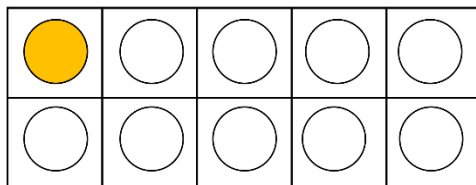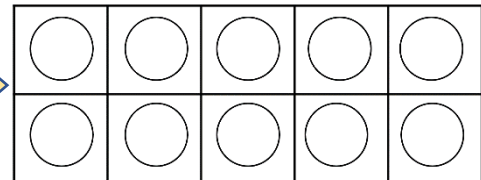# 1. How to… understand number facts (1)

Making 10

This will help me to add and subtract numbers without doing lots of counting!

This is a ten frame. There are 10 counters.

They are all the same.

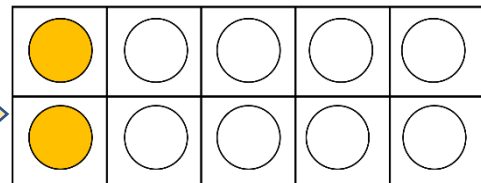1 counter is different. I can see that:-

1 + 9 = 10   10 – 1 = 9

9 + 1 = 10   10 – 9 = 1

2 counters are different. I can see that:-
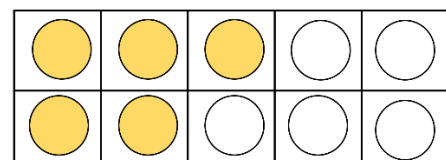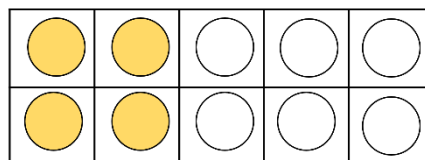
2 + 8 = 10   10 – 2 = 8

8 + 2 = 10   10 – 8 = 2

3 counters are different. What can you see?

? + ? = 10   10 – ? = ?

? + ?= 10   10–? = ?

Now try these! What can you see?

Can you find the answers?

a) 5 + ? = 10   b) 10 = 6 + ?   c) 10 - ? = 8   d) 10 – 7 = ?

You can try this out with bigger numbers.

e) 50 + 50 = ?   f) 100 = 60 + ?   g) 100 - ? = 80   h) 100 – 70 = ?

$4 + 6 + 7 =$
$10 + 7 = 17$

I know that 4 + 6 = 10.

I know that 10 + 7 = 17.

The answer is 17!

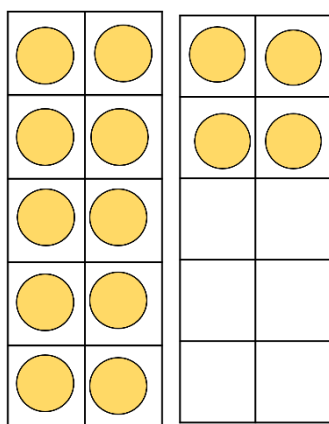Can you use what you know to find the answers?

   i) 3 + 7 + 4 =   j) 5 + 2 + 5 =   k) 3 + 8 + 2 =
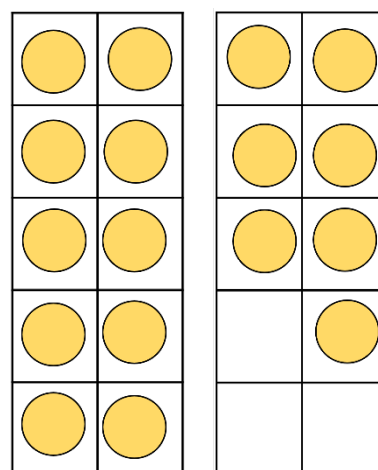
If I know how to make 10 then I know how to make 20!

I can see that 14 is 10 and 4.

I can see that 4 + 6 = 10.

I can see that 14 + 6 = 20,

 because 10 + 10 = 20.

I can see that 17 + 3 = 20.

I can see that 20 – 3 = 17.

    What can you see?

 Can you use what you know to find the answers?

   l) 13 + 7 + 4 =   m) 5 + 12 + 5 =   n) 13 + 8 + 2 =
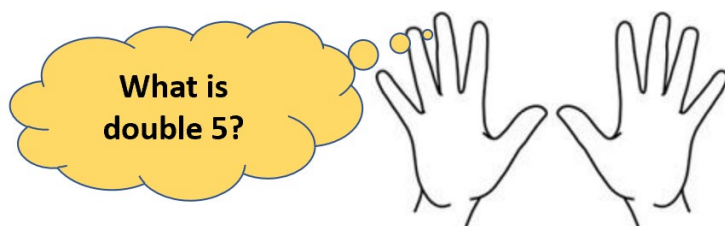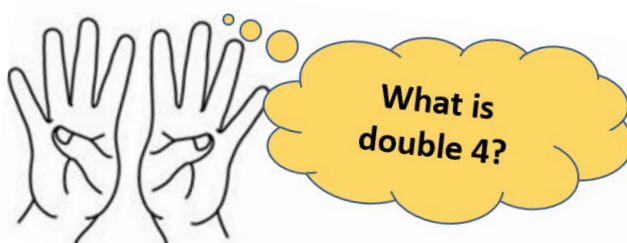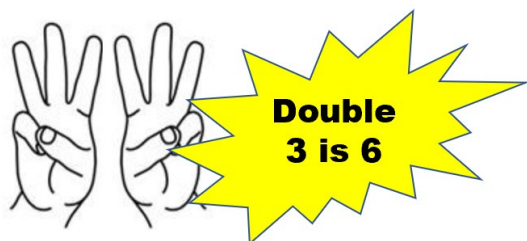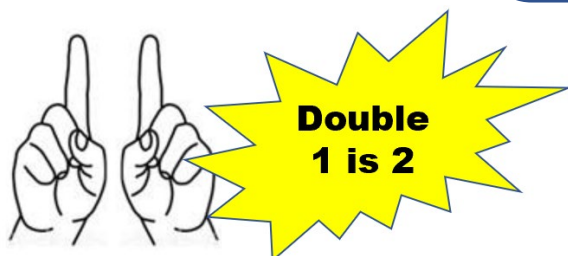
Answers.
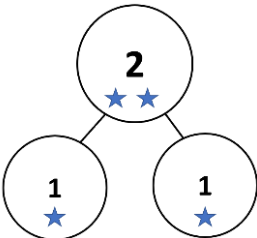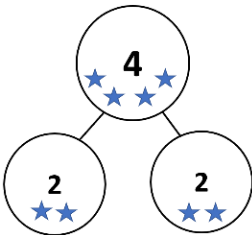a) 5   b) 4   c) 2   d) 3   e) 100 f) 40   g) 20   h) 30   i) 14   j) 12   k) 13   l) 24   m) 22   n) 23
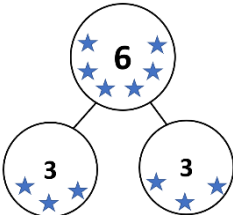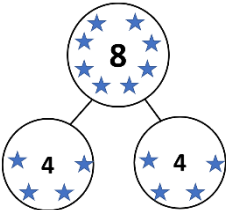
2. How to understand number facts (2)

Doubles and halves

This will help me to add and subtract numbers without doing lots of counting!

Double 1 is 2

Double 2 is 4

Double 3 is 6

What is double 4?

What is double 5?

Double 1 is 2	Double 2 is 4
Half of 2 is 1	Half of 4 is 2

2	
1	1

4	
2	2

Double 3 is 6	Double 4 is 8
Half of 6 is 3	Half of 8 is 4

6	
3	3

8	
4	4

Can you use what you know to find the answers?

a) Double 5 is 10. What is half of 10?

b) Double 4 is 8. What is half of 8?

$$3 + 5 + 3 =$$
$$6 + 5 = 11$$

I know that double 3 is 6.

6 + 5 is 11.

The answer is 11!

Can you use what you know to find the answers?

c) 2 + 7 + 2 =   d) 4 + 4 + 3 =   e) 4 + 5 + 5 =
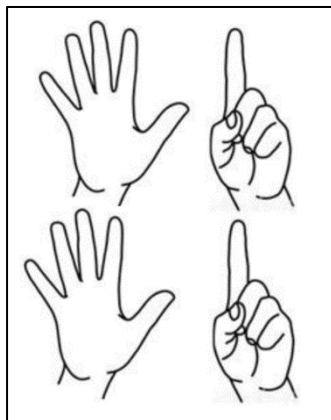
Double 6 is the same as double 5 and double 1.

Double 5 is 10.

Double 1 is 2.

Double 6 is 12!

f) What is double 7?   g) What is double 8?   h) What is double 9?

Can you use what you know to find the answers?

i)   7 + 4 + 7 =   j) 9 + 9 + 2 =   k) 6 + 8 + 8 =

If double 10 is 20, and double 4 is 8 then double 14 is 28!

Answers.

a) 5   b) 4   c) 11   d)11   e) 14   f) 14   g) 16   h) 18   i) 18   j) 20   k) 22
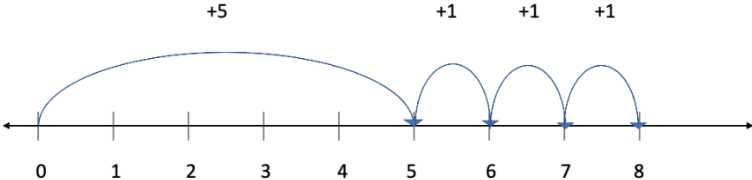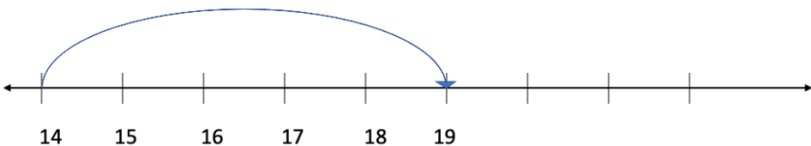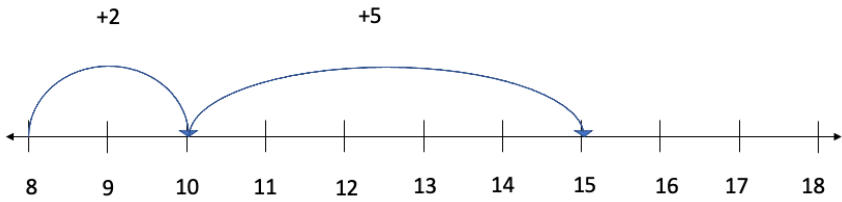
3. How to…add using a number line

Adding words – add, addition, plus, sum, total, equals, altogether

Number lines with numbers

When you begin adding small numbers, you can use a number line with numbers. To begin with you will count in ones, then you will become faster and make bigger jumps. You will start using what you already know to get even quicker! Soon you will just add in your head!

