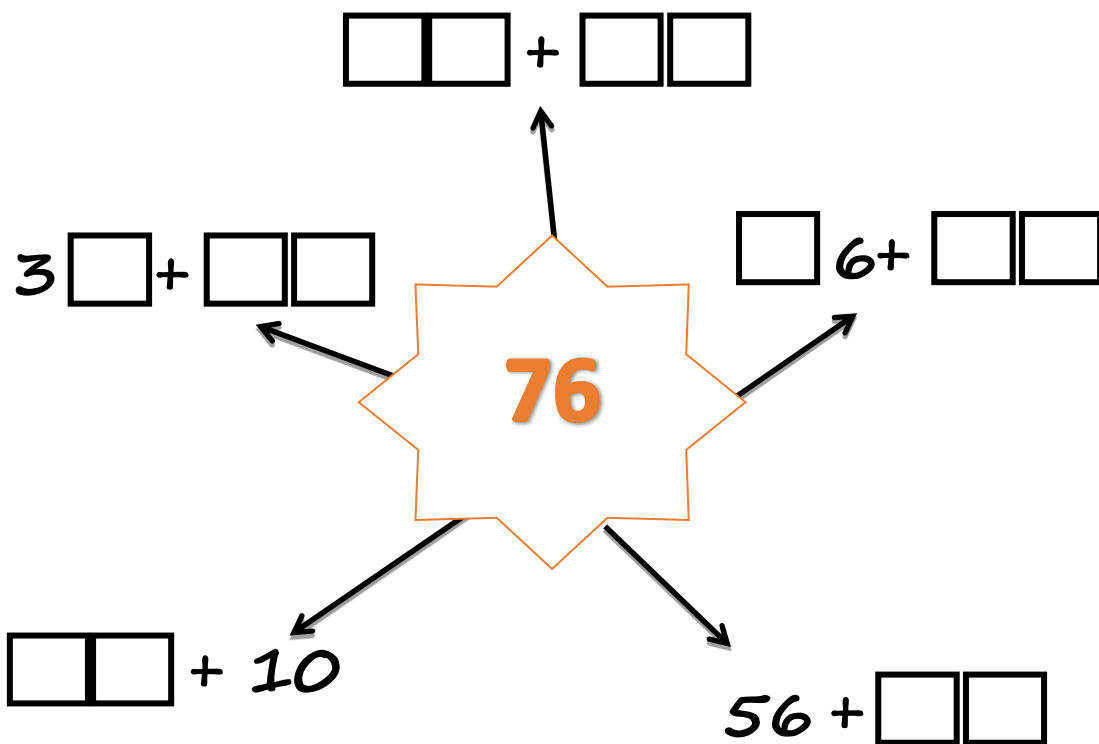
$$\text{If } \boxed{4} + \boxed{5} = 9 \text{ then } \boxed{4}0 + \boxed{5}0 = \boxed{9}\boxed{0}$$

Is there only one way to solve this problem?

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

Create your own missing digit problem.

Fill in the missing digits in several different ways:



Calculate the missing numbers:

$$23 + 30 = \boxed{53}$$

$$43 + 30 = \boxed{73}$$

$$13 + 40 = \boxed{53}$$

$$53 + 20 = \boxed{73}$$

$$23 + 50 = \boxed{73}$$

$$33 + 20 = \boxed{53}$$

What do you notice?

$$14 + \boxed{40} = 54$$

$$34 + \boxed{20} = 54$$

$$24 + \boxed{50} = 74$$

$$44 + \boxed{30} = 74$$

$$34 + \boxed{40} = 74$$

$$24 + \boxed{30} = 54$$

What do you notice?



Colin says, "When you add 40 to a 2-digit number the tens digit increases by 4"

When is this true?

Do you agree with Colin?

Using a number line, convince yourself

$$28 + 40 = 68$$

Using concrete resources, convince Coco that, $17 + 50 = 67$



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

$$\boxed{3} \boxed{4} + \boxed{5} \boxed{0} = \boxed{8} 4$$

$$\boxed{2} \boxed{7} + 40 = \boxed{6} 7$$

$$39 = 2 \boxed{9} + \boxed{1} 0$$

Is there only one way to solve this problem?

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

Create your own missing digit problem.

Find the matching pairs:

$34 + 7$	62
$64 + 7$	53
$55 + 8$	61
$46 + 6$	52
$54 + 7$	41
$56 + 6$	43
$35 + 8$	63
$44 + 7$	71
$36 + 6$	42
$45 + 8$	51

What's missing?

Create your own matching pairs problem.

Add 7 to each of these numbers:

24 54 74 34 64
 31 61 81 41 71

What do you notice?

Now add 7 to each of these numbers:

25 55 75 35 65
 32 62 82 42 72

What do you notice?

Try adding 7 to other numbers.

Coco thinks to add 7 to a 2-digit number it is best to split it into 5 and 2



Always true?

Sometimes true?

Never true?

Using known facts, convince yourself

$$38 + 6 = 44$$

Using known facts, convince Colin

$$57 + 8 = 65$$



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

$$\boxed{1} \boxed{8} + \boxed{5} = 2 \boxed{3}$$

$$\boxed{4} 6 + \boxed{0} = 4 \boxed{6}$$

$$1 \boxed{9} = 1 \boxed{7} + \boxed{2}$$

Is there only one way to solve this problem?

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

Create your own missing digit problem.

For which calculations would rounding to a near multiple of 10 be a useful strategy?

