Birmingham City Council

Birmingham
Resources for
Understanding
Mathematics

C if U can

Number

Birmingham City Council

Ratio and proportion

I can convert between currencies			
I can split an amount into a given ratio			
I can solve proportion problems			

Standard form

I can change between ordinary numbers and standard form			
I can add, subtract, multiply and divide numbers in standard form			
I can solve problems involving standard form			

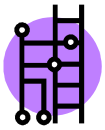
Using numbers	I am **confident** I can do this	I am **close** to being able to do this	I am **clueless** and need more help
I can find the HCF and LCM			
I can find the nth term in a sequence			
I can use prime factors			

Rounding and calculating			
I can round numbers to find an approximate solution			
I can use a calculator efficiently and effectively			
I can round to a given number of significant figures			

Fractions, decimals and %			
I can calculate percentage increase and decrease			
I can calculate with fractions			
I can find the original amount given the amount after a % change			

How will this booklet help you to get a grade C in maths?

- This booklet is one of four covering number, algebra, shape, space and measures and handling data.
- Each booklet contains work on the topics you need to understand to get a grade C
- Each topic starts off with a 'warm up' with some easier grade E questions followed by a harder D grade question where you get a bit of help
- There are then some (harder still) C grade questions, where you are given clues if you need them (try on your own first) and finally a C grade question for you to try on your own.

Look for  to indicate grade E/D questions,

to indicate harder D grade questions

and  to indicate C grade work

At the end of each topic, go to the <u>back</u> of the booklet and keep a record of your progress

Using numbers

Easy E/D grade questions

1.

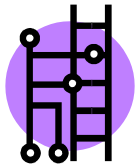
3	4	18	25	40	63	81

From this list, write down

a. a multiple of 6

b. a factor of 20

c. the square root of 9



2. (a) Explain why 45 is **not** a prime number

(b) Find a prime number between 40 and 50

Are you feeling more **C**onfident?

C if you can ….. cope on your own!

There are 22 million houses in the United Kingdom.

(a) Write 22 million in standard form.

(b) On average each of these 22 million houses has a value of £82 000
What is the total value of all these houses?
Give your answer in standard form.

The table shows the mass of 9 planets

Planet	Mass of Planet (kg)
Mercury	3.3×10^{23}
Venus	4.9×10^{24}
Earth	6.0×10^{24}
Mars	6.4×10^{23}
Jupiter	1.9×10^{27}
Saturn	5.7×10^{26}
Uranus	8.7×10^{25}
Neptune	1.0×10^{26}
Pluto	1.5×10^{22}

(a) Which planet is the heaviest?

(b) Chris says that Earth is approximately 1·8 times as heavy as Mercury.
Is he correct?
You **must** explain your answer

This is a bit like the last question.
Approximate first.
What would you get if you doubled the weight of Mercury?

Definitely D grade questions

Find the Highest Common Factor (HCF) of 24, 60 and 108

A way you might start is to list all the factors of the three numbers.
List them as factor pairs so you know you haven't missed any

C if U can……. answer the rest! (With a few **C**lues)

When written as the product of prime factors,

$225 = 3^2 \times 5^2$

This means using a factor tree to find the prime factors of one of the factor pairs.

eg 225 = 45 × 5

9 × 5

3 × 3

(a) Write 150 as the product of prime factors. Give your answer in index form

Use the same method here

(b) Work out the highest common factor of 225 and 150

You can use prime factors to help answer parts (b) and (c)

(c) What is the least common multiple of 2, 3 and 4?

Work out

$5{\cdot}6 \times 10^{-6} + 5{\cdot}2 \times 10^{-5}$

Give your answer in standard form

Don't get caught out here by the + sign. This is not the same type of question as the × and ÷ ones
Think about how you would write this out as a column addition if they were ordinary numbers

C if U can……. answer the rest! (With a few **C**lues)

Work in figures first

(a) Write seventy one million eight hundred thousand in standard form

(b) Work out $(18 \times 10^7) \div (3 \times 10^4)$
Give your answer in standard form

These are bigger numbers, so try to remember what you know about indices to help you answer.
Converting to ordinary numbers is a useful check, though

Here are the first five terms of an arithmetic sequence

3 7 11 15 19

Remember, you could do this by numbering the terms and finding the difference between them

(a) Find, in terms of *n*, an expression for the *nth* term of the sequence

Laura says that 412 is a term in this arithmetic sequence. Laura is wrong

(b) Explain why

You could try using the nth term rule and working backwards to find out whether any number is a term in the sequence

Work out 147·6 ÷ 0·24

You **must** show all your working

This has to be done without a calculator

You could start by changing the decimals to whole numbers – carefully!