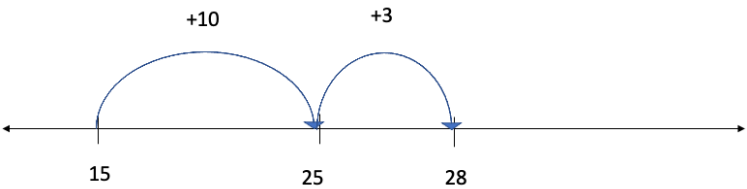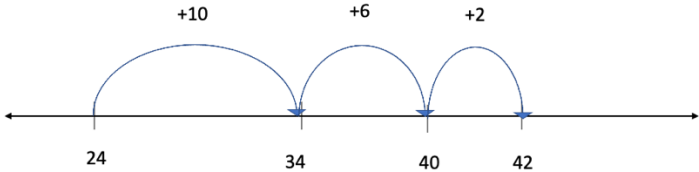|	Number line	What to do
3 + 5	Counting in ones +5 +1 +1 +1 0 1 2 3 4 5 6 7 8	I can add in any order so I'll start with the bigger number, that's 5, then count on 3. The answer is 8.
14 + 5	Bigger jumps (no need to start from 0 every time) +5 14 15 16 17 18 19	I can make a jump of 5 from 14. That's 19.
8 + 7	Jumping to the nearest 10 +2 +5 8 9 10 11 12 13 14 15 16 17 18	I know that 8 + 2 is 10. I'll jump to 10 first. To add 7, I know that I just need to jump another 5. I land on 15.

Practice questions
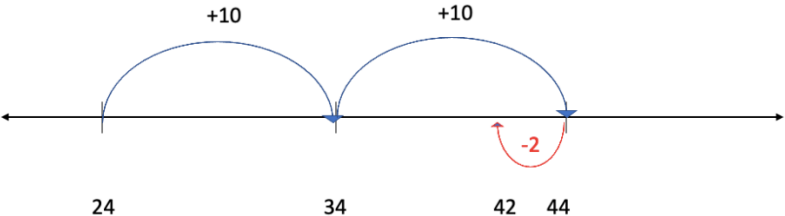
Answer the questions using a number line. If you make a mistake, try to work out what is wrong and correct it. Doing this helps you to learn.

a)   2 + 6   b)   4 + 5   c)   21 + 4

d)   16 + 6   e)   32 + 9

Answers a) 8   b) 9   c) 25   d) 22   e) 41

Empty number lines

An empty number line is useful as it helps you record the jumps you have made.

15 +13		I start with the bigger number (15). 13 is 1 ten and 3 ones (units). I add the ten first. That's 25. Now I count on 3. That's 28.
	+10 +3 15 25 28	
24 + 18	+10 +6 +2 24 34 40 42	I start at 24 and make a jump of 10. That's 34. I need to jump 8 more. I jump 6 to the next ten. That's 40. I jump 2 more. That's 42.

You can make any jumps on a number line that make sense to you, for example ...

24 + 18	+10 +10 24 34 42 44 -2	I know that 18 is 2 less than 20. So I jump 2 lots of 10 to 44 then jump back 2 to 42.

Practice questions

If you make a mistake, try to work out what is wrong and correct it. Doing this helps you to learn.

a) 33 + 17   b) 14 + 29   c) 57 + 22

d) Find a friend. Make up three questions for each other and check that you both get the same answers.

e) Farai and Chipo planted maize seeds in the school garden. Farai planted 42 and Chipo planted 48. How many did they plant altogether?

Answers	a) 50	b) 43	c) 79	e) 90

4. How to…add using column addition

Adding words – add, addition, plus, sum, total, equals, altogether

a. Adding 2 numbers with no exchange. 75 + 21

Tens	Ones (Units)
7	5
+ 2	1

There are 7 tens and 5 ones (units) in 75.
There are 2 tens and 1 one in 21.
I make sure they are in the right columns.

Tens	Ones (Units)
7	5
+ 2	1
9	6

First I add the ones (units).
Then I add the tens.
The answer is 96.

b. Adding 2 numbers with exchange. 56 + 17

Tens	Ones (Units)
5	6
+ 1	7

There are 5 tens and 6 ones (units) in 56. There are 1 ten and 7 ones in 17. I make sure they are in the right columns.

Tens	Ones (Units)
5	6
+ 1	7
	13

First I add the ones. I have 13 ones.
There is 1 group of 10 and 3 more in 13.

Tens	Ones (Units)
5	6
+ 1	7
7	3
1	

I exchange 10 ones for 1 ten. That leaves 3 in the ones (units) column.
Now I add the tens. I must not forget the extra ten!
The answer is 73.

Practice questions

a) 32 + 43   b) 25 + 54   c) 23 + 39   d) 45 + 38

c. Adding bigger numbers!

First I add the ones (units). There are 11.

11 is 1 group of ten and 1 one. I'll put the group of 10 in the tens column and leave 1 in the ones (units)

Thousands	Hundreds	Tens	Ones (Units)
2	3	6	5
	8	7	6
			11

Thousands	Hundreds	Tens	Ones (Units)
2	3	6	5
	8	7	6
			1
			1

Next I add the tens. There are 14, including the extra 10.

14 is 1 group of a hundred and 4 tens. I'll put the group of 100 in the hundreds column and leave 4 in the tens column.

Thousands	Hundreds	Tens	Ones (Units)
2	3	6	5
	8	7	6
		14	1
		1	

Thousands	Hundreds	Tens	Ones (Units)
2	3	6	5
	8	7	6
		4	1
	1	1	

Next I add the hundreds. There are 12, including the extra 100.

Thousands	Hundreds	Tens	Ones (Units)
2	3	6	5
	8	7	6
	12	4	1
	1	1	

12 is 1 group of a thousand and 2 hundreds. I'll put the group of 1000 in the thousands column. and leave 2 in the undreds column.

Thousands	Hundreds	Tens	Ones (Units)
2	3	6	5
	8	7	6
	2	4	1
1	1	1	

Last I add the thousands. There are 3, including the extra 1000.

Thousands	Hundreds	Tens	Ones (Units)
2	3	6	5
	8	7	6
3	2	4	1
1	1	1	

Practice questions

e) 71 + 38   f) 123 + 93   g) 363 + 127 h) 2 245 + 1 776

			h) 4 021	g) 490
f) 216	e) 109	d) 83	c)62	b) 79	a) 75
				Answers

5. How to…subtract using a number line

I know that 2 + 3 = 5. If I start with 5 and subtract 2, I get back to 3. If I start with 5 and subtract 3, I get back to 2. Subtraction is the **opposite (or inverse)** of addition.
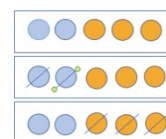
(dots diagram)	2 + 3 = 5
	5 − 2 = 3
	5 − 3 = 2

Subtraction words – subtract, subtraction, take away, difference, minus, equals

Number lines with numbers

Subtracting on a number line is a bit like adding - see Card 3.

	Number line	What to do
5 - 3	**Counting in ones** (number line from 0 to 8 with three −1 jumps back from 5 to 2)	Starting at 5, I can count back three. The answer is 2.
14 - 5	**Bigger jumps** (number line from 8 to 18 with a −5 jump back from 14 to 9)	I can jump back 5 from 14. That's 9.
15 - 7	**Jumping to the nearest 10** (number line from 8 to 18 with a −5 jump from 15 to 10 and a −2 jump from 10 to 8)	I can split 7 into 5 and 2. I'll jump 5 to 10 first. To jump 7, I know I need to jump another 2. I land on 8.
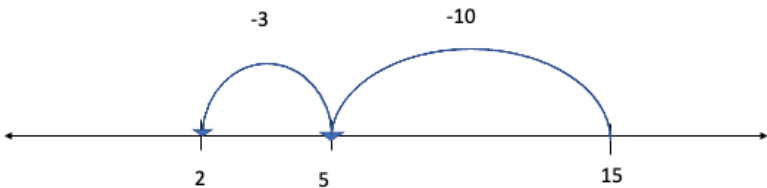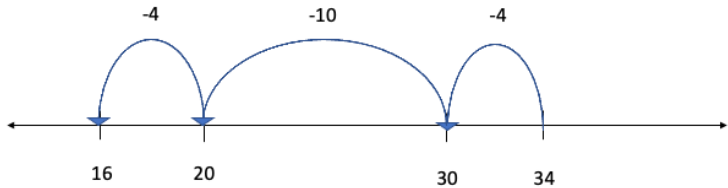
Practice questions

Answer the questions using a number line. If you make a mistake, try to work out what is wrong and correct it. Doing this helps you to learn.
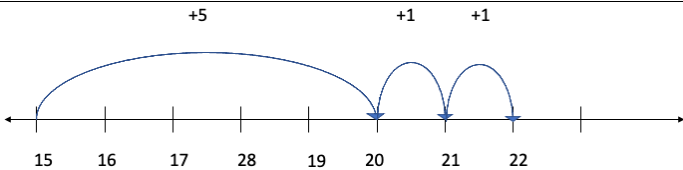
a)   6 - 2   b)   10 - 7   c)   21 – 4

d)   16 - 6   e)   32 - 9

e) 23	d) 10	c) 17	b) 3	a) 4

Answers

An empty number line is very useful as it helps you record the jumps you have made.

15 - 13		I start at 15. I want to subtract 13. 13 is 1 ten and 3 ones (units). I subtract the ten first. 15 less 10 is 5. I write that on the line. Now I need to subtract another 3. My answer is 2.
	-3 -10 2 5 15	
34 - 18	-4 -10 -4 16 20 30 34	I start at 34 and make a jump of 4 to 30. Next I jump 10 to 20. I've jumped 14 altogether. To jump 18, I need to jump 4 more. My answer is 16.

You can also find the difference between two numbers by jumping from the smaller number to the larger one, for example ...

22 - 15	+5 +1 +1 15 16 17 28 19 20 21 22	First I jump 5 ones to 20. To get to 22, I have to make 2 more jumps. That's 7 altogether.

Practice questions

If you make a mistake, try to work out what is wrong and correct it. Doing this helps you to learn.

a) 33 - 17 b) 29 - 14   c) 57 - 22

d) Find a friend. Make up three subtraction questions for each other and check that you both get the same correct answers.

e) Use a number line to find the difference between $9 and $3.

f) Farai and Chipo planted maize seeds in the school garden. Farai planted 42 and Chipo planted 48. How many more did Chipo plant than Farai?

6. How to…subtract using columns

You can add numbers in any order. This is not true for subtraction. When subtracting, it is very important to put the correct number on the top line.
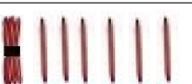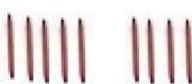
Subtraction words – subtract, subtraction, take away, difference, minus, equals

Here are two examples of subtraction calculations. They use both sticks and numbers to show the meaning of the numbers in the calculations.

