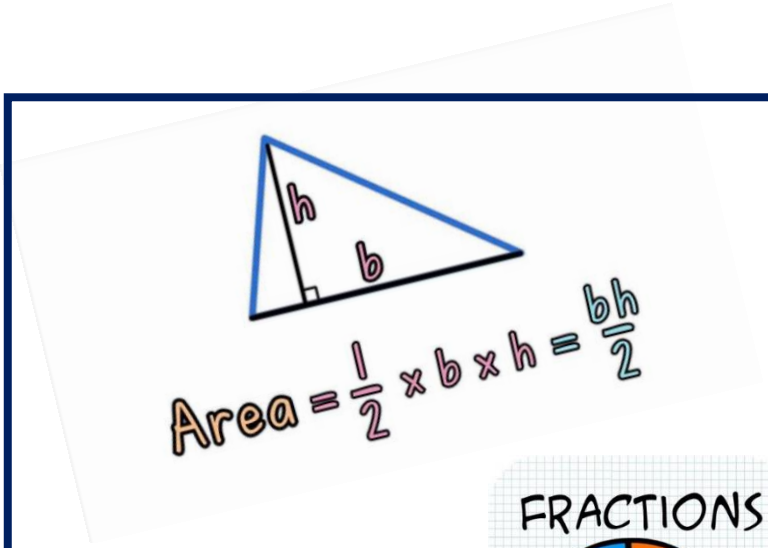
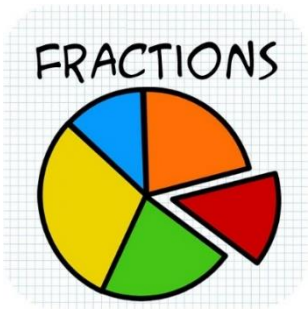
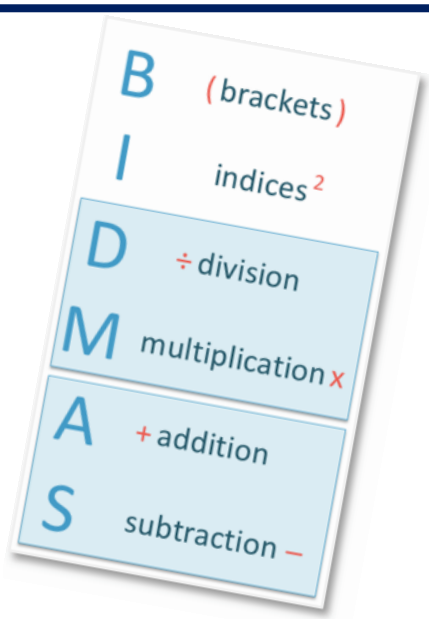
Bury College

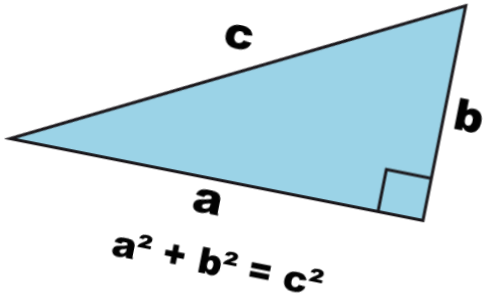
GCSE and Functional Skills Maths

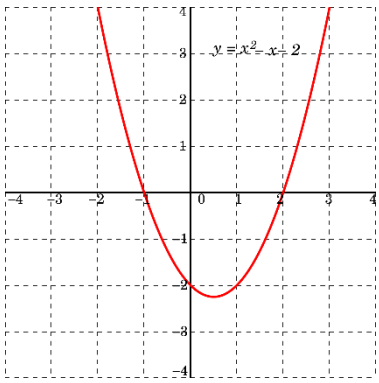
Maths skills booklet











Introduction

Welcome to maths at Bury College.

This booklet is to be used as a short revision aid throughout the summer months to keep your maths skills fresh for when you join us in September.

There is space on the page to show your working out. Make sure you show all working clearly. It is a good idea to use a pencil to keep your work tidy.

All answers are provided at the back of the booklet.

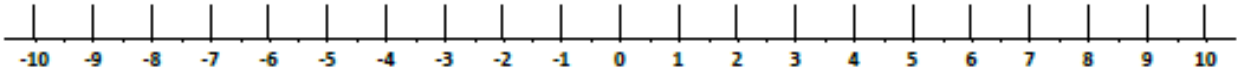
Do not be afraid to ask for help if you get stuck, or even if you just want your teacher to check that your working out is correct.

Contents

Chapter 1- Number facts, place value and rounding

Integers

An integer is a whole number – it can be positive or negative or zero.



So I can write all:

the positive integers: 1, 2, 3, 4, 5, 6,… and so on.
the negative integers: -1, -2, -3, -4,… and so on.