$15 + 9$

$26 + 25$

$24 + 19$

$16 + 11$

$23 + 17$

$22 + 9$

$59 + 15$

$48 + 13$

$9 + 13$

$56 + 39$

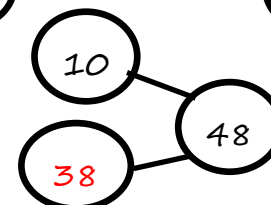
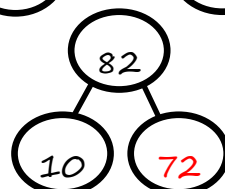
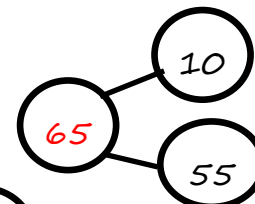
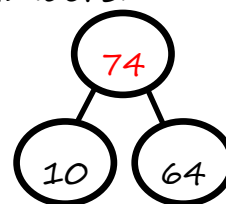
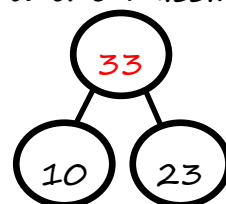
$36 + 29$

$23 + 69$

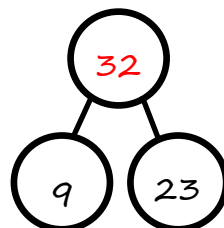
Useful	Not Useful

Create other calculations that rounding to a near multiple of 10 would be a useful strategy to solve.

Find the missing numbers:



Now add 9 to the same numbers:



What do you notice?

Add 20 to these numbers:

23

64

72

38

55

Now add 19 to the same numbers.

What do you notice?

Add 20 then add 19 to some other numbers.



Colin says, "When you add 9 to a two digit number the tens get bigger."

Can you find 5 examples when this is not true?

Can you find 5 examples when this is true?

Using practical resources, convince yourself

$$26 + 9 = 26 + 10 - 1$$

Convince Coco that

$$35 + 9 = 35 + 10 - 1$$



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

$$5 \boxed{3} + \boxed{2}0 = \boxed{7}3 \text{ so } 53 + \boxed{1}9 = 7 \boxed{2}$$

$$46 + 2 \boxed{0} = 6 \boxed{6} \text{ so } 46 + 19 = 6 \boxed{5}$$

$$7 \boxed{8} + 2 \boxed{0} = 98 \text{ so } \boxed{7}8 + \boxed{1}9 = \boxed{9}7$$

$$\boxed{5}5 + \boxed{4}0 = 95 \text{ so } \boxed{5}5 + \boxed{3}9 = 9 \boxed{4}$$

Is there only one way to solve this problem?

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

Create your own missing digit problem.

Find the matching pairs:

$17 + 15 =$	50
$45 + 25 =$	32
$34 + 26 =$	80
$32 + 18 =$	49
$46 + 34 =$	70
$32 + 17 =$	69
$22 + 16 =$	60
$33 + 28 =$	61
$34 + 27 =$	38
$43 + 26 =$	61

What's missing?

Create your own matching pairs problem using adding tens then ones.

Fill in the missing numbers:

$$37 + 12 = 37 + 10 + \boxed{2} = \boxed{49}$$

$$37 + 13 = 37 + 10 + \boxed{3} = \boxed{50}$$

$$37 + 14 = 37 + \boxed{10} + \boxed{4} = \boxed{51}$$

$$37 + 15 =$$

Now try these:

$$27 + 22 = 27 + 20 + \boxed{2} = \boxed{29}$$

$$27 + 23 =$$

$$27 + 24 =$$

$$27 + 25 =$$

$$48 + 32 = 48 + 30 + \boxed{2} = \boxed{80}$$

$$48 + 33 =$$

$$48 + 34 =$$

$$48 + 35 =$$

What do you notice?

Coco thinks the best way to add 36 and 27 is to start on 36, add the tens then the ones.



Do you agree with Coco?

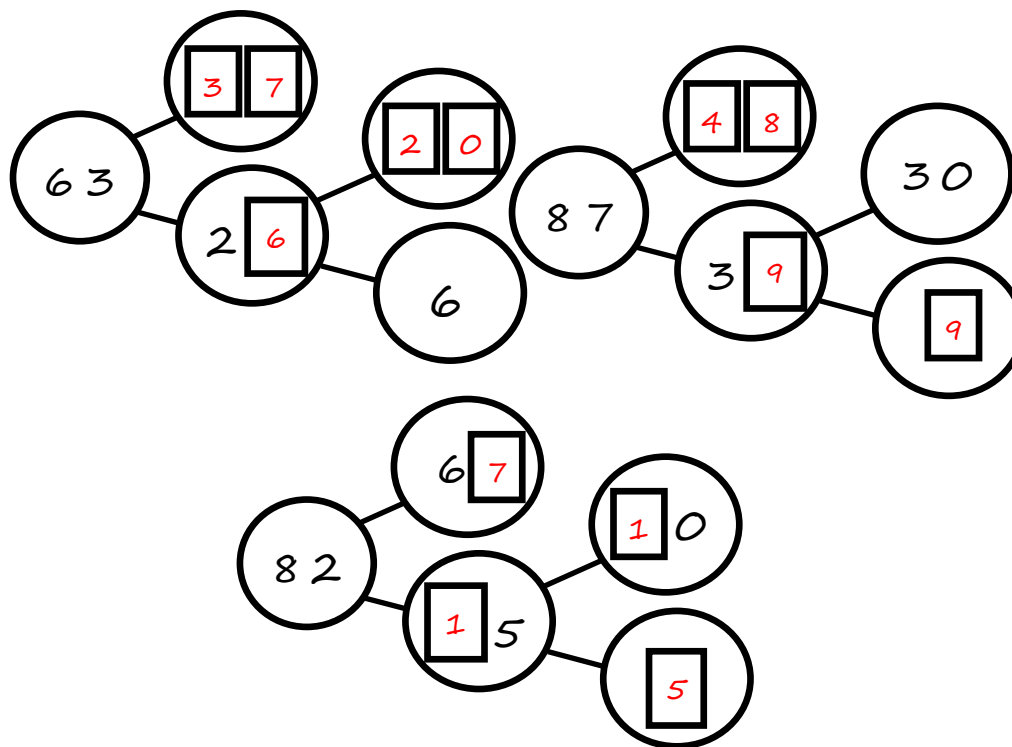
What other ways could you try?

Adding tens then ones to 46, using resources, convince yourself $46 + 27 = 73$

Using a number line convince Colin that $35 + 27 = 62$



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



Is there only one way to solve this problem?

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

Create your own missing digit problem.