1. Subtracting 2 numbers with no exchange. 75 - 21

Tens	Ones (Units)
7	5
- 2	1

There are 7 tens and 5 ones (units) in 75.
There are 2 tens and 1 one in 21.
I make sure they are in the right columns.

Tens	Ones (Units)
7	5
- 2	1
5	4

First I subtract the ones (units).
Then I subtract the tens.
The answer is 54.

2. Subtracting 2 numbers with exchange. 56 - 17

Tens	Ones (Units)
5	6
- 1	7

There are 5 tens and 6 ones (units) in 56.
There are 1 ten and 7 ones in 17.
I make sure they are in the right columns.

Tens	Ones (Units)
4⁵̷	¹6
- 1	7
3	9

I start by subtracting the ones. There are not enough ones to subtract 7 ones from 6 ones. I exchange a ten from the Tens column for ten ones and put the 10 ones in the Ones column. Now I have 4 tens and 16 ones. I check that I still have 56 sticks. Then I take 7 ones from 16 ones, leaving 9 ones, and 1 ten from 4 tens leaving 3 tens. My answer is 39.

Practice questions

If you make a mistake, try to work out what is wrong and correct it. Doing this helps you to learn.

a)   43 - 32   b)   45 - 24   c)   71 - 28   d)   64 - 35
e)   53 - 39   f)   41 - 24   g)   74 - 48   h)   60 - 35

If you need more practice, ask a friend to set some more questions for you. Numeracy is like football. The more you practise, the better you get at it!

Common mistakes to avoid

Chico, Farai and Simba have made mistakes. Can you help them to see what they have done wrong?

T	U
3	2
− 1	7
2	5

T	U
7	¹2
− 3	4
4	8

H	T	U
2	4	0
− 1	3	
1	1	0

Here are the correct calculations.

T	U
²3̶	¹2
− 1	7
1	5

T	U
⁶7̶	¹2
− 3	4
3	8

H	T	U
2	³4̶	¹0
−	1	3
2	2	7

Try to spot the mistakes yourself, before you read any further.

1. Chico: In subtraction, the bottom number is always taken from the top number. You can't take the top number from the bottom number just because it is easier!

2. Farai: This subtraction has a 1 in the Ones column, but no exchange has taken place. You exchange one ten for ten ones, and move the ones to the Ones column, then you can subtract.

3. Simba: Numbers must always be written in the correct columns.

h) 25	g) 26	f) 17	e) 14
d) 29	c) 43	b) 21	a) 11
			Answers

7. Choosing the best way to subtract

Subtraction words – subtract, subtraction, take away, difference, minus, equals

You can subtract numbers of any size. Using the column method, you may have to exchange more than once. Here is an example.

<table>
<tr><td colspan="3">**131 - 86**</td><td>First I subtract the ones (units). I do not have enough ones to subtract 6 from 1, so I exchange 1 ten for 10 ones. That leaves 2 tens in the tens column and 11 in the ones column.</td></tr>
<tr><td>H</td><td>T</td><td>O(U)</td><td></td></tr>
<tr><td>0 1̸</td><td>12 3̸</td><td>1 1</td><td>Now I subtract 6 from 11 to give 5.

Next I subtract the tens. I do not have enough tens to subtract 8 from 2, so I exchange 1 hundred for 10 tens, leaving no hundreds in the hundreds column and 12 tens in the tens column.</td></tr>
<tr><td>-</td><td>8</td><td>6</td><td></td></tr>
<tr><td></td><td>4</td><td>5</td><td>Now I subtract 8 from 12 to give 4.

The answer is 45.</td></tr>
</table>

Let's look at other ways to find the answer.

1. **Counting back** from 131 to 86 on a number line.
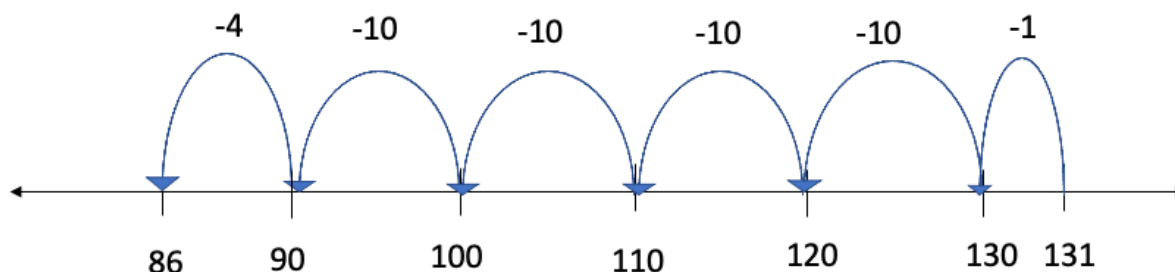
I make 1 jump of one from 131 to 130, 4 jumps of ten to 90 and 1 jump of four ones to 86. That's 45 jumps altogether.

2. **Counting on** using a number line from 86 to 131. I make 4 jumps of one from 86 to 90, 4 jumps of ten to 130 and 1 jump of one to 131. That's 45 jumps altogether.
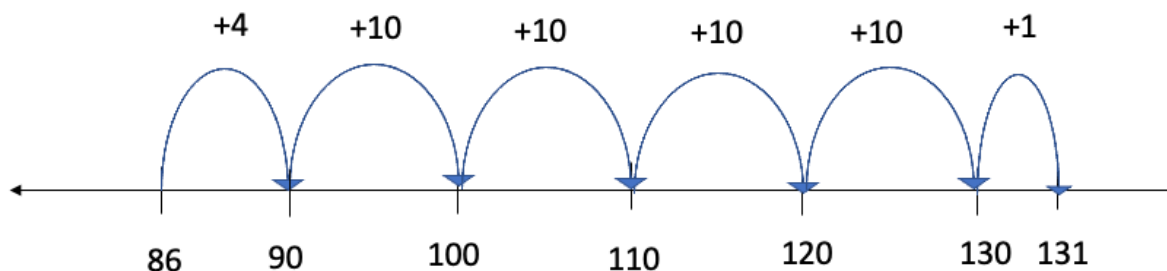
3. **Changing the calculation** to make it easier. Subtraction is the difference between two numbers. The difference between 7 and 5 is 2. The difference between 6 and 4 is also 2. 5 subtract 3 is 2. We can write these as:-

7 - 5 = 2
6 - 4 = 2
5 - 3 = 2
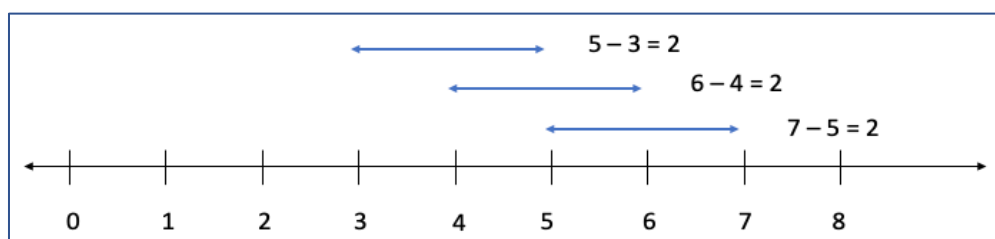
Each calculation has the same difference, but is in a different position on the number line. Similarly, **131- 86 = 130 - 85 = 125 - 80** which is much easier to work out.
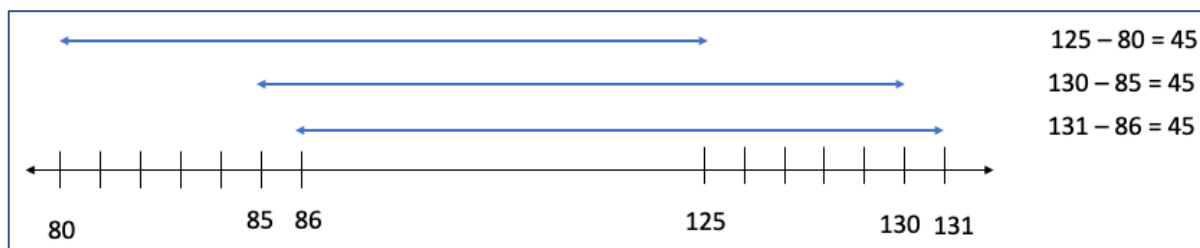
Practice

Now try these subtraction questions using both the column method and one of the number line methods.

Which do you find easiest for each calculation?

a)   87 - 62
b)   63 - 27
c)   37 - 15
d)   276 - 84
e)   222 - 73

Answers

a) 25   b) 36   c) 22   d) 192   e) 149

8. How to…understand multiplication

Multiplication words - multiply, times, array, x, equals, row, column

Activity 1

3 by 4 array
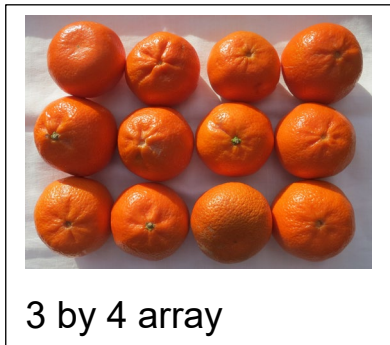
4 by 3 array

Above are two pictures of 12 oranges. Picture 1 has 3 rows and 4 columns. This is a called a 3 by 4 array. Picture 2 has 4 rows and 3 columns. This is called a 3 by 4 array. Instead of the word "by" we can use "x". It doesn't matter whether 3 is the number of rows or the number of columns - we still have 12 oranges!

Practice questions

In your exercise book, draw as many arrays as you can to show the following numbers - 12, 24, 6 ,16. You can use stones, sticks or bottle tops to help you.

Activity 2

We can make number patterns from arrays. 2 x 3 = 6 means 2 rows of 3.