Even Numbers

An even number is a whole number that ends in 0, 2, 4, 6 or 8.
An even number can be divided by 2 and leave no remainder.

All the numbers in red are even numbers.

Odd Numbers

An odd number is a whole number that ends in 1, 3, 5, 7 or 9.
When you divide an odd number by two (2) you always have a remainder of 1.

All the numbers in black are odd numbers.

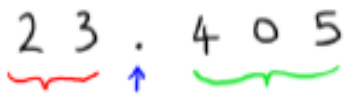
Decimal Numbers

Sometimes you need to write a number that is not a whole number. You can write it using a decimal point.

If you want to write one and a half you write it like:

You say it as: "one point five"

Another decimal number is 23.405.
Remember that you say 23.405 as 'twenty three point four zero five'.



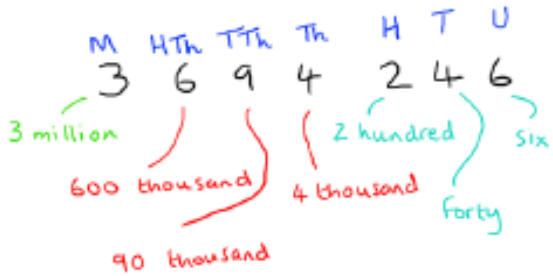
twenty three point four zero five

Do not say

"twenty three point four hundred and five"

Numbers (big numbers and place value)

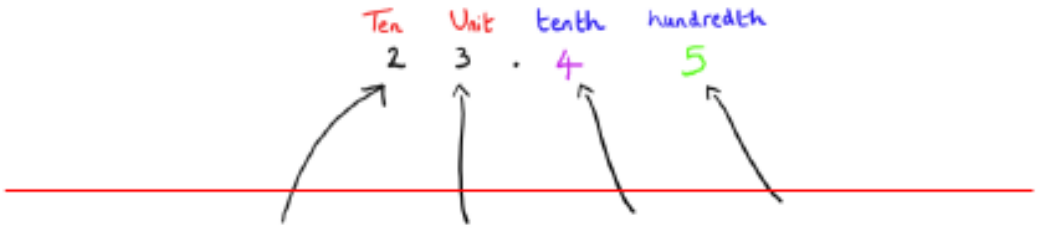
one	1
ten	10
hundred	100
thousand	1, 000
ten thousand	10, 000
hundred thousand	100, 000
million	1, 000, 000
billion	1, 000, 000, 000
trillion	1, 000, 000, 000, 000



3 million 694 thousand 2 hundred and 46

Decimal Number (place value)

It is important to know the **place value** of decimal places.



Digit Value =	2	3	4	5
Place Value =	2 Tens	3 Units	4 tenths	5 hundredths
Real Value =	20	3	$\frac{4}{10}$	$\frac{5}{100}$

1.1 Practice questions

a. Write down the value of the number 7 in
47891

……..

b. Write down the value of the number 3 in
0.832

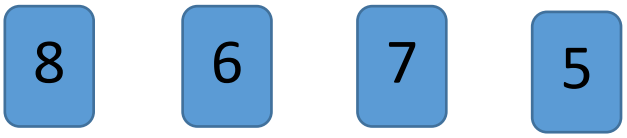
……

c. Write the following number in words:
5,608,921

……

……

d. By using the following cards, make the biggest possible **even** number

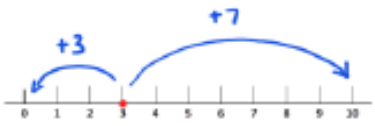


……

Rounding Off

This is a way of finding the approximate value (like an accurate guess).

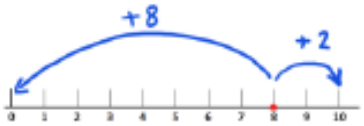
There is a simple rule to remember when rounding off: if the digit is 5 or more round up.



3 ⟶ 0

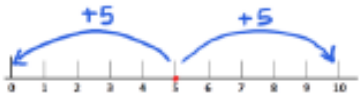
Round off 3 to the nearest 10

The 3 is closer to zero so you round down to zero.

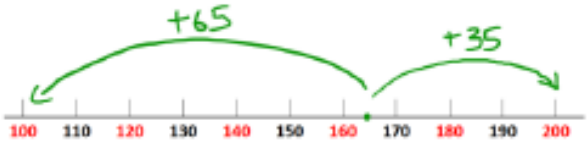


8 ⟶ 10

Round off 8 to the nearest 10.
The 8 is closer to 10 so you round up to 10.



The number 5 is in the middle.
If it is in the middle you should always round up



If you stand on 165 and look up the number line you will see the number 200 – it is 35 away.

If you stand on 165 and look down you will see 100 – it is 65 away.

If you round off 165 to the nearest 100, you will round it up to 200 because it is closer to 200.