Find the matching pairs:

$34 + 27 =$	$40+50+6+5$
$46 + 58 =$	$40+50+8+7$
$27 + 36 =$	$30+20+4+7$
$46 + 55 =$	$50+30+8+3$
$38 + 57 =$	$40+50+6+8$
$48 + 57 =$	$30+50+7+4$
$24 + 37 =$	$30+50+8+7$
$37 + 54 =$	$20+30+4+7$
$38 + 53 =$	$20+30+7+6$
$37 + 56 =$	$30+50+7+6$

What's missing?

Create your own matching pairs problem using partitioning and recombining to add.

Fill in the missing number:

$$\begin{array}{c}
 24 + 27 \\
 \swarrow \quad \searrow \\
 20 + 20 + 4 + 7 = \boxed{51}
 \end{array}$$

Use partitioning and recombining for these:

$34 + 37 =$

$44 + 47 =$

$24 + 57 =$

$34 + 47 =$

$44 + 37 =$

$24 + 67 =$

$34 + 57 =$

$24 + 47 =$

What do you notice?

What do you notice?



Colin says, "When you add two 2-digit numbers you get a 1 in the ones column."

What do all the true examples have in common?

Can you find examples where this is not true?

Using practical resources and partitioning convince Coco that

$$37 + 54 = 91$$



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

$$27 + 46 = \boxed{2}0 + \boxed{4}0 + 7 + 6 = \boxed{7}3$$

$\swarrow \searrow$
 $\boxed{6} \boxed{0}$

 $\swarrow \searrow$
 $\boxed{1} \boxed{3}$

$$\boxed{5}9 + 1\boxed{8} = 50 + 10 + \boxed{9} + 8 = 77$$

$\swarrow \searrow$
 $\boxed{6} \boxed{0}$

 $\swarrow \searrow$
 $\boxed{1} \boxed{7}$

$$\boxed{5}4 + \boxed{3}3 = \boxed{5}0 + \boxed{3}0 + \boxed{4} + \boxed{3} = 87$$

$\swarrow \searrow$
 $\boxed{8} \boxed{0}$

 $\swarrow \searrow$
 $\boxed{7}$

Is there only one way to solve this problem?

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

Create your own missing digit problem.

Find the matching pairs by
using known facts:

$17 - 5 =$	51
$46 - 5 =$	44
$38 - 6 =$	12
$57 - 6 =$	22
$79 - 6 =$	32
$49 - 5 =$	41
$68 - 5 =$	72
$27 - 5 =$	63
$69 - 5 =$	73
$78 - 6 =$	64

What's missing?

Create your own matching pairs problem
using known facts.

Fill in the missing numbers:

If $10 - 6 = 4$ then $11 - 6 =$ 5

If $10 - 8 = 2$ then $11 - 8 =$ 3

If $10 - 7 = 3$ then $11 - 7 =$ 4

If $10 - 4 = 6$ then $11 - 4 =$ 7

If $9 - 4 = 5$ then $19 - 4 =$ 15

If $9 - 6 = 3$ then $19 - 6 =$ 13

If $9 - 7 = 2$ then $29 - 7 =$ 22

If $9 - 5 = 4$ then $39 - 5 =$ 34

If $8 - 3 = 5$ then $80 - 30 =$ 50

If $8 - 6 = 2$ then $80 - 60 =$ 20

If $8 - 4 = 4$ then $80 - 40 =$ 40

If $8 - 7 = 1$ then $80 - 70 =$ 10

What do you
notice?

What do you
notice?

What do you
notice?

10

ArithmeKit 2

Use known facts to 10 to derive other facts

Coco thinks if you subtract one more, then the answer is or more.



Do you agree with Coco?

Can it ever be true?

Using practical resources convince Colin

$$79 - 5 = 74$$

Can you use different resources?



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

$$\boxed{3} \boxed{0} - \boxed{8} = 22$$

$$36 - \boxed{9} = \boxed{2} \boxed{7}$$

$$1 \boxed{5} = 1 \boxed{6} - \boxed{1}$$

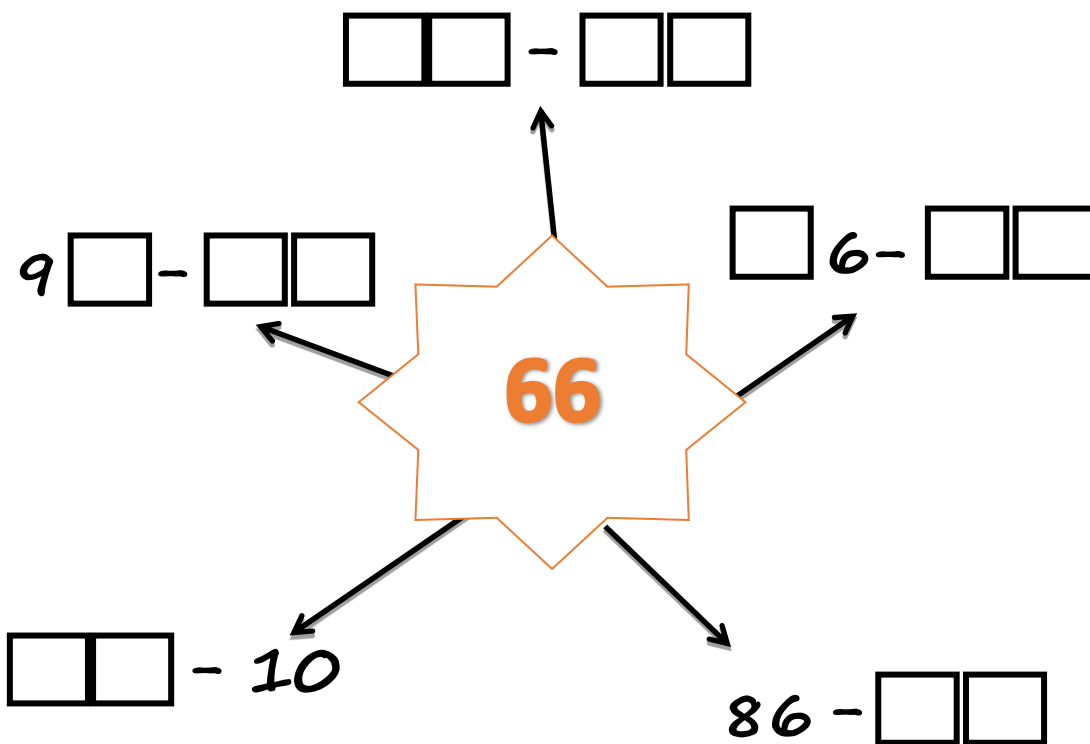
$$2 \boxed{4} = 29 - 5$$

Is there only one way to solve this problem?