Definitely D grade questions

Work out $(2 \times 10^3) \times (6 \times 10^2)$

Give your answer in standard form

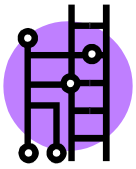
You might know how to do this with the numbers in standard form but if you don't, you could convert them to ordinary numbers, do the calculation and then convert your answer back into standard form. *Don't forget a number like 13×10^4 is NOT in standard form! (Why isn't it?)*

Standard form

Easy E/D grade questions

1. Write 23 000 in standard form

2. (a) Write 30 000 000 in standard form



(b) Write 2×10^{-3} as an ordinary number

Are you feeling more **C**onfident?

C if you can ….. cope on your own!

A and B are numbers written as the products of their prime factors

$A = 3^2 \times 5 \times 7$ $B = 2 \times 3^3 \times 5^2$

(a) Find the Highest Common Factor (HCF) of A and B

(b) Find the lowest common multiple (LCM) of A and B

Rounding and using a calculator

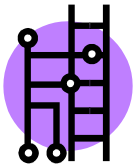
Easy E/D grade questions

2. (a) Write the number **nineteen thousand, four hundred and eighty two** in figures

(b) Write the number 7824 correct to the nearest hundred

(c) Write down the value of the 3 in the number 2387

2. Write an approximate answer for $7{\cdot}9^2$



Are you feeling more **C**onfident?

C if you can ..... cope on your own!

The table shows the amounts of tomatoes, onions and water needed to make tomato sauce for 4 people

Fill in the amounts needed to make tomato sauce for 10 people

	4 people	10 people
Tomatoes	200 g	..... g
Onions	2	5
Water	50 ml	..... ml

'Soft pink' paint is made by mixing red and white paint in the ratio 2:3

(a) Which of these mixes will make 'soft pink' paint?
Write 'yes' or 'no' in the last column

Mix	Amount of red paint (litres)	Amount of white paint (litres)	'Soft pink' yes or no
A	2	3	yes
B	1	2	
C	3	2	
D	4	5	
E	1	$1\frac{1}{2}$	
F	6	8	
G	4	6	

Here you need to look for EQUIVALENT ratios

(b) Sam mixed 20 litres of red paint with 35 litres of white paint.
Did he make 'soft pink' paint?
Explain your answer

Definitely D grade questions

Think about rounding numbers, when do you round up and when do you leave the value as it is?

Kirsty buys a bag that costs £25 to the nearest pound

(a) Write the least amount that she could have paid

(b) Write the greatest amount that she could have paid

C if U can……. answer the rest! (With a few **C**lues)

Find an approximate value of

$$\frac{7{\cdot}93 \times 503}{0{\cdot}486}$$

Round each term – but think about how you will do this. They will not all be done the same way

You **must** show your working

In a school, there are 750 pupils in total in years 9, 10 and 11.

The numbers of pupils in years 9, 10 and 11 are in the ratio 12:7:6

How many pupils are there in each year?

As before, start by working out how many parts the 750 needs to be split into, then the number of pupils in one part

C if U can……. answer the rest! (With a few **C**lues)

This is a NON-CALCULATOR question

The ingredients needed to make 500 millilitres (ml) of a fruit drink are

Orange juice	300 ml
Mange juice	60ml
Lemonade	140ml

(a) What percentage of the fruit drink is orange juice?

(b) Dan makes some of the fruit drink
He uses 30ml of mango juice
How much of the fruit drink does he make?

What fraction of the ingredients will be needed?

(c) Robert wants to make 750ml of the fruit drink
How much lemonade will he need?

What is the relationship between the new 750ml and the original 500ml?

Use your calculator to work out

$\sqrt{6{\cdot}4^2 + 3{\cdot}18^3}$

Think about how you will input these numbers into your calculator.
Which parts of the calculation need to be done first?