1.2 Practice questions

a. Round 87 to the nearest 10

.....

b. Round 742 to the nearest 100

.....

c. Round 3500 to the nearest 1000

.....

Chapter 2- The four operations

There are different words for the four operations. Make sure you know them all.

Addition + add, plus, sum

Subtraction − minus, takeaway, difference

Multiplication × times, multiply, product

Division ÷ divide, share

Adding Integers

When you add integers make sure you line up the numbers.

$437 + 41 =$

line up the place values in columns:

$$\begin{array}{r} 437 \\ +\ 41 \\ \hline 478 \\ \hline \end{array}$$

$97 + 108 =$

$$\begin{array}{r} 97 \\ +\ 108 \\ \hline 205 \\ \hline \end{array}$$

Subtracting Integers

$364 - 42 =$ $321 - 32 =$ $27 - 18 =$

$$\begin{array}{r} 364 \\ -\ 42 \\ \hline 322 \end{array}$$

$$\begin{array}{r} {}^{2}\cancel{3}{}^{11}\cancel{2}1 \\ -\ 32 \\ \hline 289 \end{array}$$

$$\begin{array}{r} {}^{1}\cancel{2}{}^{1}7 \\ -\ 18 \\ \hline 9 \end{array}$$

Don't forget to borrow from you next door neighbour

Multiplying Integers

32×12

$30 + 2$ and $10 + 2$

$$\begin{array}{r} 32 \\ \times\ 12 \\ \hline 64 \\ 320 \\ \hline 384 \end{array}$$

×	30	2
10	300	20
2	60	4

$$\begin{array}{r} 300 \\ 20 \\ 60 \\ 4 \\ \hline 384 \end{array}$$

grid method

Dividing Integers

$16 \div 4 = 4$

$\frac{16}{4} = 4$

$164 \div 4 = 41$

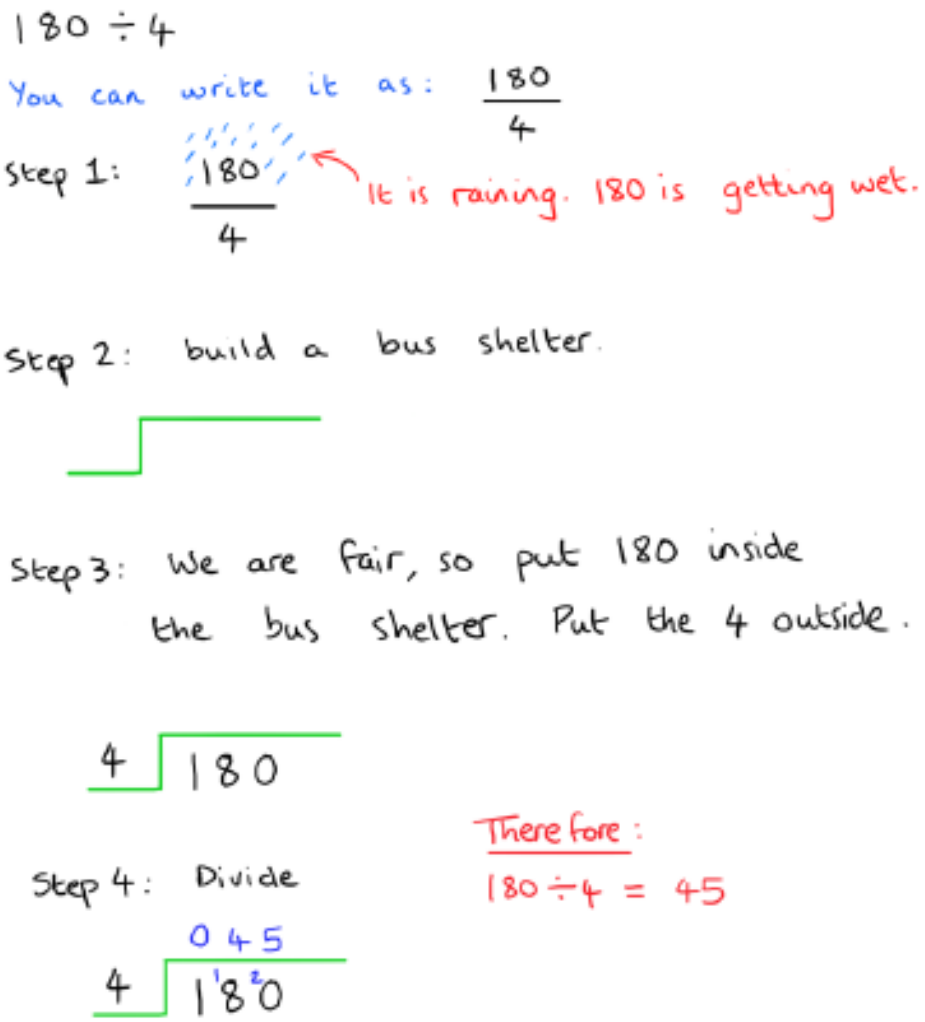
$$4 \overline{)\,16'4} \quad \text{(0 4 1)}$$