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

Create your own missing digit problem.

Fill in the missing digits in several different ways:



Calculate the missing numbers:

$$43 - 30 = \boxed{13}$$

$$53 - 20 = \boxed{33}$$

$$83 - 30 = \boxed{53}$$

$$73 - 50 = \boxed{23}$$

$$63 - 40 = \boxed{23}$$

$$53 - 30 = \boxed{23}$$

What do you notice?

$$84 - \boxed{30} = 54$$

$$94 - \boxed{20} = 74$$

$$94 - \boxed{40} = 54$$

$$74 - \boxed{20} = 54$$

$$84 - \boxed{10} = 74$$

$$64 - \boxed{10} = 54$$

What do you notice?

Try subtracting multiples of 10 from your own numbers.



Colin says, "When you subtract a multiple of 10 from a 2-digit number the ones digit does not change."

Is this always true?

Show Colin using resources.

Using practical resources convince yourself that $54 - 30 = 24$

Convince Coco that the best way to do $73 - 40$ is to count back in tens.



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

$$41 - 3 \boxed{0} = 1 \boxed{1}$$

$$\boxed{3} \boxed{4} - \boxed{2} 0 = 14$$

$$\boxed{5} \boxed{7} - 40 = 17$$

$$38 = \boxed{9} \boxed{8} - \boxed{6} 0$$

Is there only one way to solve this problem?

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

Create your own missing digit problem.

Find the matching pairs:

$25 - 8 =$	19
$37 - 6 =$	17
$39 - 6 =$	26
$27 - 9 =$	27
$34 - 8 =$	22
$35 - 8 =$	18
$29 - 7 =$	29
$34 - 6 =$	31
$28 - 9 =$	33
$36 - 7 =$	28

What's missing?

Create your own matching pairs problem
involving subtraction of a single digit from a
2-digit number.

Subtract 8 from each of these numbers:

24 54 74 34 64
 16 46 66 26 56

What do you
notice?

Now subtract 8 from each of these numbers:

25 55 75 35 65
 17 47 67 27 57

What do you
notice?

Try subtracting 8 from other numbers.

Coco thinks you bridge through
a multiple of 10 when you
subtract a single digit number
from a 2-digit number.



When is it not
true?

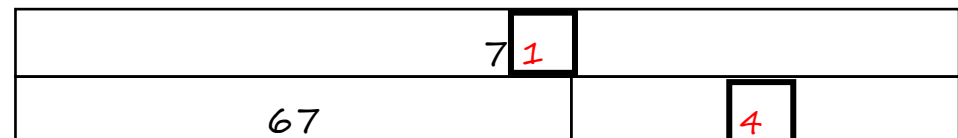
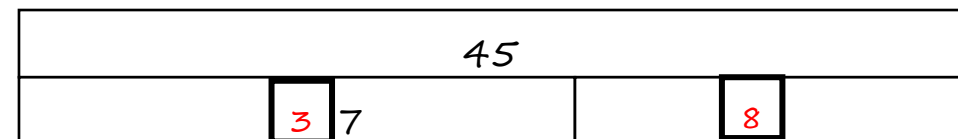
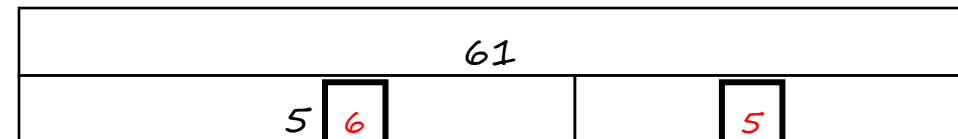
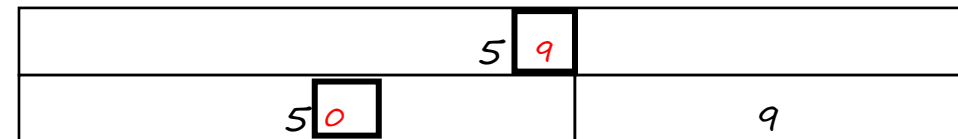
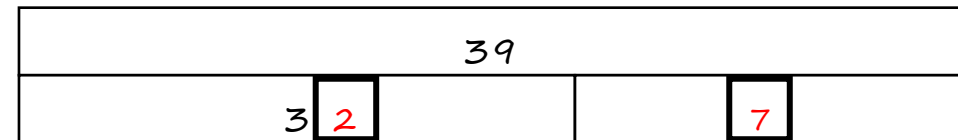
When is it
true?

Colin thinks $36 - 8 = 32$
because $8 - 6 = 2$

Use Base 10 equipment or Place
Value counters to convince Colin he
is incorrect.



Put a digit in each box to make these bar models correct:



Is there only one way to solve this problem?

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

Create your own missing digit problem.

Find the matching pairs:

31 - 27	28
32 - 17	6
45 - 39	8
45 - 38	4
68 - 50	7
45 - 34	11
58 - 30	18
72 - 58	15
64 - 56	14
55 - 46	9

What's missing?

Create your own matching pairs problem involving the difference between numbers.

List five pairs of single digit numbers with a difference of 2

What do you notice?

Now list five pairs of teen numbers with a difference of 2

What do you notice?

Write some of your pairs as calculations.



Colin says, "If the difference between two numbers is even then both the numbers were odd."

Find examples where this is not true.

Find examples where this is true.

Using an empty number line, convince Coco that

$$47 - 28 = 37 - 18$$



Find the missing digits to make these calculations equal:

$$8 \boxed{0} - \boxed{7} \boxed{4} = \boxed{6}$$

$$48 - \boxed{3} \boxed{3} = 28 - \boxed{1}5$$

$$\boxed{8} \boxed{9} - 7 \boxed{2} = 77 - 60$$

Is there only one way to solve this problem?