Multiplying by three using arrays

1 x 3 = 3

2 x 3 = 6

3 x 3 = 9

4 x 3 = 12

5 x 3 = 15

6 x 3 = 18

7 x 3 = 21
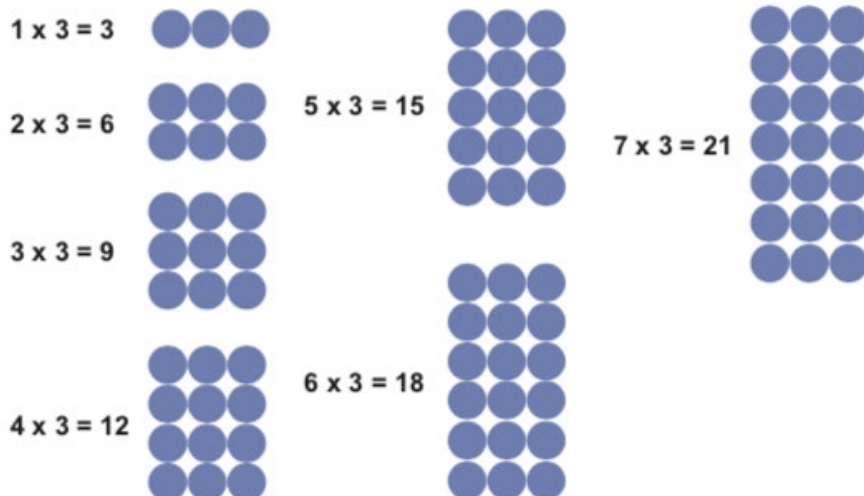
Practice questions

1. Draw a pattern in your book like this for rows of 2 as far as 10 rows. It will start like this.
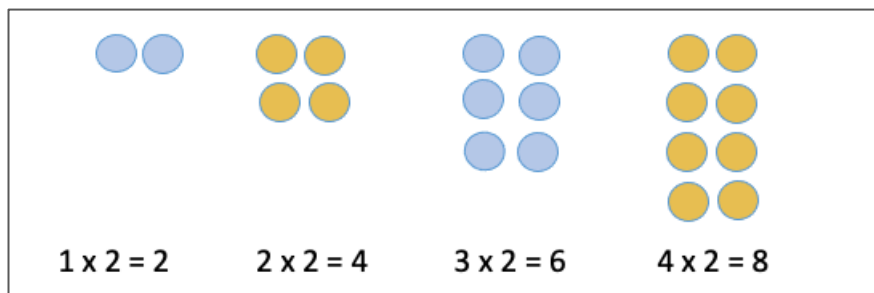
Now use drawings of arrays to help you to answer these questions.

Image: souTH AFRica shared under Creative Commons Attribution license (CC BY 3.0)

2. How many legs has 1 child? How many legs have 3 children?

3. How many toes has 1 child? How many toes have 3 children?

4. How many legs has 1 spider? How many legs have 4 spiders?

5. How many toes has 1 hen? How many toes have 5 hens?

6. How many legs has 1 ant? How many legs have 10 ants?

7. How many legs have 3 children and 2 donkeys altogether?

| Answers | 2) 2 legs, 6 legs | v 3) 10 toes, 30 toes | 4) 8 legs, 32 legs | 5) 4 toes, 20 toes | 6) 6 legs, 60 legs | 7) 14 legs |

9. How to…construct a multiplication square

Multiplication words - multiply, times, array, x, equals, row, column

On Card 8, you used arrays to help with multiplication. This card helps you to learn multiplication facts.

1 x 2 = 2   2 x 2 = 4   3 x 2 = 6   4 x 2 = 8
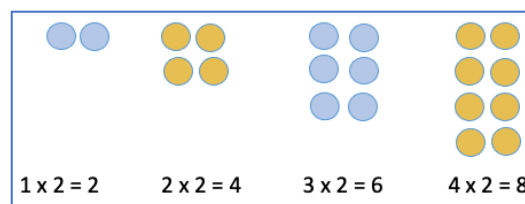
Activity 1

x	1	2	3	4	5	6	7	8	9	10
1										
2	2	4	6	8	10	12	14	16	18	20
3										
4										
5										
6										
7										
8										
9										
10										

1. Make a copy of the diagram above.

2. Can you see why the numbers are in the boxes on the '2' row? For example, (4 x 2 = 8, so 8 is *written under the 4*)

3. Now fill in all the facts you know or can work out. Do x4s and x8s first, then x10 and x5. Next do x3, x6 and x9. Do x7 last.

4. You can make arrays using stones, seeds or bottle tops to help you. You may be able to fill in some rows by doubling others.

5. You can take as much time as you like to fill it in.

6. When you have filled in all the boxes, you are ready to do the next activity.

Activity 2

Sets of multiplication facts are often called tables. The set of facts about 2 is called the two times table. It is the row starting with '2'.

If you want to know what 5 x 8 is, you look for the 8 row and then go down the 5 column. The answer is 40.

x	1	2	3	4	5	6
1					5	
2					10	
3					15	
4					20	
5					25	
6					30	
7					35	
8	8	16	24	32	40	48
9					45	

Practice

Use your table to look up these multiplication facts. Check that your answers are correct by using stones to make arrays or asking a friend.

a) 2 x 9   b) 3 x 5   c) 6 x 4   d) 7 x 7   e) 9 x 8

Activity 3

Your multiplication square has lots of patterns in it.

Here are two squares.

Write down the patterns you can see in your exercise book.

X	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16	18	20
3	3	6	9	12	15	18	21	24	27	30
4	4	8	12	16	20	24	28	32	36	40
5	5	10	15	20	25	30	35	40	45	50

Can you spot any other patterns by shading your multiplication square a different way?

X	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16	18	20
3	3	6	9	12	15	18	21	24	27	30
4	4	8	12	16	20	24	28	32	36	40
5	5	10	15	20	25	30	35	40	45	50
6	6	12	18	24	30	36	42	48	54	60
7	7	14	21	28	35	42	49	56	63	70
8	8	16	24	32	40	48	56	64	72	80
9	9	18	27	36	45	54	63	72	81	90
10	10	20	30	40	50	60	70	80	90	100

Answers

a) 18   b) 15   c) 24   d) 49   e) 72

10. How to …understand division

Division words:
divide, share, group, array, ÷, equal, row, column, opposite, inverse, remainder.

This will help me see how multiplication and division are connected.

Here is a picture of an array. You may have seen it on Card 8.

3 rows of 4 oranges.

3 x 4 = 12.

12 oranges divided into 3 rows.

12 ÷ 3 = 4.
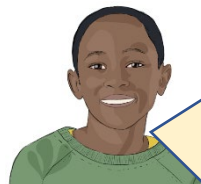
4 columns

3 rows

4 columns of 3 oranges.

4 x 3 = 12.

12 oranges divided into 4 columns.

12 ÷ 4 = 3.

This array shows:

3 x 4 = 12   4 x 3 = 12
12 ÷ 3 = 4   12 ÷ 4 = 3
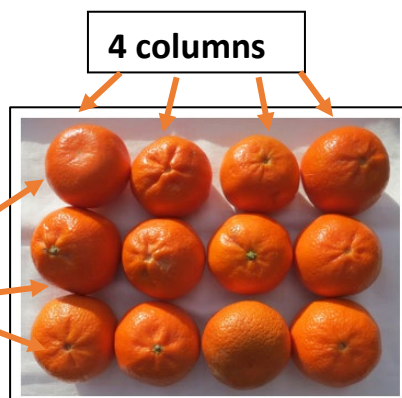
Multiplication (x) and division (÷)

are opposites or *inverses*.

Activity 1

1. Draw an array to show 5 x 4 = 20.
You can use counters to help. (These can be stones, bottle tops, buttons or similar things.)
Write a division (÷) that your array shows.
Can you write another multiplication (x) and another division(÷)?

2. Draw a different array for the number 20.
(Remember each row must have the same number of counters as other rows and each column must have the same number of counters as other columns.)
Write a multiplication (x) and a division (÷) that your array shows.
Now write another multiplication and another division that it shows.

Activity 2

You can use arrays to help you solve division problems.

12 apples are shared between 3 children. How many apples does each child have?

12 ÷ 3 = 4

Child 1
Child 2
Child 3

One for you, one for you …
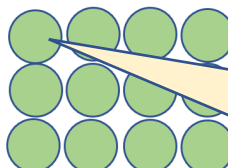
I have 12 seeds. I will plant 3 seeds in each pot. How many pots will I need?

12 ÷ 3 = 4

1 pot
2 pots
3 pots
4 pots

1,2,3 … that's 1 pot full!
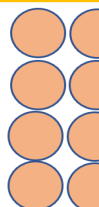
Make or draw an array to help you solve these problems.
Write the division and the answer.

3. Joel has 15 marbles. He shares them equally between his 3 friends. How many does each friend have?

4. Mary has 15 sweets. She eats 3 sweets every day until there are none left. How many days does she eat sweets?

Remainders

Sometimes some things are left over when you share things out equally or put them into equal groups (divide). The ones that are left over are called the *remainder*. It is written like this. **14 ÷ 3 = 4 r 2.**

Practice questions

5) 15 ÷ 5 =   6) 16 ÷ 5 =   7) 21 ÷ 3 =   8) 21 ÷ 7 =
9) 24 ÷ 4 =   10) 24 ÷ 6 =   11) 28 ÷ 6 =   12) 35 ÷ 4 =

Answers

1)
5 × 4 = 20
20 ÷ 5 = 4
4 × 5 = 20
20 ÷ 4 = 5

3) 15 ÷ 3 = 5 marbles

2)
10 × 2 = 20
20 ÷ 10 = 2
2 × 10 = 20
20 ÷ 2 = 10

4) 15 ÷ 3 = 5 days

5) 3   6) 3 r 1   7) 7   8)3   9) 6   10) 4   11) 4 r 4   12) 8 r 3

11. How to …record multiplication

Multiplication words:

multiply, times, lots of, array, x, row, column, place value counter, calculation, grid method.

1 = | **10** = ▮

ones   **tens**
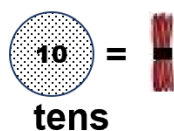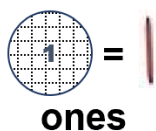
> I can use place value counters to draw arrays with tens and ones on a grid. This will help me understand how to multiply bigger numbers.

Activity1: Multiplying big numbers by small numbers

53 x 4 = ?

Step 1

a) *Draw* a grid with two columns, one row and 'x' in the corner.

x	50	3
4		

b) *Write* 4 at the side of the row (see picture) because you are multiplying by 4.

c) *Split* 53 into 50 and 3. *Write* '50' above the first column and '3' above the second column (see picture).

Step 2

a) *Draw* 5 'ten' place value counters to show

x	50	3
4	10 10 10 10 10	1 1 1

b) *Draw* 3 'one' place value counters to show one row of 3.

Step 3

a) *Keep drawing* rows of 5 tens and 3 ones until you have 4 rows of each. (50 x 4 and 3 x 4).

x	50	3
4	10 10 10 10 10	1 1 1
	10 10 10 10 10	1 1 1
	10 10 10 10 10	1 1 1
	10 10 10 10 10	1 1

c) 53 x 4 = 212

b) Find the totals.