$24 \div 2 = 12$

$240 \div 2 = 120$

$121 \div 11 = 11$

$$11 \overline{)\,12'1} \quad \text{(0 1 1)}$$



There are many different methods to add, subtract, multiply and divide. Below are four useful links to MrBurridgeMaths on YouTube, who goes through all the different methods. It is up to you to choose which ones you most prefer:

https://www.youtube.com/watch?v=khm74IVNC_U

https://www.youtube.com/watch?v=rUJPynsyT7Q

https://www.youtube.com/watch?v=sLwF0hPMisk

https://www.youtube.com/watch?v=OBhuVpfJ_Qc

2.1 Practice questions

Use the space provided for any working out. Do these **without** a calculator.

a. 256 + 169

……

b. 1742 – 816

……..

c. 84 x 7

……

d. 132 x 45

……

e. 513 ÷ 9

……

f. 1620 ÷ 12

……

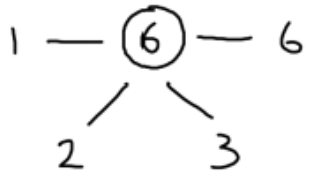
Chapter 3- Factors, multiples and primes

Factor

This is a strange word. But the simplest way, I suppose, is to ask '***which times tables is this number in?***'

For example the factors of 6 are: 1, 2, 3 and 6 because the number 6 appears in the:

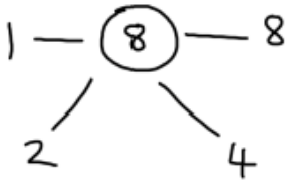
1 times table
2 times table
3 times table and
6 times table.



Another way of looking at it is to say: '***which number can 6 divide into and leave no remainder?***'

Example: the factors of 8 are: 1,2,4 and 8 because

$8 \div 1 = 8$
$8 \div 2 = 4$
$8 \div 4 = 2$
$8 \div 8 = 1$



Multiple

These are the numbers that are in the times tables. Simple.

The multiples of 6: 6, 12, 18, 24, 30.....

To take it a step futher we can say that 18 is a multiple of: 1, 2, 3, 6, 9 and 18.

1: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20
2: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26,
3: 3, 6, 9, 12, 15, 18, 21, 24, 27, 30,
6: 6, 12, 18, 24, 30, 36, 42, 48,
9: 9, 18, 27, 36, 45, 54,
18: 18, 36, 54, 72

} because 18 is in all these times tables

Prime numbers

These are numbers with only two factors; 1 and themselves

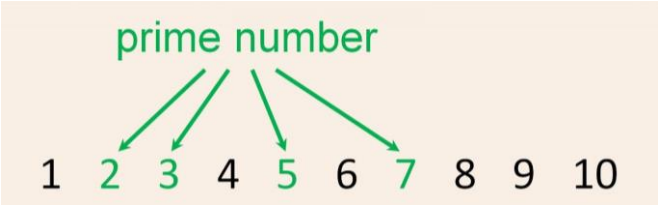
For example:

The factors of 2 are: 1 and 2 so 2 is prime

The factors of 7 are: 1 and 7 so 7 is prime

The factors of 13 are: 1 and 13 so 13 is prime etc…

Here are the prime numbers less than 10:



3.1 Practice questions

a. List all the factors of 30:

……

b. List the first five multiples of 7:

……

c. Below is a set of numbers:

29 25 21 23 26 30

From this list, write down:

(i) A prime number

……

(ii) A multiple of 5

……

(iii) A multiple of 3 and 5

……

(iv) A factor of 42

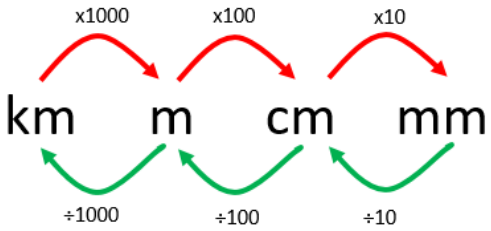
……

Chapter 4- Metric unit conversion

Metric Length Units

When measuring how long things are we use the following units:

Kilometre (km)
Metre (m)
Centimetre (cm)
Millimetre (mm)



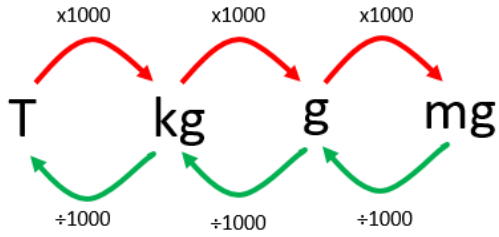
Conversions you need to know:

1km = 1000m 1m = 100cm 1cm = 10mm

Metric Mass Units

These are the names you should learn:

Tonne (t)
Kilogram (kg)
Gram (g)
Milligram (mg)



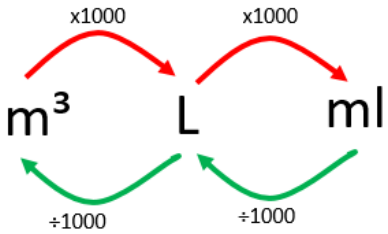
Conversions you need to know:

1 Tonne = 1000kg 1kg = 1000g 1g = 1000mg

Metric Volume Units

These are the names you should learn:

Litre (l)
Millilitre (ml)
Cubic metre (m^3)



Conversions you need to know:

1 Litre= 1000ml $1m^3 = 1000L$

4.1 Practice questions

a. Change 4500m to km

……

b. Change 2.6L to ml

……..

c. Change 45mm to cm

……..

d. David is 1.61m tall. Jack is 8cm taller than David.
How tall is Jack?

……

Chapter 5- Perimeter and area

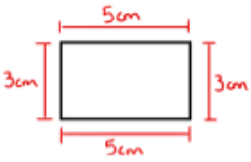
Perimeter

This is the distance all the way around a shape.

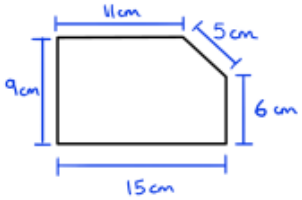
peri + meter

this means around

this means measure



Perimeter = 5 + 3 + 5 + 5
= 16cm

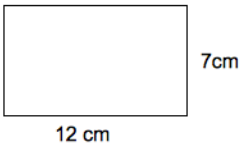


Perimeter = 11 + 5 + 6 + 15 + 9
= 36cm

5.1 Practice questions

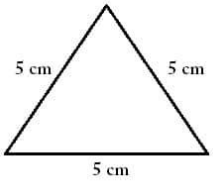
a. Calculate the perimeter of these shapes. Don't forget the units.

(i)



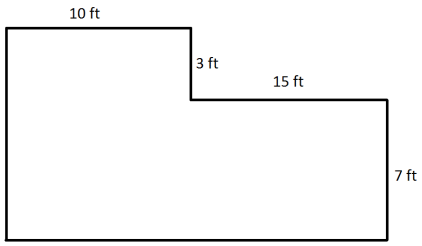
Perimeter = ……..

(ii)



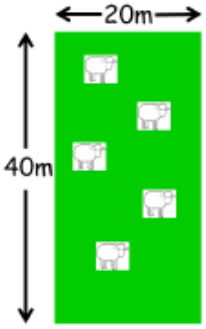
Perimeter = ……..

(iii)



Perimeter = ……

b. Farmer Joe wants to put a fence around his field.
His field is in the shape of a rectangle with dimensions 20m x 40m.
Each bundle of fencing is 10m long.
Each bundle costs £4.
Joe pays with a £50 note. How much change will he get?



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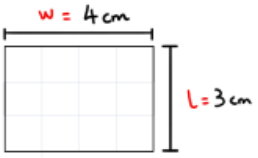
Area

This is the amount of surface inside a shape.

Area is measured in square units. Examples will be cm^2 or m^2.

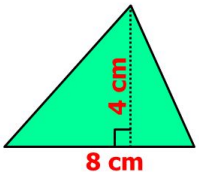


Area = width × length
= w × l
= 4 × 3
= 12 cm^2

It takes 12 squares to cover this shape.
Each square equals one square cm.

The formula for the area of a triangle is:

Base x height ÷ 2



example:

$$A = \frac{b \times h}{2}$$

$$= \frac{8 \times 4}{2}$$

$$= 16\ cm^2$$

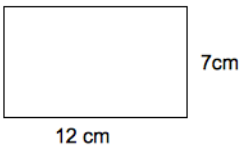
Area of the triangle:

$$A = \frac{b \times h}{2}$$

5.2 Practice questions

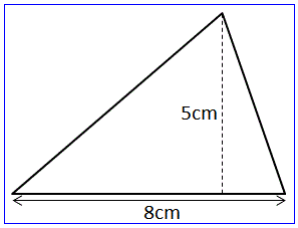
a. Calculate the area of these shapes. Don't forget the units:

(i)



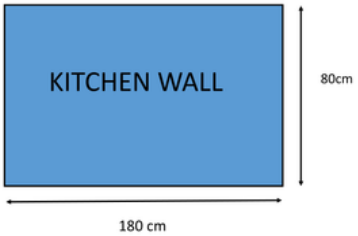
Area = ……

(ii)



Area = ……

b. Bob wants to paint his kitchen wall.
His kitchen wall is a rectangle with dimensions 80cm x 180cm.
A tin of paint covers 1000cm^2.
How many tins will Bob need to cover his wall?