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

Create your own missing digit problem.

Match the calculations:

$37 - 12 =$

$37 - 10 - 2$

$37 - 10 + 2$

$44 - 17 =$

$44 - 10 + 7$

$44 - 10 - 7$

$42 - 13 =$

$42 - 10 - 3$

$42 - 10 + 3$

$54 - 17 =$

$54 - 10 - 7$

$54 - 10 + 7$

Write the missing calculations:

$34 - 13$

$34 - 10 - 3$

$56 - 17$

$56 - 10 - 7$

$73 - 18$

$73 - 10 - 8$

$37 - 19$

$37 - 10 - 9$

Create your own matching pairs problem.

Fill in the missing numbers:

$34 - 12 = 34 - 10 - \boxed{2} = \boxed{22}$

$34 - 13 = 34 - 10 - \boxed{3} = \boxed{21}$

$34 - 14 = 34 - 10 - \boxed{4} = \boxed{20}$

$34 - 15 =$

$24 - 12 = 24 - 10 - \boxed{2} = \boxed{14}$

$24 - 13 =$

$24 - 14 =$

$24 - 15 =$

$43 - 12 = 43 - 10 - \boxed{2} = \boxed{31}$

$43 - 13 =$

$43 - 14 =$

$43 - 15 =$

What do you notice?

Coco thinks that when you subtract ten more, the answer stays the same.



What could you try first?

Is it ever true?

Using practical resources and jottings, convince Colin that,

$$73 - 18 = 73 - 10 - 8$$



Put a digit in each box to make these correct.:

Three subtraction problems are shown on a number line, each with a curved arrow indicating the subtraction of a number from the first number.

Problem 1: $1 \boxed{7} - \boxed{3} = 20$ (Arrow from 17 to 20)

Problem 2: $\boxed{2}4 - \boxed{4} = 24$ (Arrow from 24 to 20)

Problem 3: $34 - \boxed{1}\boxed{0} = 34$ (Arrow from 34 to 34)

Problem 4: $2 \boxed{1}30 - \boxed{9} = 30$ (Arrow from 2130 to 30)

Problem 5: $\boxed{3}6 - \boxed{6} = 36$ (Arrow from 36 to 30)

Problem 6: $\boxed{8}6 - \boxed{5}0 = 6$ (Arrow from 86 to 6)

Problem 7: $3 \boxed{0} - \boxed{3} = 3$ (Arrow from 30 to 3)

Problem 8: $\boxed{3}\boxed{3} - \boxed{4}0 = 73$ (Arrow from 33 to 73)

Write the calculations for each one.

Can you do them another way?

Match the calculations:

$37 - 9 =$

$37 - 10 - 1$

$37 - 10 + 1$

$66 - 9 =$

$66 - 10 + 1$

$66 - 10 - 1$

$42 - 9 =$

$42 - 10 - 1$

$42 - 10 + 1$

$54 - 9 =$

$54 - 10 - 1$

$54 - 10 + 1$

Write the missing calculations:

$34 - 9$

$34 - 10 + 1$

$56 - 9$

$56 - 10 + 1$

$73 - 9$

$73 - 10 + 1$

$37 - 9$

$37 - 10 + 1$

Create your own matching pairs problem.

Subtract 10 from all these numbers:

64 **54** 53 **43** 75 **65** 81 **71** 43 **33**

Now subtract 9 from these numbers:

64 **55** 53 **44** 75 **66** 81 **72** 43 **34**

What do you notice?

Subtract 20 from all these numbers:

34 **14** 63 **43** 45 **25** 71 **51** 83 **63**

Now subtract 19 from these numbers:

34 **15** 63 **44** 45 **26** 71 **52** 83 **64**

What do you notice?

Subtract 20 then subtract

19 from some other numbers.



Colin says, "To subtract 18 you cannot subtract 20 then add 2"

When is this a good method?

Is this true?

Using practical resources and jottings, convince Coco that

$$45 - 9 = 45 - 10 + 1$$

and not

$$45 - 9 = 45 - 10 - 1$$



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

$$\boxed{8}4 - 20 = \boxed{6}4 \quad \text{so} \quad 84 - \boxed{1}9 = \boxed{6}5$$

$$\boxed{7}6 - 30 = \boxed{4}6 \quad \text{so} \quad \boxed{7}6 - 29 = \boxed{4}7$$

$$63 - \boxed{4}0 = \boxed{2}3 \quad \text{so} \quad 63 - \boxed{3}8 = \boxed{2}\boxed{5}$$

$$58 - 2\boxed{0} = 38 \quad \text{so} \quad 58 - 19 = 3\boxed{9}$$

Is there only one way to solve this problem?

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

Create your own missing digit problem.

Find the matching pairs:

2×2	1
2×5	16
0×2	6×2
$8 \div 2$	4
$14 \div 2$	9
$24 \div 2$	11
3×3	7
8×2	4
$2 \div 2$	0
$22 \div 2$	5×2

What's missing?

Create your own matching pairs problem involving multiplication and division facts for the 2 times table.

Multiply these numbers by 2:

4 8 2 4 8 16

6 12 12 24 3 6

What do you notice?

Divide these numbers by 2:

20 10 10 5

16 8 8 4

What do you notice?

What happens if you divide 7 by 2?

Coco thinks that multiplying by 2 is the same as doubling.



Is this true
for larger
numbers?

What happens
when you
double?

Using practical resources, convince
yourself $2 \times 8 = 8 \times 2$

Convince Colin that $22 \div 2 = 11$



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

$$1 \boxed{8} \div 2 = \boxed{9}$$

$$\boxed{7} \times 2 = 14$$

$$\boxed{1} \boxed{0} = \boxed{5} \times 2$$

$$6 \div \boxed{2} = \boxed{3}$$

$$\boxed{6} \times 2 = 2 \boxed{4} \div 2$$

Is there only one way to solve this problem?

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

Create your own missing digit problem.

Find the matching pairs:

10×7	9
6×10	4
10×10	12
$10 \div 10$	0
$120 \div 10$	70
$90 \div 9$	50
$110 \div 10$	11
10×0	60
$40 \div 10$	1
10×5	100

What's missing?