5 tens x 4 = 20 tens

So   50 x 4 = 200

3 x 4 = 12

Practice questions

Now try using what you have learned to answer these questions.

a) 46 x 3 =   b) 54 x 6 =   c) 75 x 4 =   d) 69 x 7 =

Activity 2: Multiplication without counters

73 x 6 =

Make the grid and write the calculation.	x | 70 | 3 6 | |	**73** **x 6**
Multiply the tens. Write what you have done.	x | 70 | 3 6 | 7 tens x 6= 42 tens / So 70 x 6 = 420 |	73 x 6 **70 x 6 420**
Multiply the ones. Write what you have done.	x | 70 | 3 6 | 7 tens x 6= 42 tens / So 70 x 6 = 420 | 3 x 6 = 18	73 x 6 70 x 6 420 **3 x 6 18**
Add together the answers to 70 x 6 and 3 x 6.	x | 70 | 3 6 | 7 tens x 6= 42 tens / So 70 x 6 = 420 | 3 x 6 = 18 **73 x 6 = 438**	73 x 6 70 x 6 420 3 x 6 18 **438**

Practice questions
e) 36 x 3   f) 67 x 4   g) 84 x 8   h) 78 x 9

Extra challenge
Can you use a grid to help you find the answers to these questions?
i) 125 x 4   j) 245 x 3   k)174 x 5   l) 213 x 6

12. How to …record division

Division words:

divide, array, ÷, row, column, remainder, place value counter, calculation, division chart, exchange.

1 = | ones   10 = ▮ tens
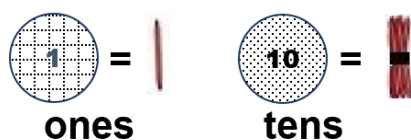
These are place value counters. They will help me understand how to divide bigger numbers.

I can draw arrays with tens and ones and put them on a division chart.

Activity 1: Division with no exchange or remainder

69 ÷ 3 =?

Step 1		
a) *Draw* a division chart with columns for tens and ones.	Tens Ones (Units) 3) 6 9 **c)** *Write* 3 at the side because you are dividing by 3.	**b)** *Write* 6 in the tens column and 9 in the ones column because 69 is 6 tens and 9 ones.
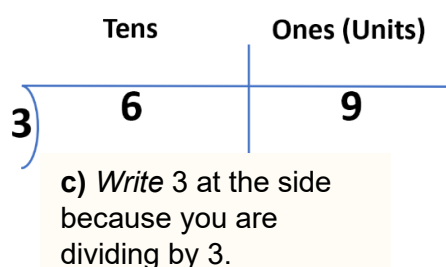
Step 2		
a) *Draw* 6 'ten' place value counters in an array with 3 equal rows because you are dividing by 3.	Tens Ones (Units) 2 3) 6 9 (10)(10) (10)(10) (10)(10)	**b)** There are 2 tens in each row. *Write* 2 in the tens column of the answer line. No tens are left over.
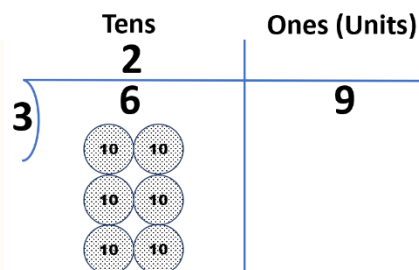
Step 3		
a) *Draw* 9 'one' place value counters in an array with 3 equal rows because you are dividing by 3.	Tens Ones (Units) 2 3 3) 6 9 (10)(10) (1)(1)(1) (10)(10) (1)(1)(1) (10)(10) (1)(1)(1) **c)** 69 ÷ 3 = 23.	**b)** There are 3 ones in each row. *Write* 3 in the ones column of the answer line. No ones are left over.
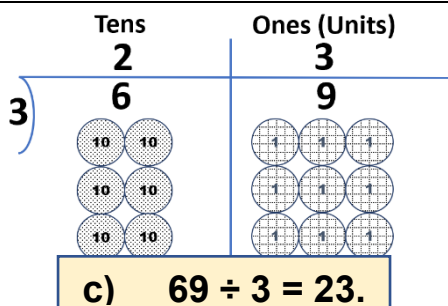
Practice questions

Now try using what you have learned to answer these questions.
(Challenge: Can you work out how to find the answer to d?)
a) 96 ÷ 3 =   b) 86 ÷ 2 =   c) 84 ÷ 4 =   d) 396 ÷ 3 =

Activity 2: Division with exchange

78 ÷ 6 = ?

Step 1

Draw a division chart with columns for tens and ones. *Write* 7 in the tens column, 8 in the ones column and 6 at the side because you are dividing by 6.

Draw 7 'ten' counters in six equal rows.

There is one ten in each row.

Write 1 in the tens column of the answer line.

Tens — 1 — 7

Ones (Units) — 8

There is one 'ten' left over!
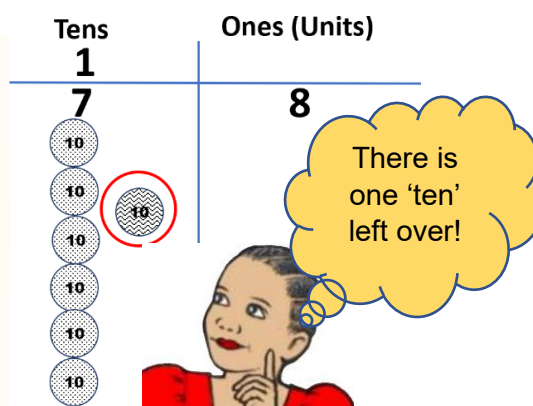
Step 2

a) *Exchange* the ten that is left over for 10 ones. (Don't forget *to cross off* the ten you have exchanged!)
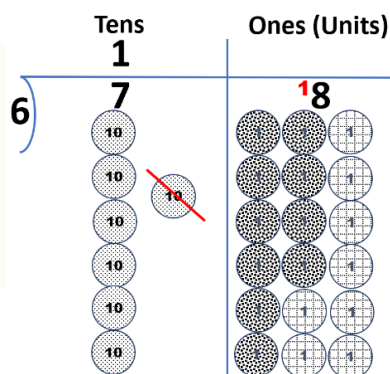
b) *Write* a small '1' next to the 8 because you have added 10 ones to 8 ones and now have 18 ones.

Draw 18 'ones' in the ones column in 6 equal rows.

Step 3

There are 3 ones in each row.

Write 3 in the ones column of the answer line. No ones are left over.
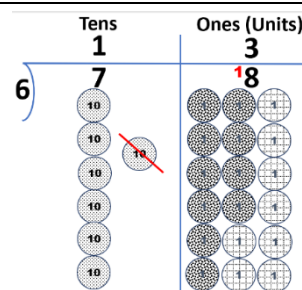
78 ÷ 6 = 13

Practice questions

e) 72 ÷ 3 =   f) 96 ÷ 4 =   g) 65 ÷ 5 =   h) 81 ÷ 3 =
i) 91 ÷ 7 =   j) 456 ÷ 4 =   k) 345 ÷ 3 =   l) 696 ÷ 6 =

Tip: Sometimes you may have to exchange more than one ten!

Extra challenge

m) 524 ÷ 4 =   n) 535 ÷ 5 =   p) 95 ÷7 =   q) 167 ÷ 3 =

Tip: Sometimes there may be some ones left over. These are called the **remainder.** You write it by putting an r after the answer then the number of ones left over.

Answers

		q) 55 r 6	p) 13 r 5	n) 107	m) 131
l) 116	k) 115	j) 114	i) 13	h) 27	g) 13
f) 24	e) 24	d) 132	c) 21	b) 43	a) 32
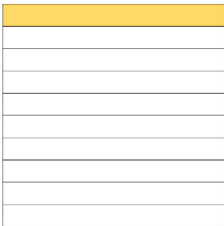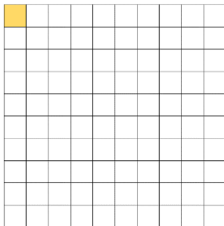
13. How to work with decimal numbers
This card will help you to add and subtract decimal numbers.
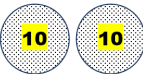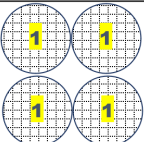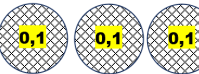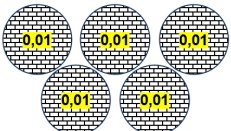
Here are some diagrams to help you understand decimal numbers.
1. Place value charts and shapes

Ones (Units) **,**	tenths	hundredths
One whole (1,0)	One tenth (0,1)	One hundredth (0,01)

2. Place value charts and counters

This image shows **124,35**.

Hundreds	Tens	Ones (Units) **,**	tenths	hundredths
100	10 10	1 1 1 1	0,1 0,1 0,1	0,01 0,01 0,01 0,01 0,01

3. Number lines

Whole numbers

0 1 2 3 4 5

Tenths

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

0 0,1 0,2 0,3 0,4 0,5

Hundredths

0 0,01 0,02 0,03 0,04 0,05 0,06 0,07 0,08 0,09 0,1

Activity 1: What number does it show?

a) What number does this diagram show?

Ones (Units)	,	tenths	hundredths

b) What number does this diagram show?

Hundreds	Tens	Ones (Units)	,	tenths	hundredths
100 100	10 10 10	1		0,1 0,1 0,1 0,1	0,01 0,01
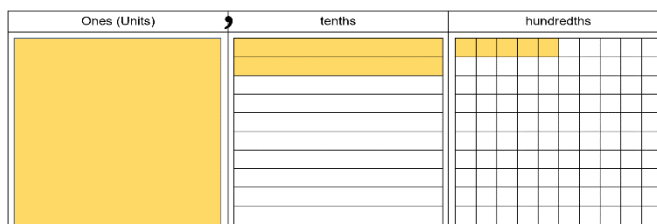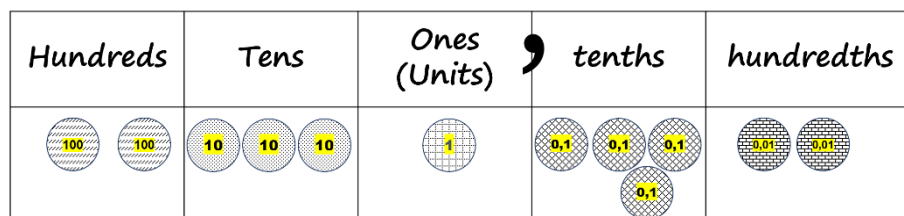
Activity 2: Adding and subtracting with decimals

Adding and subtracting decimals is just like adding and subtracting whole numbers.

Tip: Make sure the decimal comma is always between the 'ones' and the 'tenths'!

a)

Tens	Ones (Units)	tenths
2	3	5
4	6	3

+

b)

Tens	Ones (Units)	tenths
1	8	4
2	3	7

+

c)

Tens	Ones (Units)	tenths	hundredths
1	2	9	4
8	5	1	7

+

d)

Tens	Ones (Units)	tenths
5	8	6
1	3	4

-

e)

Tens	Ones (Units)	tenths
5	6	2
4	3	5

-

f)

Tens	Ones (Units)	tenths	hundredths
7	2	9	3
4	5	1	7

-

Now try these…

g) 54,75 + 65,24

h) 132,58 + 37,46

i) 57,4 + 132,48

j) 78,42 – 28,61

k) 147,46 – 36,27

l) 237,16 – 224,2

Answers

Activity 1

a) 1,25

b) 231,42

Activity 2

a) 69,8

b) 42,1

c) 98,11

d) 45,2

e) 12,7

f) 27,76

g) 119,99

h) 170,04

i) 189,88

j) 49,81

k) 111,19

l) 12,96

14. How to …round and estimate

I need to know how to round so I can estimate.