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Chapter 6- Fractions

Fact 12 – Fraction (Numerator and Denominator)

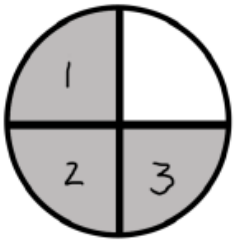
A fraction is a number that shows us how much of a whole thing we have.

$\frac{2}{3}$ ← numerator (the top part tells us how many parts we eat)

$\frac{2}{3}$ ← denominator (the bottom part tells us how many equal parts we split up 1 pizza in to)

Fact 13 – Proper Fraction

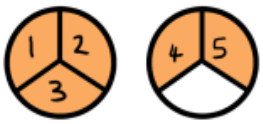
This is when the numerator (top part) is <u>smaller</u> than the denominator (bottom part).



$\frac{3}{4}$ ← The numerator is less than the denominator.

Fact 14 – Improper Fraction

This is when the numerator (top part) is <u>bigger</u> than the denominator (bottom part).



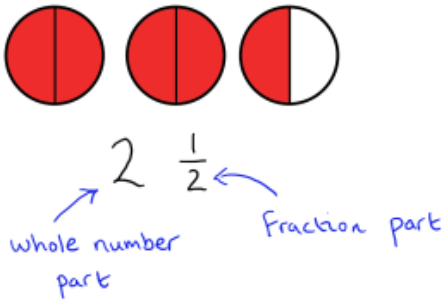
$\frac{5}{3}$ ← Take 5 pieces home to eat.

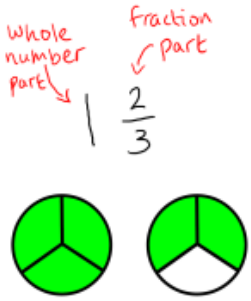
$\frac{5}{3}$ ← Split each pizza into 3 equal parts.

"five thirds"

Fact 16 – Mixed Number

This is a number that has a whole part and a fraction part.

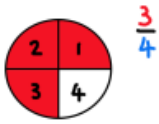




Fact 83 – Drawing a Proper Fraction

Make sure that you are able to draw proper fractions. There are two models that we normally use. Model 1 – the pizza model. Model 2 – the chocolate bar model.

Pizza Model For $\frac{3}{4}$

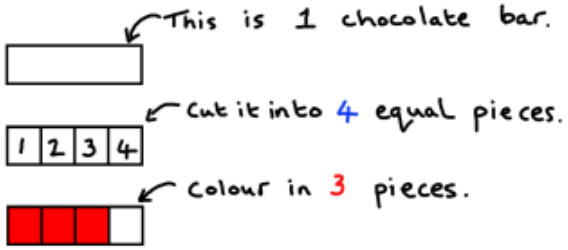


Step 1 - take a pizza and cut it into 4 equal pieces.

Step 2 - colour in 3 pieces.

You have coloured in $\frac{3}{}$ out of the $\frac{4}{}$ pieces.
Or, you have shaded in 3 quarters $\left(\frac{3}{4}\right)$

Chocolate Bar Model

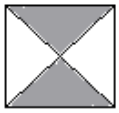


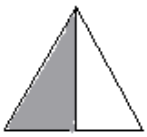
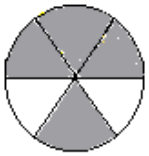
You have coloured in 3 out of 4 pieces.

You have shaded in 3 quarters.

6.1 Practice questions

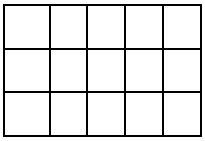
a. What fraction of each of these shapes is shaded?



(i) (ii) (iii) (iv)

b. Shade $\frac{3}{5}$ of this shape

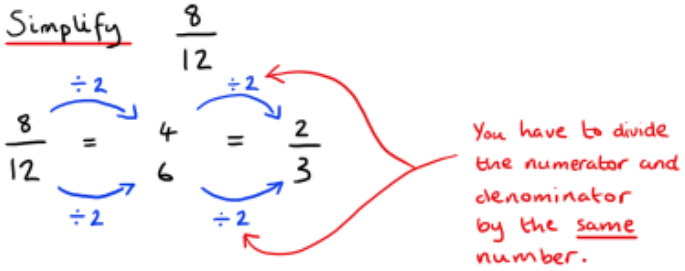


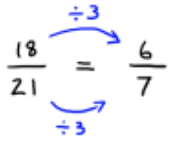
Fact 94 – Simplifying Fractions

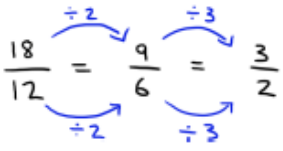
When you simplify a fraction to try to write in an easy way.