Create your own matching pairs problem involving multiplication and division facts for the 10 times table.

Multiply these numbers by 10:

6 60 12 120 3 30

4 40 2 20 8 80

What do you notice?

Divide these numbers by 10:

40 4 20 2 10 1

100 10 50 5

What do you notice?

What happens if you multiply 13 by 10?



Colin says, "When you divide a number with 0 in the ones column by 10 you get a single digit answer."

Why does this happen?

When is it true?

Using practical resources, convince yourself $8 \times 10 = 10 \times 8$

Convince Coco that
 $90 \div 10 = 45 \div 5$



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

$$\boxed{8}0 \div \boxed{1}\boxed{0} = 8$$

$$\boxed{2} \times 10 = \boxed{3}0 - 10$$

$$\boxed{7}0 \div 7 = 10$$

$$\boxed{5} \times 10 = \boxed{9}0 - \boxed{4}0$$

$$60 \div 10 = \boxed{6}$$

Is there only one way to solve this problem?

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

Create your own missing digit problem.

Find the matching pairs:

5×3	2×5
$35 \div 5$	55
5×5	1
6×5	40
$50 \div 5$	5
$25 \div 5$	0
5×8	30
5×11	3×5
0×5	7
$5 \div 5$	25

What's missing?

Create your own matching pairs problem involving multiplication and division facts for the 5 times table.

Multiply these numbers by 5:

6 30 12 60 4 20 2 10

3 15 7 35 5 25 9 45

What do you notice?

Divide these numbers by 5:

40 8 20 4 10 2

50 10 30 6

What do you notice?

What happens if you multiply 13 by 5?

Coco thinks that when you multiply by 5 the answer is a multiple of 10



Show Coco using resources

When is it true?

Using practical resources, convince yourself $5 \times 6 = 10 \times 3$

Convince Colin that $45 \div 5 = 9$



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

$$\boxed{5} \times \boxed{1} \boxed{2} = \boxed{6} \boxed{0}$$

$$\boxed{3} 5 \div 5 = \boxed{7}$$

$$\boxed{9} = \boxed{4} 5 \div 5$$

$$5 \times \boxed{8} = 40$$

$$\boxed{5} \boxed{0} \div 5 = \boxed{2} \times 5$$

Is there only one way to solve this problem?

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

Create your own missing digit problem.

Find the matching pairs:

Double 6	14
Double 8	22
Double 9	12
Double 15	26
Double 7	28
Double 13	16
Double 12	32
Double 16	30
Double 11	18
Double 14	24

What's missing?

Create your own matching pairs problem involving doubles.

Choose some numbers and double them.

Make your numbers with resources. What do they look like when you double them?

- i) Double 3
Double 8
- ii) Double 13
Double 18
- iii) Double 23
Double 28

What do you notice?



Colin says, "When you double an odd number, the answer can be odd or even."

Always true?

Sometimes true?

Never true?

Using practical resources, convince yourself double 25 is 50

Convince Coco that double 17 is 34



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

$$\text{Double } \boxed{1} \boxed{6} = \boxed{3} \boxed{2}$$

$$\text{Double } 14 = 2 \boxed{8}$$

$$\text{Double } \boxed{4} 5 = \boxed{9} \boxed{0}$$

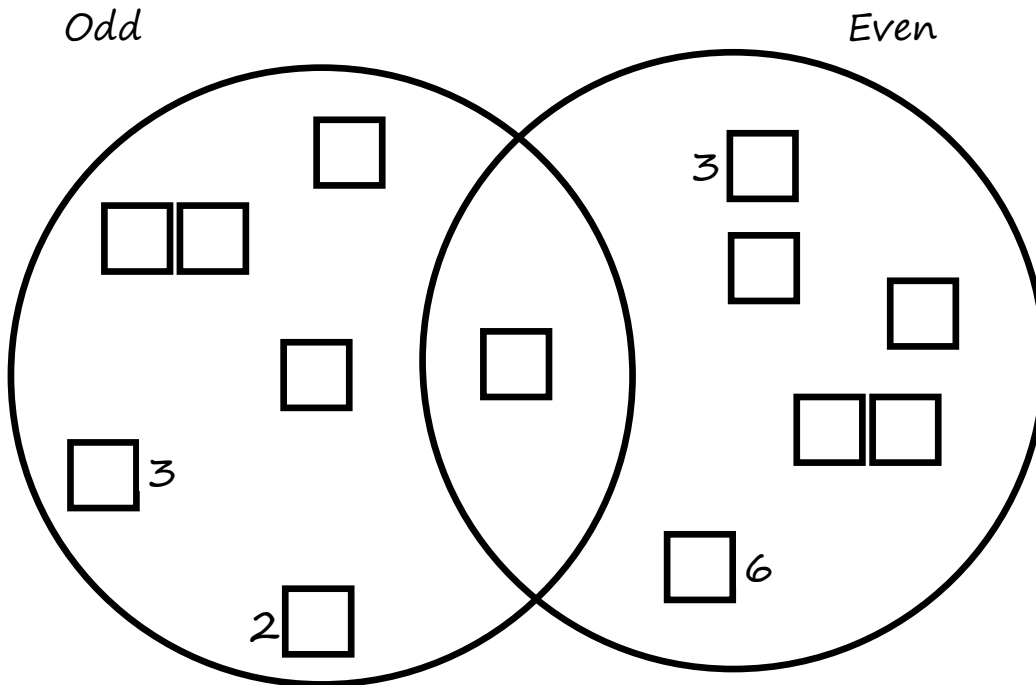
$$\text{Double } 3 \boxed{5} = \boxed{7} 0$$

Is there only one way to solve this problem?

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

Create your own missing digit problem.

Fill in the missing digits:



Solve the problem in different ways.

Using counters, make arrays for these numbers:

8 26 22 14

Now make arrays for these ones:

9 15 25 21

What do you notice?

Try making arrays for other odd numbers.

Coco thinks that 5 is an odd number so the 5 times table is made up of odd numbers.



Is this true?

Show Coco using resources

Using practical resources, convince yourself 13 is odd.