Estimating will help me know if my answer makes sense. It will also help me to quickly check that I have enough money to pay when I go shopping.

Activity 1: Rounding to the nearest ten

Can you see the **tens** on this number line? They all have a '0' in the ones (units) column. Rounding to the nearest **ten** means rounding to the nearest number with a <u>0 in the ones (units) column</u>.

0 1 2 3 4 5 6 7 8 9 **10** 11 12 13 14 15 16 17 18 19 **20** 21 22 23 24

Imagine there is a hill between the tens, like this.
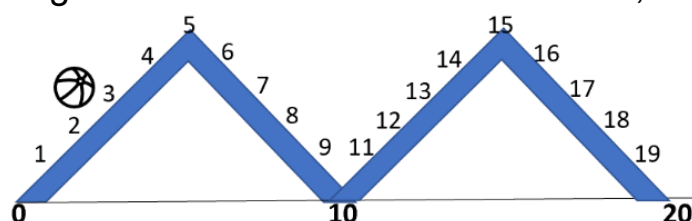
If I put a ball by 3, it rolls to 0. I round 3 to 0.
0 is the nearest 10 to 3.
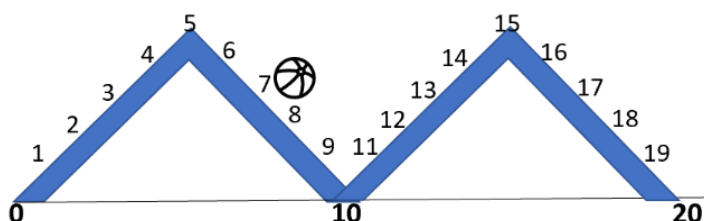
If I put a ball by 7 it rolls to 10. I round 7 to 10.
0 is the nearest 10 to 7.

A number with **'5'** in the ones (units) column is always at the top of the hill. If I put a ball at the top of the hill, it rolls to the **next ten**. So, if I put the ball by **5**, it rolls to **10**. If I put it by **65**, it rolls to **70**.

Practice questions
Round these numbers to the nearest 10.
a) 17   b) 4   c) 15   d) 27   e) 38   f) 162

Activity 2: Rounding to the nearest hundred
Can you see the **hundreds** on this number line? They all have a '0' in the tens column and the ones (units) column.
Rounding to the nearest **hundred** means rounding to the nearest number with a <u>0 in the tens column and in the ones (units) column</u>.

0 10 20 30 40 50 60 70 80 90 **100** 110 120 130 140 150 160 170 180 190 **200** 210 220 230 240

Imagine there is a hill between the hundreds, like this.
If I put the ball by 40, it rolls to 0. I round 40 to 0.
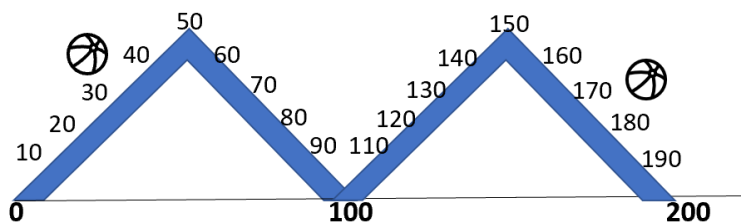
0 is the nearest hundred to 40.

If I put the ball by 170, it rolls to 200. 200 is the nearest hundred to 170.

A number with **'5'** in the tens column is always at the top of the hill. If I put a ball at the top of the hill, it rolls to the **next hundred**. So, if I put the ball by **50**, it rolls to **100**. If I put it by **650**, it rolls to **700**.

Practice questions
Round these numbers to the nearest hundred.
g) 80   h) 140   i) 30   j) 150   k) 380   l) 420

Activity 3: Estimating

An estimate is an answer that is quite close to the answer. It's not a guess, you still have to use what you know and do some thinking!

Round both numbers to the nearest 10. 70 + 90 = 160. The answer will be about 160.

74 + 87

270 - 180

Round both numbers to the nearest 100. 300 – 200 = 100. The answer will be about 100.

Practice questions
Estimate the answer to these questions by rounding to the nearest 10.
m) 67 + 54   n) 76 – 55   p) 98 - 56   q) 103 + 58

Extra challenge
Round these numbers 1) to the ten? 2) to the nearest hundred?
r) 163   s) 386   t) 425   u) 255   v) 957   w) 1243

Answers

a) 20   b) 0   c) 20   d) 30   e) 40   f) 160
g) 100   h) 100   i) 0   j) 200   k) 400   l) 400
m) 70 + 50 = 120   n) 80 – 60 = 20   p) 100 – 60 = 40   q) 100 + 60 = 160
r) 160; 200   s) 390; 400   t) 430; 400   u) 260; 300   v) 960; 1000   w) 1240; 1200

15. How to…understand fractions

Fraction words: part, whole, equal, numerator (top number), denominator (bottom number), one half $\left(\frac{1}{2}\right)$, one quarter $\left(\frac{1}{4}\right)$, one sixth $\left(\frac{1}{6}\right)$, one eighth $\left(\frac{1}{8}\right)$, one ninth $\left(\frac{1}{9}\right)$, one tenth $\left(\frac{1}{10}\right)$.

Activity 1: Fractions of shapes

A fraction is a number which splits something into equal parts. Find a sheet of paper and follow the instructions below to split it into fractions.
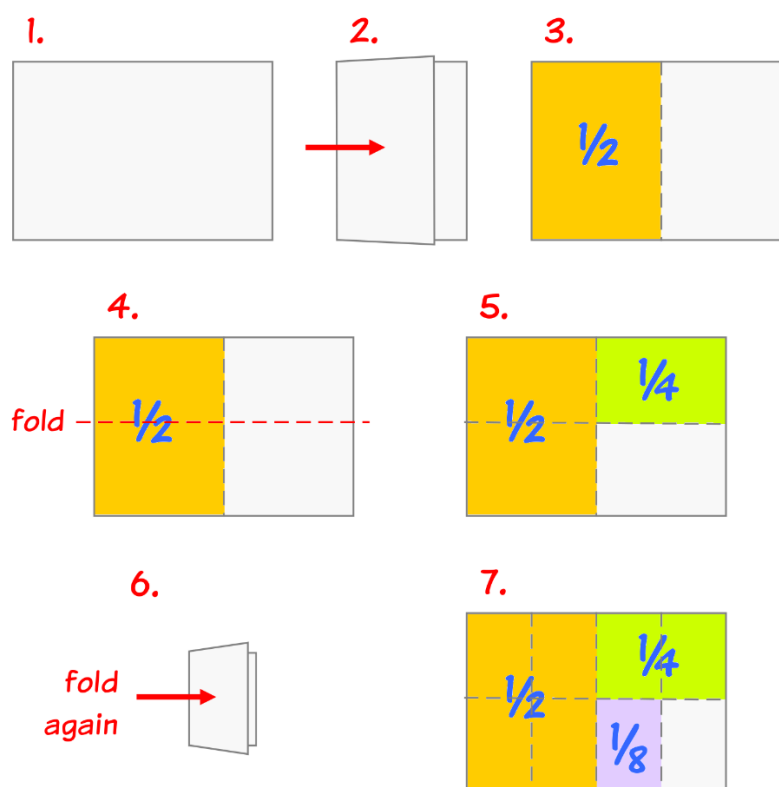
Steps 1, 2 and 3. Fold your paper into two equal parts, open it up and write $\frac{1}{2}$ on one part, as in the diagram above.

Steps 4 and 5. Repeat the folding and write $\frac{1}{4}$.

Steps 6 and 7. Repeat the folding and write $\frac{1}{8}$.

What do you notice? (The bottom number (denominator) is the same as the number of parts on the page. The top number (numerator) is the number of parts being counted).

Here are some more examples of fractions.

$\frac{1}{3}$ $\frac{2}{3}$

$\frac{3}{5}$ $\frac{5}{8}$
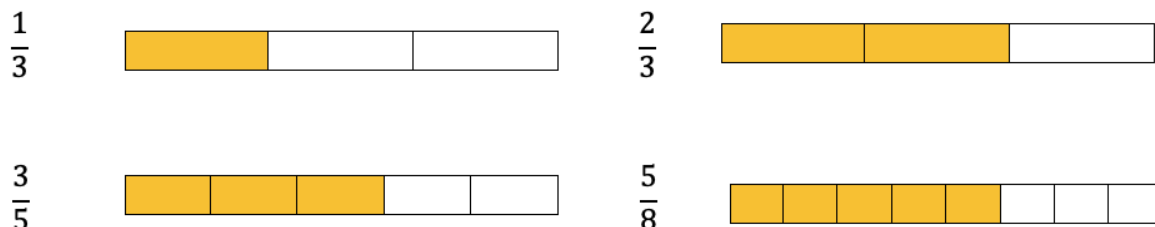
Practice questions

1. Copy these drawings and write the fraction each one shows beside it.

a   b

c   d
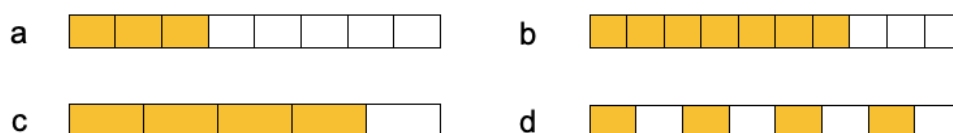
2. Draw a picture to show these fractions. a) $\frac{1}{2}$ b) $\frac{2}{4}$ c) $\frac{5}{6}$ d) $\frac{4}{9}$

Ask someone to check your answers.

Activity 2: Fractions as numbers

We can count in both whole numbers and fractions on a number line.
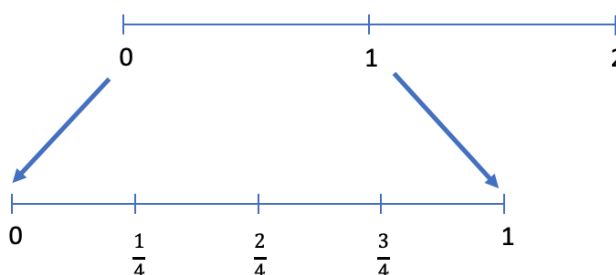
Practice question

3. Draw three number lines from 0 to 2. Label them like the one above to show counting in a) sixths $\left(\frac{1}{6}\right)$, b) eighths $\left(\frac{1}{8}\right)$ and c) tenths $\left(\frac{1}{10}\right)$. Ask someone to check your answers.

| Answers | 1a) $\frac{3}{8}$ | b) $\frac{7}{10}$ | c) $\frac{4}{5}$ | d) $\frac{4}{8}$ |

16. How to…make a fraction chart

Fraction words: part, whole, equal, equivalent, numerator (top number), denominator (bottom number)

> **Reminder:** A fraction is a number which splits something into equal parts.