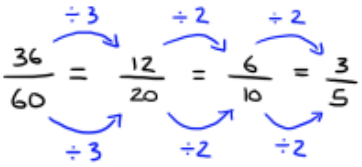
Method 1 – Keep Dividing

You do this by dividing the numerator and denominator by the same number. You keep doing this until you can't divide by the same number anymore.





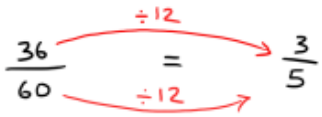




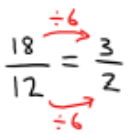
Keep dividing the numerator and denominator by the same number until you can't divide anymore.
The important question is: which timestable is the numerator and denominator in? Then divide by that number.

Method 2 – Divide by the Largest Number (or largest common factor)

Or you can find the largest number that the numerator and denominator will divide into.



The largest number that the numerator and denominator will divide into and leave no remainder is 12.



18 and 12 are both in the 1, 2 and 6 times tables.
So we can divide both by 6 (because 6 is the biggest times table that 18 and 12 are in).

6.2 Practice questions

Write each of these fractions in their simplest form:

a. $\frac{10}{30}$

.....

b. $\frac{8}{12}$

.....

c. $\frac{9}{21}$

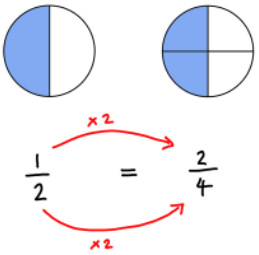
.....

d. $\frac{48}{144}$

.....

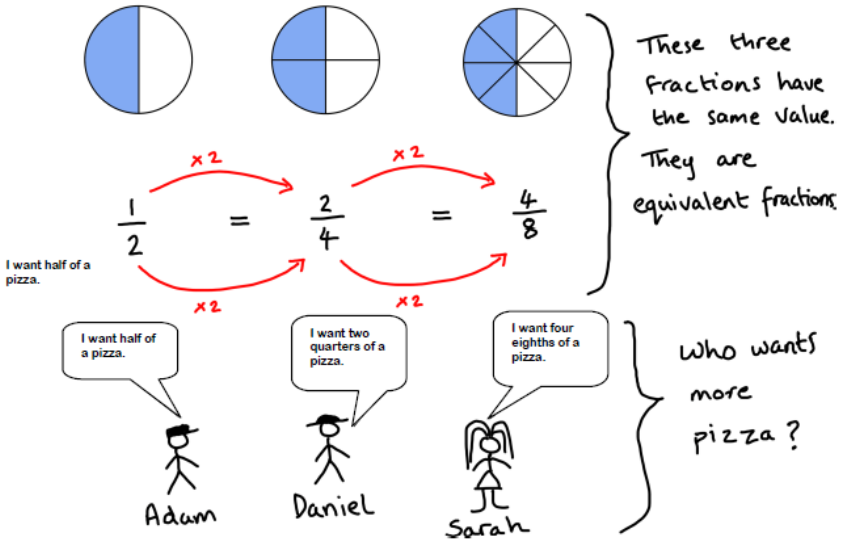
Fact 95 – Equivalent Fractions

These are fractions that have the same value.



These two fractions are equivalent fractions because they have the same value.
If you multiply (×) the numerator by 2 you also have to multiply the denominator by 2

When you simplify a fraction – you end up with two fractions that have the same value.