Convince Colin that 30 is even.



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

Even number, greater than 10, less than 20

1	6
---	---

Odd number, less than 10, greater than 5

7

Odd number between 20 and 30

2	5
---	---

Even number greater than 40

3	4
---	---

Largest odd number less than 10

9

Largest even number less than 10

8

Is there only one way to solve this problem?

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

Create your own missing digit problem.

Find the matching pairs:

2×5	How many sides on 5 squares?
10×3	15
4×5	xxxx xxxx
3×5	How many eyes do 5 people have?
2×4	$10 + 10 + 10$
5×3	How many sides on 5 triangles?

What's missing?

Create your own matching pairs.

Draw pictures to show these problems:

How many wheels on 2 cars?

How many corners on 10 triangles?

How many sides on 4 squares?

How many wheels on 5 tricycles?

Write the mathematical statements to describe the pictures.

Create a story to represent:

$$4 \times 5 = 20$$

$$3 \times 10 = 30$$

$$10 \times 2 = 20$$

What do you notice?



Colin says,
 $5 \times 2 = 2 \times 5$

Show Colin
 using
 resources.

Is this true?

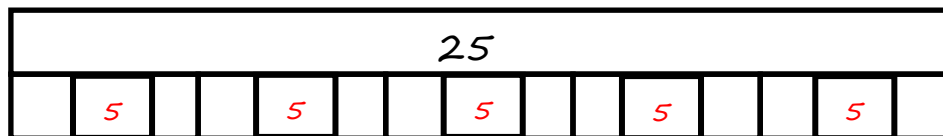
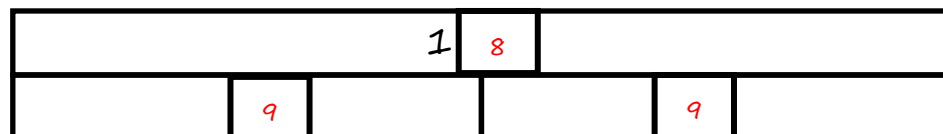
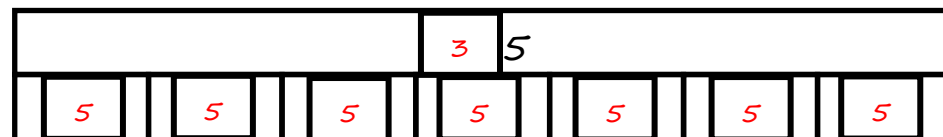
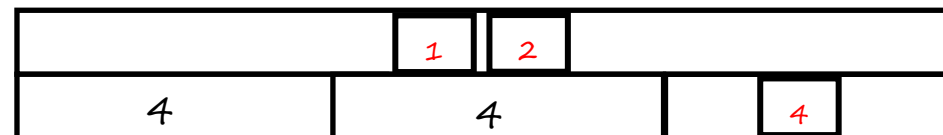
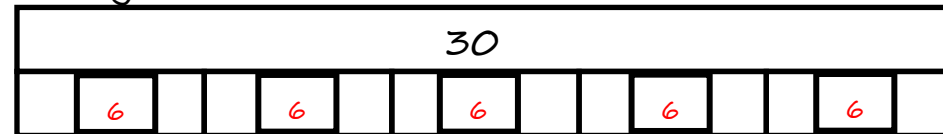
Using practical resources convince
 Coco that

$$4 \times 5 = 5 \times 4$$

$$\text{And } 4 \times 5 = 2 \times 10$$



Put a digit in each box to make the bar models true:



Is there only one way to solve this problem?

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

Create your own missing digit problem.

Find the matching pairs:

6	Halve 14
8	Halve 22
9	Halve 12
15	Halve 26
7	Halve 28
13	Halve 16
12	Halve 32
16	Halve 30
11	Halve 18
14	Halve 24

What's missing?

Create your own matching pairs involving halving.

Find half of 4 2

Find half of 24 12

Find half of 44 22

Find half of 14 7

Find half of 34 17

Find half of 54 27

What do you notice?

Make your numbers with resources. What do they look like when you halve them?

Try halving numbers with a 2 in the ones column.

What do you notice?

Coco thinks you can't
halve an odd number.



What happens?
Why?

Is this true?

Convince Colin that halving a
number will give a smaller
answer.



Put a digit in each box for these halving models:

			4	8			
2	4				2	4	

			5	8			
2	9				2	9	

			7	0			
	3	5				3	5

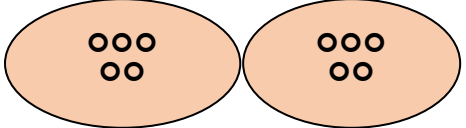
			3	2			
	1	6				1	6

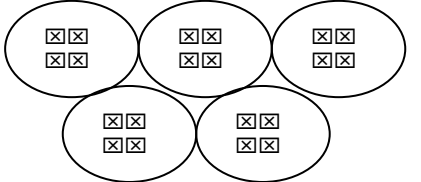
Is there only one way to solve this problem?

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

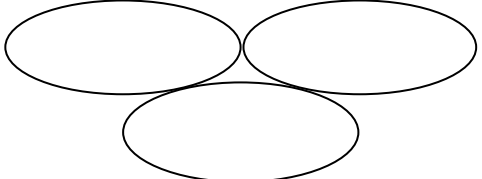
Create your own missing digit problem.

Match the problem to the correct picture:

10 apples shared equally between 2 bags	
---	---

20 apples shared equally between 4 bags	
---	---

Make your own:

___ apples shared equally between ___ bags	
--	---

Using resources, can you share these equally?

12 between 4

20 between 4

10 between 4

18 between 4

What do you
notice?

Now can you share these equally:

11 between 4

21 between 4

17 between 4

15 between 4

What do you
notice?



Colin says, "Even numbers of counters can be shared equally between 4 with nothing left over."

Why does this happen?