Activity 1: Fraction chart

In this activity, you will make a fraction chart like the one on the other side of this card.

You will need
- 4 strips of paper, all the same size and small enough to fit in your exercise book.

1. Write "One whole" on one strip.

2. Fold the next strip into two equal parts. Label each part $\frac{1}{2}$.

3. Fold another strip into two equal parts and then into two again. Unfold and label each part as $\frac{1}{4}$.

4. Fold the last piece of paper into eight equal parts by folding it three times. Unfold and label each part as $\frac{1}{8}$.

5. Keep the strips in your exercise book. You will find them useful.

What do you notice about your strips?
- The bottom number (denominator) is the same as the number of parts on the page. The top number (numerator) is the number of parts being counted.

- Some fractions are equivalent (the same size). For example, $\frac{1}{2}$ = $\frac{2}{4}$.

Practice questions

1. Use your fraction strips to help you to write down three more pairs of fractions which are equivalent (the same size).

1 Whole

| $\frac{1}{2}$ | $\frac{1}{2}$ |

Two halves

| $\frac{1}{4}$ | $\frac{1}{4}$ | $\frac{1}{4}$ | $\frac{1}{4}$ |

Four quarters

| $\frac{1}{8}$ | $\frac{1}{8}$ | $\frac{1}{8}$ | $\frac{1}{8}$ | $\frac{1}{8}$ | $\frac{1}{8}$ | $\frac{1}{8}$ | $\frac{1}{8}$ |

Eight eighths

2. Use your fraction strips to help you to decide which fraction is bigger.

a) $\frac{1}{2}$ or $\frac{3}{8}$ b) $\frac{1}{4}$ or $\frac{3}{8}$ c) $\frac{3}{4}$ or $\frac{7}{8}$

A challenge!

Can you make a fraction chart to show 1 whole, thirds, sixths, ninths?

Answers

1) $\frac{2}{4} = \frac{4}{8}$ $\frac{2}{8} = \frac{1}{4}$ $\frac{3}{6} = \frac{4}{8}$ $\frac{1}{2} = \frac{4}{8}$

2a) $\frac{1}{2}$ b) $\frac{3}{8}$ c) $\frac{7}{8}$

17. How to…find fractions of amounts

Fraction words: part, whole, equal, numerator (top number), denominator (bottom number), array, one half $\left(\frac{1}{2}\right)$, one quarter $\left(\frac{1}{4}\right)$, one sixth $\left(\frac{1}{6}\right)$, one eighth $\left(\frac{1}{8}\right)$, one ninth $\left(\frac{1}{9}\right)$, one tenth $\left(\frac{1}{8}\right)$

Activity 1: Fair shares!
You will need:

- 25 counters (pebbles, bottle tops, seeds, etc.) and chalk (if drawing on the floor), or paper and pens (if drawing on paper).

1. Draw a large rectangle on the floor, on paper or in the dust (if outside).
2. Divide the rectangle into two equal parts.
3. Count out 12 counters.
4. Find $\frac{1}{2}$ of 12 by putting the same number of counters in each half of the rectangle.
5. Your rectangle shows $\frac{1}{2}$ of 12 = 6.
6. Now divide your rectangle into quarters. (Remember that $\frac{1}{4}$ is half of a half).
7. Find $\frac{1}{4}$ of 12.

Practice questions

1. Find a) $\frac{1}{4}$ of 8,   b) $\frac{1}{4}$ of 16,   c) $\frac{1}{4}$ of 4,   d) $\frac{1}{2}$ of 10,   e) $\frac{1}{2}$ of 14

Challenge questions

Can you find f) $\frac{3}{4}$ of 12, and g) $\frac{3}{4}$ of 20?

Activity 2: Fraction of amounts using arrays

You will need:

- 25 counters (pebbles, bottle tops, seeds, etc.) and chalk (if drawing on the floor), or paper and pens (if drawing on paper).

Here is a way to find $\frac{1}{3}$ of 12. (This means divide 12 counters into 3 groups and say how many are in one group).

1. Count out 12 counters.
2. Arrange the counters into an array with three equal rows.
3. Each row has 4 counters in it, so $\frac{1}{3}$ of 12 is 4.

Here is a way to find $\frac{2}{3}$ of 9. (This means divide 9 counters into 3 groups and say how many are in two groups).

1. Count out 9 counters.
2. Arrange the counters into an array with three equal rows.
3. Each row has 3 counters in it, so $\frac{1}{3}$ 1/3 of 9 is 3. $\frac{2}{3}$ of 9 is 6.

Practice questions

Use arrays to help you to answer the following questions.

2 a) $\frac{1}{4}$ of 16   b) $\frac{1}{2}$ of 16   c) $\frac{1}{3}$ of 18   d) $\frac{2}{3}$ of 18

e) $\frac{1}{5}$ of 20   f) $\frac{2}{5}$ of 20   g) $\frac{1}{3}$ of 24   h) $\frac{2}{3}$ of 24

i) $\frac{1}{5}$ of 25   j) $\frac{3}{5}$ of 25   k) $\frac{1}{10}$ of 20   l) $\frac{4}{10}$ of 20

Answers

Activity 1 $\frac{1}{4}$ of 12 is 3

1a) 2   b) 4   c) 1   d) 5   e) 7   f) 9   g) 15
2a) 4   b) 8   c) 6   d)12   e) 4   f) 8   g) 8
h) 16   i) 5   j) 15   k) 2   l) 8

18. How to add and subtract fractions 1
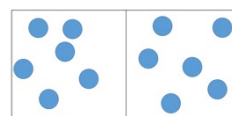
Fraction words: part, whole, equal, numerator (top number), denominator (bottom number), one half $\left(\dfrac{1}{2}\right)$, one quarter $\left(\dfrac{1}{4}\right)$, one eighth $\left(\dfrac{1}{8}\right)$.

Activity 1:
You will need to make some fraction cards like these.
Use four rectangles of paper which are the same size.
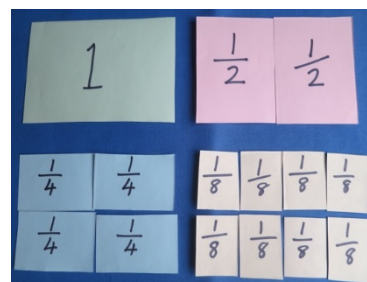
1. Copy this picture into your book.
2. It shows that one half add one half equals two halves ($\dfrac{1}{2} + \dfrac{1}{2} = \dfrac{2}{2}$).
3. The top number (numerator) in the answer is 2 because there are two halves.
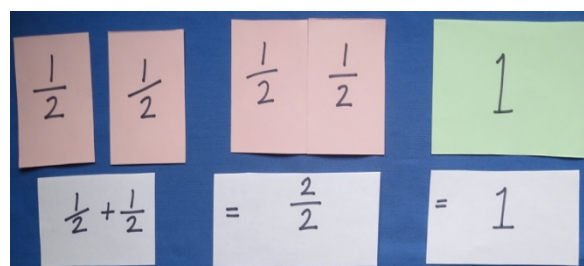
4. Two halves are the same as 1, so we can write $\dfrac{2}{2} = 1$.

Here is another example.

1. This example shows that
   a. $\dfrac{1}{8} + \dfrac{2}{8} = \dfrac{3}{8}$.
2. The top number always shows how many parts we are working with.
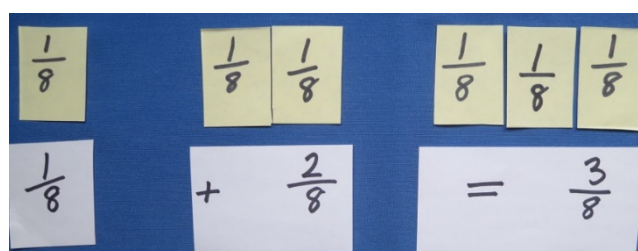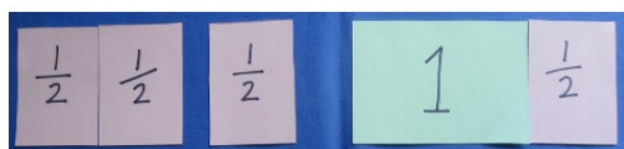

Practice questions

Use your cards to help you to answer these questions in your book.

1a) $\dfrac{1}{4} + \dfrac{1}{4} = ?$ b) $\dfrac{1}{8} + \dfrac{2}{8} = ?$ c) $\dfrac{1}{8} + \dfrac{3}{8} = ?$ d) $\dfrac{1}{8} + \dfrac{2}{8} + \dfrac{3}{8} = ?$
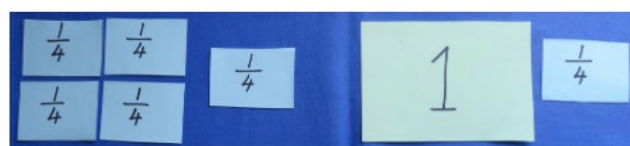
Mixed numbers

Sometimes the top number (numerator) of a fraction is larger than the bottom number (denominator) and the fraction is bigger than one whole. This type of fraction can also be written as a mixed number. A mixed number is made from both a whole number and a fraction.
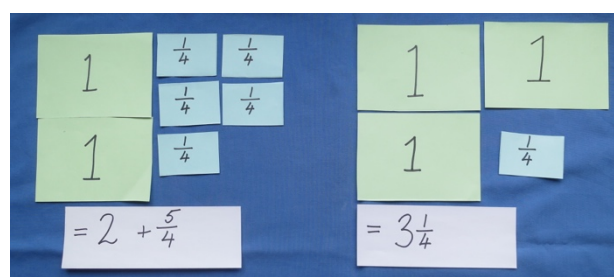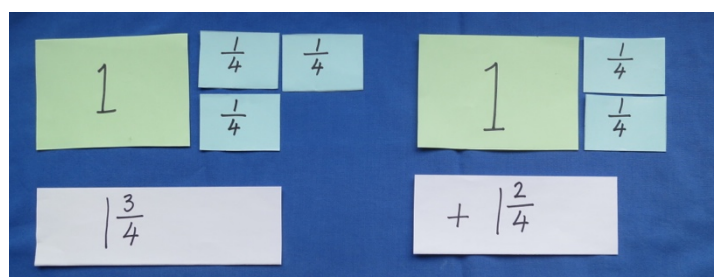
Here are some examples.

$$\frac{3}{2} = 1\frac{1}{2}$$

$$\frac{5}{4} = 1\frac{1}{4}$$

Activity 2: Adding mixed numbers

You will need:

- fraction cards from Activity 1.

Use your cards to check that you understand that $1\frac{3}{4} + 1\frac{2}{4} = 3\frac{1}{4}$.