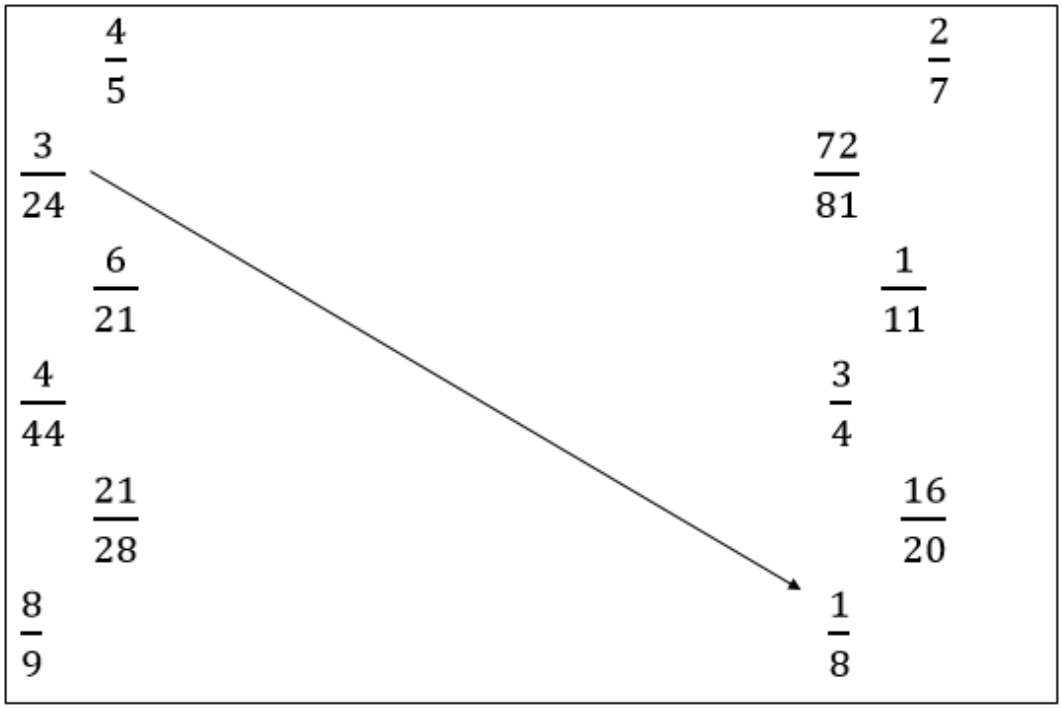


These three fractions have the same value. They are equivalent fractions

Who wants more pizza?

6.3 Practice questions

a. Match the pairs of equivalent fractions:



b. Fill in the blanks:

$\frac{2}{3} = \frac{6}{\quad}$ $\qquad$ $\frac{1}{2} = \frac{\quad}{80}$

$\frac{\quad}{5} = \frac{8}{20}$ $\qquad$ $\frac{5}{\quad} = \frac{25}{30}$

$\frac{90}{100} = \frac{9}{\quad}$ $\qquad$ $\frac{3}{4} = \frac{\quad}{20}$

Answers

1.1

a) 7000 **or** 7 thousand

b) 0.03 **or** $\frac{3}{100}$ **or** 3 hundredths

c) Five million, six hundred and eight thousand, nine hundred and twenty one

d) 8756

1.2

a) 90

b) 700

c) 4000

2.1

a) 425

b) 926

c) 588

d) 5940

e) 57

f) 135

3.1

a) 1, 2, 3, 5, 6, 10, 15, 30

b) 7, 14, 21, 28, 35

c) (i) 23 **or** 29 (ii) 25 **or** 30 (iii) 30 (iv) 21

4.1

a) 4.5

b) 2600

c) 4.5

d) 169cm **or** 1.69m

5.1

a) (i) 38cm (ii) 15cm (iii) 70cm

b) £2 change

5.2

a) (i) $84cm^2$ (ii) $20cm^2$ (iii) 15 tins

6.1

a) (i) $\frac{2}{4}$ **or** $\frac{1}{2}$ (ii) $\frac{4}{8}$ **or** $\frac{1}{2}$ (iii) $\frac{1}{2}$ (iv) $\frac{4}{6}$ **or** $\frac{2}{3}$

b) Any 9 squares shaded

6.2

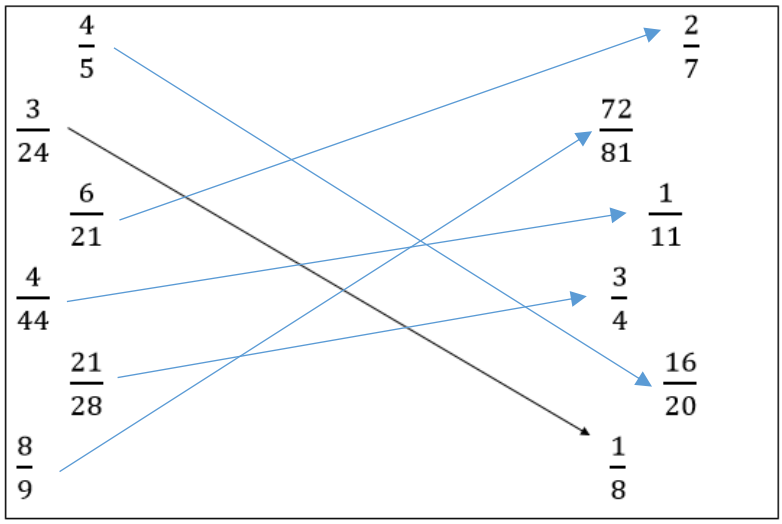
a) $\frac{1}{3}$

b) $\frac{2}{3}$

c) $\frac{3}{7}$

d) $\frac{1}{3}$

6.3



$\frac{2}{3} = \frac{6}{9}$ $\frac{1}{2} = \frac{40}{80}$

$\frac{2}{5} = \frac{8}{20}$ $\frac{5}{6} = \frac{25}{30}$

$\frac{90}{100} = \frac{9}{10}$ $\frac{3}{4} = \frac{15}{20}$