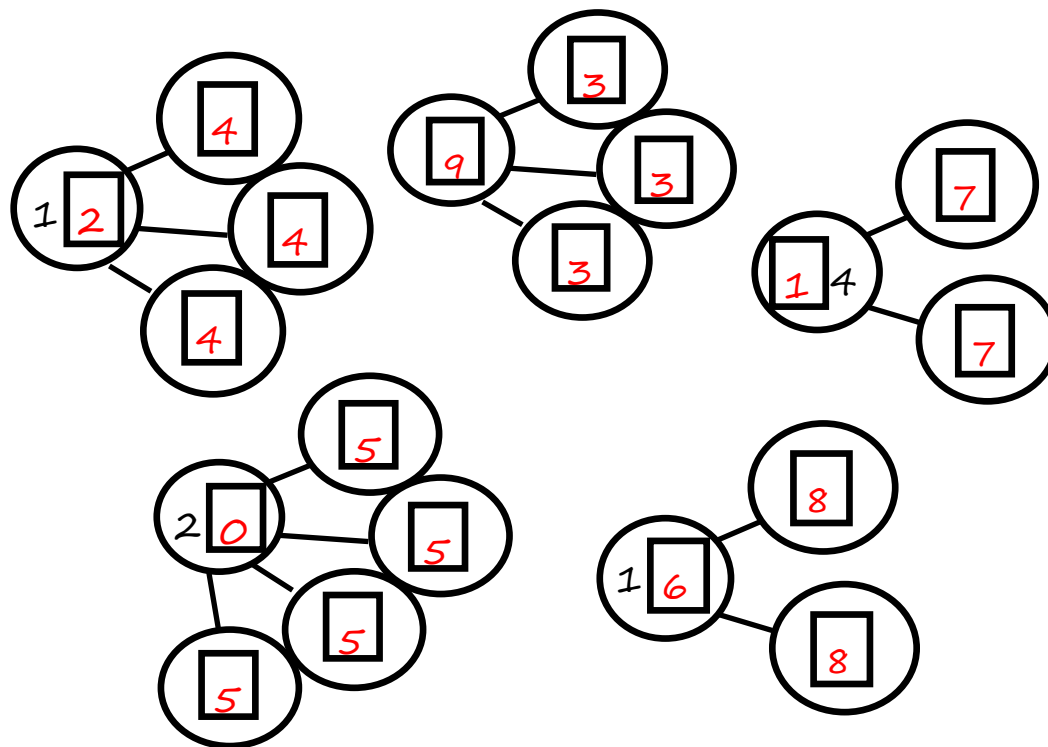
When is this true?

Using practical resources, convince yourself an even number can be shared equally between 2

Convince Coco an even number can be shared equally between 2



Sharing equally: put a digit in each box.

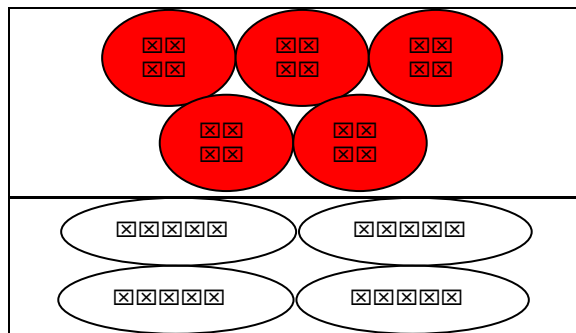
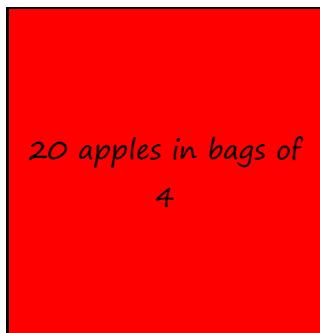
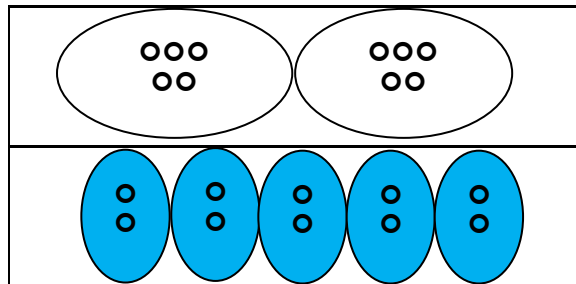
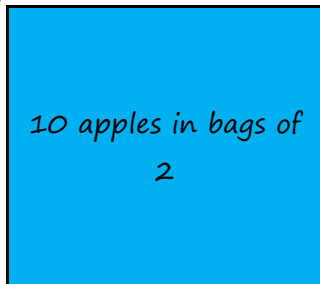


Is there only one way to solve this problem?

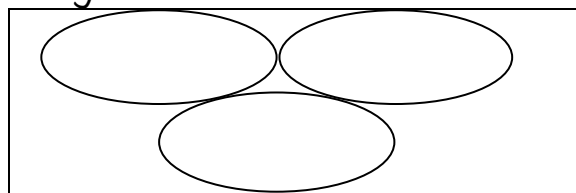
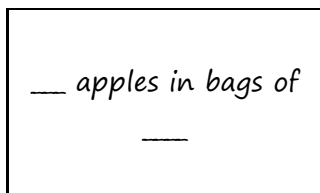
Can you do it using the digits 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9 at least once each?

Create your own missing digit problem.

Match the problem to the correct picture:



Make your own:



Using resources, can you put:

12 into groups of 4?

20 into groups of 4?

10 into groups of 4?

18 into groups of 4?

Now can you put:

11 into groups of 4?

21 into groups of 4?

17 into groups of 4?

15 into groups of 4?

What do you notice?

What do you notice?

Coco thinks that 10 divided into groups of 2 is the same as 20 divided into groups of 4



Can you explain what happens?

What is the same/different?

Using practical resources convince yourself any multiple of 10 can be grouped in 5s.

Convince Colin that any multiple of 10 can be grouped in 5s.



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

$$\boxed{4} \text{ groups of } 3 = 1 \boxed{2}$$

$$2 \text{ groups of } \boxed{9} = 1 \boxed{8}$$

$$9 \text{ groups of } \boxed{5} = 45$$

$$\boxed{6} \text{ groups of } \boxed{1} 0 = 6 \boxed{0}$$

$$5 \text{ groups of } \boxed{7} = \boxed{3} 5$$

Is there only one way to solve this problem?

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

Create your own missing digit problem.