Practice questions

Use your cards to help you to answer the following questions

2a) $1\frac{3}{8} + 1\frac{5}{8} = ?$ b) $2\frac{5}{8} + 1\frac{5}{8} = ?$ c) $1\frac{7}{8} + 1\frac{2}{8} = ?$

Answers

2a) 3   b) $4\frac{2}{8}$ or $4\frac{1}{4}$ c) $3\frac{1}{8}$

1a) $\frac{2}{4}$ or $\frac{1}{2}$ b) $\frac{3}{8}$ c) $\frac{4}{8}$ or $\frac{2}{4}$ or $\frac{1}{2}$ d) $\frac{6}{8}$ or $\frac{3}{4}$

19. How to find a common denominator

Fraction words: part, whole, equal, numerator (top number), denominator (bottom number), one half $\left(\frac{1}{2}\right)$, one quarter $\left(\frac{1}{4}\right)$, one eighth $\left(\frac{1}{8}\right)$.

Activity 1: Adding fractions

When you add or subtract fractions, they must have the same denominator. So how do you add $\frac{1}{2} + \frac{1}{3}$? You have to change them both into the same sort of fraction – one with the same denominator.

You will need sheets of paper – scrap paper or old letters or newspapers will be fine.

1. Because the denominator of the first fraction is 2, fold your piece of paper into halves.
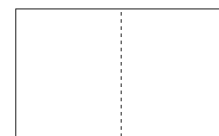
2. Turn your piece of paper round through 90°, as in the picture on the right. Because the second denominator is 3, fold it in this direction into thirds.
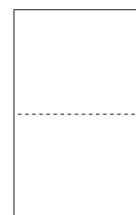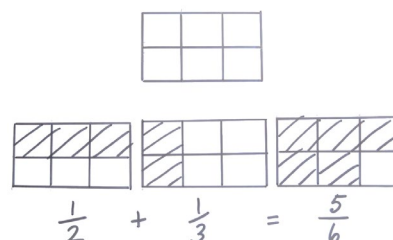
3. The result will be a piece of paper divided into sixths.
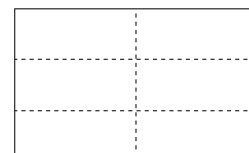
4. Unfold your paper. How many sixths can you see in $\frac{1}{2}$? $\left(\frac{3}{6}\right)$

5. How many sixths can you see in $\frac{1}{3}$? $\left(\frac{2}{6}\right)$

6. If you add $\frac{3}{6}\left(\frac{1}{2}\right)$ and $\frac{2}{6}\left(\frac{1}{3}\right)$ how many sixths will you have? $\left(\frac{5}{6}\right)$ So $\frac{1}{2} + \frac{1}{3} = \frac{5}{6}$.

7. You could write it down like this.

$$\frac{1}{2} \quad + \quad \frac{1}{3} \quad = \quad \frac{5}{6}$$

Numeracy cards

Activity 2: Subtracting fractions

Subtraction is a bit different. Let's look at $\dfrac{5}{6} - \dfrac{1}{2} = \dfrac{1}{3}$.

You will need some scrap paper.
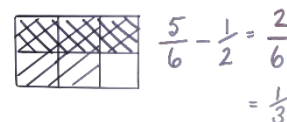
1. Fold your paper into sixths.

2. Shade $\dfrac{5}{6}$.

3. Subtract $\dfrac{1}{2}$ by crossing out half the sixths ($\dfrac{1}{2} = \dfrac{3}{6}$ so you

   cross out $\dfrac{3}{6}$).

4. You have $\dfrac{2}{6}$ left. $\dfrac{2}{6}$ is the same as $\dfrac{1}{3}$.

Practice questions

Use pictures to help you to answer these questions.

1a) $\dfrac{1}{2} + \dfrac{1}{4} = ?$ b) $\dfrac{1}{8} + \dfrac{1}{2} = ?$ c) $\dfrac{2}{3} - \dfrac{1}{6} = ?$ d) $\dfrac{7}{8} - \dfrac{3}{8} = ?$
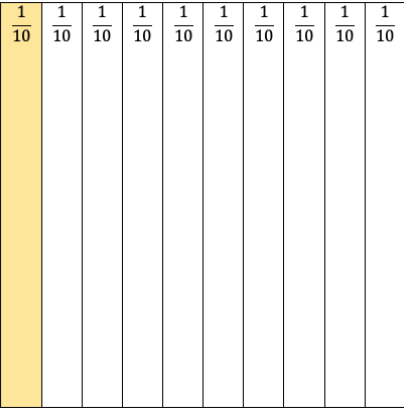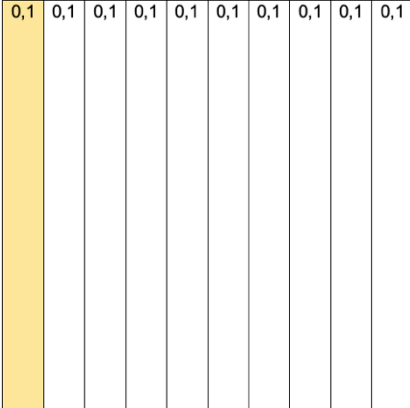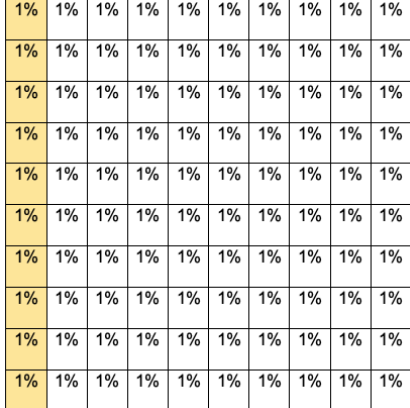
1a) $\dfrac{6}{9}$ or $\dfrac{3}{4}$ b) $\dfrac{5}{8}$ c) $\dfrac{3}{6}$ or $\dfrac{1}{2}$ d) $\dfrac{8}{8}$ or $\dfrac{4}{2}$ or $\dfrac{1}{2}$

Answers

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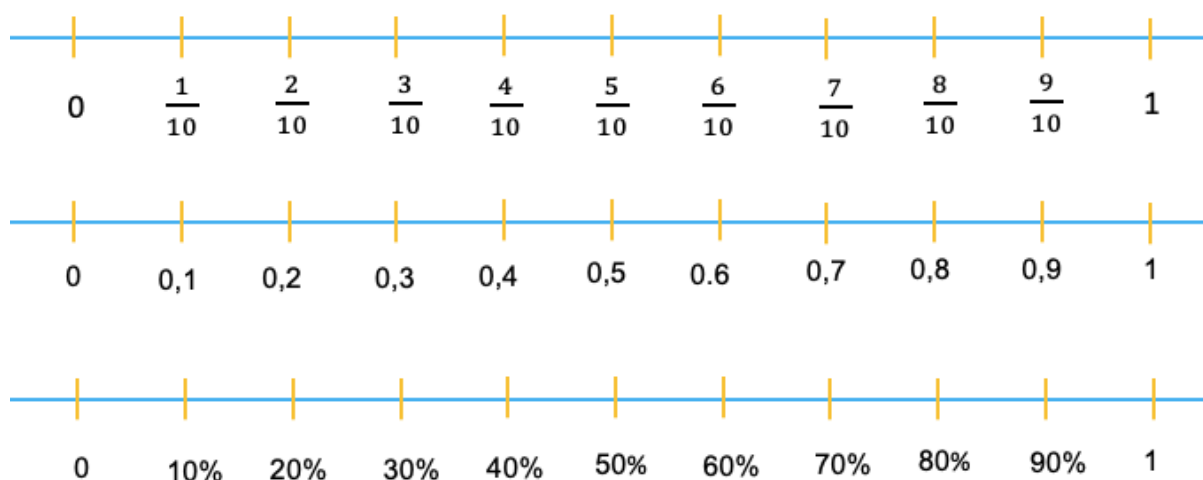
20. How to match fractions, decimals and percentages

Fractions, decimals and percentages are all numbers which show parts of a whole.

Here is a diagram which shows that $\frac{1}{10}$, 0,1 and 10% are the same size.

Fraction	Decimal	Percentage
$\frac{1}{10}$	0,1	10%

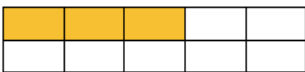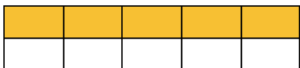We can also show that other fractions, decimals and percentages are the same size using number lines.

Activity 1: What's the same?

Use the number lines to help you to complete the table below.

Fraction	Decimal	Percentage
$\dfrac{3}{10}$		
	0,5	
		60%
$\dfrac{4}{5}$		
	0.2	

Activity 2: Mix and match

Here are some fractions, decimals and percentages. Can you find three which are the *same* size? There are five sets altogether.

$\dfrac{3}{10}$	0,5	90%
0,9	10%	$\dfrac{2}{5}$
40%	$\dfrac{9}{10}$	0,1
$\dfrac{1}{2}$		$\dfrac{1}{10}$
0,4	30%	

21. How to find a percentage of an amount

Percentages are often used in business, so it is useful to be able to calculate them. Sometimes prices are increased by a certain percentage and it is important to know how much you will have to pay.

Reminder:
Here is a reminder of the links between fractions and percentages

Percentage	100%	50%	10%	5%	1%
Fraction	$\frac{100}{100}$	$\frac{50}{100}$	$\frac{10}{100}$	$\frac{5}{100}$	$\frac{1}{100}$
Image					

Activity: Finding percentages of amounts

Here is a table showing how to find some different percentages of $200. For each calculation, the percentage and the amount of money are multiplied or divided by the same number.

Percentage	Amount
100%	$200
10%	$20
1%	$2
5%	$10
5%	$10

to find 10%, I divide 100% by 10

to find 1%, I divide 10% by 10

to find 5%, I divide 10% by 2

Another way - to find 5%, I multiply 1% by 5

to find 10%, I divide $200 by 10

to find 1%, I divide $20 by 10

to find 5%, I divide $20 by 2

Another way - to find 5%, I multiply $2 by 5

Here are two examples to show how you can use the information above to find percentages.

Example 1. What is 15% of $200?

15% = 10% + 5%.

10% is $20, 5% is $10.

$20 + $10 = $30.

15% of $200 is $30.

Example 2. What is 26% of $200?

26% = 10% + 10% + 5% +1%.

Two lots of 10% is 2 x $20, 5% is $10 and 1% is $2.

$20 + £20 + $10 +$2= $52.

26% of $200 is $52.

Practice questions

1. Find (a) 20% of $200   (b) 35% of $200   (c) 63% of $200
2. Find (a) 15% of $300   (b) 8% of $300   (c) 25% of $300

You can find more about how percentages are used on Financial Literacy Card 9.

2a) $45	b) $24	c) $75
1a) $40	b) $70	c) $126

Answers