(a) Write down the full calculator display

(b) Write your answer to 2 significant figures

Remember 'significant figures' are the 'most important' – that means they have the greatest value

Work out

$$\frac{\sqrt{2.56} + 3.50}{8.765 - 6.78}$$

Again, think about how to put this into your calculator

(a) Write down all the figures on your calculator display

(b) Give your answer to part (a) to an appropriate degree of accuracy

This just means so that your answer is sensible, without too many digits

Definitely D grade questions

A shop sells CDs and DVDs.
In one week the number of CDs sold and the number of DVDs sold were in the ratio 3:5
The total number of CDs and DVDs sold in the week was 728

Work out the number of CDs sold

Work out how many parts the 728 is split into and then work out the number in one part

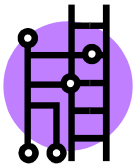
Ratio and proportion

Easy E/D grade questions

1. Here is a list of ingredients needed to make scones for 4 people

Scones
Ingredients for **4** people
200 g of flour 2 eggs 50 g of currants 100 m/ of milk

Work out how much of each ingredient is needed to make scones for 6 people



2. Jamie goes on holiday to Florida.
The exchange rate is £1 = 1·70 dollars
He changes £900 into dollars

(a) How many dollars should he get?

After his holiday Jamie changes 160 dollars back into pounds. The exchange rate is still
£1 = 1·70 dollars

(b) How much money should he get?
Give your answer to the nearest penny

Are you feeling more **C**onfident?
C if you can ….. cope on your own!

(a) Find the cube root of 125

(b) Find the value of $\frac{2}{3 \cdot 6^3}$

(c) Write down the full calculator display

(d) Write your answer to 3 significant figures

Fractions, decimals and percentages

Easy E/D grade questions

1.

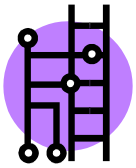
Young Person's RAILCARD

$\frac{1}{3}$ off normal price

Lisa uses her railcard to buy a ticket.

She gets $\frac{1}{3}$ off the normal price of the ticket.

The normal price of the ticket is £24·90
Work out how much Lisa pays for the ticket



2. Write these numbers in order of size.
Start with the smallest number

0·82 $\frac{4}{5}$ 85% $\frac{2}{3}$ $\frac{7}{8}$

Are you feeling more **C**onfident?

C if you can ….. cope on your own!

CutPrices	The Audio Store
£80	£92
Price does **not** include VAT	Price includes VAT

(a) Alice sees two advertisements for the same MP3 player
The rate of VAT is 17½%
Alice works out that the MP3 player costs more at CutPrices than at The Audio Store
How much more does it cost at CutPrices?

(b) In a sale the price of a digital radio decreases from £75 to £66
Work out the percentage decrease in price

(c) In a sale the price of a CD player decreases by 60%.
The sale price is £18·60
Work out the price before the sale

Laura has two dogs, Bertie and Bromley

Bertie eats $\frac{1}{3}$ of a tin of dog food every day.

Bromley eats $\frac{1}{2}$ of a tin of the same dog food every day.

What is the least number of tins of dog food needed to feed the dogs for seven days?

You could start by working out 7 lots of $\frac{1}{3}$ and 7 lots of $\frac{1}{2}$ and adding them

Definitely D grade questions

This is a NON-CALCULATOR paper question

A train leaves Manchester with 800 passengers

$\frac{1}{10}$ of these 800 people are children

(a) work out $\frac{1}{10}$ of 800

$\frac{3}{8}$ of these 800 people are women

There are lots of ways to do this. One way is to find $\frac{1}{4}$ of 800, halve it and then multiply by 3

(b) Work out $\frac{3}{8}$ of 800

The rest of the people are men

(c) Work out the number of men on the train

Don't forget, the number of men will be 800 less the number of women AND children

320 out of 800 people are under 21 years old

(d) Work out 320 out of 800 as a percentage

You could write this as a fraction and reduce it to its simplest form. Changing the fraction to a percentage will be a lot easier then

C if U can……. answer the rest! (With a few **C**lues)

(a) A camera was priced at £68. In a sale the camera costs 76% of its original price.
Calculate the cost of the camera in the sale

Write 76% as a decimal. This gives you the multiplier to find the reduced price

(b) The price of a roll of film is reduced from £4 to £3·50
Calculate the reduction as a percentage of the original price

What is the reduction in money?
What percentage of £4 is this?
Does it help to write it as a fraction first?

Use your calculator to work out

Hajra's weekly pay this year is £240
This is 20% more than her weekly pay last year

Bill says 'This means Hajra's weekly pay last year was £192'

Bill is wrong

What did Bill do to get £192?
Lots of people do what Bill did!
You could think about what Hajra STARTED with, (which is an unknown), then use the multiplier method as in the last question

(a) Explain why

(b) Work out Hajra's weekly pay last year