

action   
tutoring



**Primary**



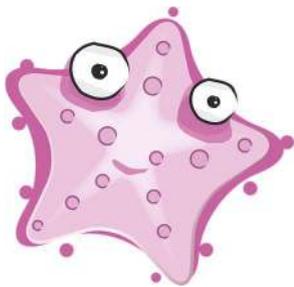
**Tutor**



**Maths**



**Workbook**





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# A Guide to this Workbook

Welcome to your Action Tutoring maths workbook!

The workbook is to be used with pupils preparing for the reasoning papers of their SATs. In their SATs, which they take in May of Year 6, pupils will sit one arithmetic paper and two reasoning papers. This workbook is primarily focused on building skills to help pupils in the reasoning paper.

It is divided into seven themes which focus on different mathematical skills pupils need to have mastered by their SATs. In the contents page, next to the activity name, it tells you which skills are being developed. This is only contained in your workbook; the pupil workbook just has the name of the activities.

Your workbook contains answers and sometimes guidance on things to be aware of that pupils may find difficult. It is important to review the section you will tutor in advance to ensure you are comfortable with the questions and methods.

Pupils will need a solid grounding in arithmetic to access the reasoning questions. Section 1 is an arithmetic section of the workbook which you can use as a warm up activity with your pupil(s).

If the school has mini whiteboards, you may find it useful to get pupils to do their working out on them, especially for the arithmetic questions. This can lessen the worry of getting an answer wrong, as they can erase it and try again. It is important in any task to encourage pupils to write down their working – it is a good mathematical habit and it can also help when you're reviewing the question with them.

There are many different factors that can impact on the engagement of pupils during a tutoring session. If the pupils are not focusing a short break can make a big difference. Section 2 is a 'brain teasers' chapter which contains ten different puzzles to attempt. Section 5 is a selection of mathematical games which you can play together. It can be useful to discuss with pupils when you might play these. Depending on the pupils it might work best as something to work towards at the end of the tutoring session, as a break in the middle or something to engage them at the start.

At the end of the workbook Section 4 is a standalone session created from HMRC education resources all about tax. It uses some key mathematical skills in context. This can be a useful session to do if you have a pupil absent from your group, or you are with a different group for one week.

We would recommend you read carefully through the *Suggested written methods* section below to ensure that you are aware of the most common methods for the four operations.

We hope you enjoy tutoring - remember to keep talking to your fellow tutors and Action Tutoring staff to share experiences, develop ideas and give feedback!

# Suggested written methods

*All suggestions and examples in this guidance are taken from the National Curriculum (2014) and national government funded hubs such as White Rose.*

As tutors you will come across a wide range of abilities and it is important to have a range of strategies at your fingertips to help you when pupils need additional challenge or further support. Hopefully these next few pages will provide a bit of support, perhaps giving you an alternative method to use with a pupil or showing you a method that a child may be using that you haven't come across before.

It's important to note that although the National Curriculum suggests using formal written methods, there is still some flexibility for schools as to what methods pupils use and when. Each school will have their own calculation policy, so if you're unsure, ask to see it and it may offer you further clarification within that setting.

## Addition

$$\begin{array}{r} 789 \\ + 642 \\ \hline 1431 \\ \hline 1 \quad 1 \end{array}$$

By Year 6, pupils should be able to solve problems such as  $789 + 642$  using **column written method** as seen here.

Some pupils may put 'carried' digits above the 'total' line rather than underneath, like this example, but as long as it is clear and they are consistent, either works.

Pupils should always start with the units and move left. When adding larger numbers, or numbers with decimals, they should be able to talk about lining up the columns. For example, all thousands should be in the same vertical line and so on. With decimals, always line up the decimal point to make sure all values line up. See the next box for suggestions on adding more complex decimals.

## Struggling with column method addition?

If a pupil is struggling with column method, they will need to go back to more concrete representations, which may include drawings and diagrams. In the case of  $23 + 14$ , pupils could **partition** (which means break down) the numbers into tens and units, and complete the sums separately. Here they have:

$$\begin{aligned} 3 + 4 &= 7 \\ 20 + 10 &= 30 \quad \text{which together give } 37. \end{aligned}$$

## Decimal addition

Pupils need to be able to add (and subtract) decimals with different numbers of decimal places. In these cases using a '**zero place holder**' can really help, as it allows pupils to make all the numbers the same length, without changing the value of the number. For example:

$$13.4 + 12.56 + 11.708$$

In this case, when writing into their columns, pupils should **line up the decimal places** foremost, but may also add 'zero place holders' to make them all 3 decimal place numbers:

$$\begin{array}{r} 13.400 \\ + 12.560 \\ \hline 11.708 \\ \hline \end{array}$$

Now they should be able to add (or subtract) without putting any digits into the incorrect place in the value column, or having to be concerned with numbers being different lengths.

'Zero place holders' are also very helpful when pupils are ordering decimals with different numbers of decimal places.

## Subtraction

### Subtraction without 'exchange'

Subtraction follows the same main rules as addition for column method. Example 1 here shows basic subtraction without exchanging (often called borrowing although using the word exchange works better as borrow implies you pay it back, when you don't!).

$$\begin{array}{r} 8 \quad 7 \quad 4 \\ - 5 \quad 2 \quad 3 \\ \hline 3 \quad 5 \quad 1 \end{array}$$

Decimal subtraction follows the same principles and the **zero place holder** (see decimal addition) is arguably even more important in subtraction, so do encourage it if pupils come across decimal subtraction with different number of decimal places.

### Subtraction with 'exchange'

$$\begin{array}{r} 8 \quad 12 \quad 1 \\ \cancel{9} \quad \cancel{3} \quad 2 \\ - 4 \quad 5 \quad 7 \\ \hline 4 \quad 7 \quad 5 \end{array}$$

Answer: 475

$$\begin{array}{r} 1 \quad 1 \\ 9 \quad 3 \quad 2 \\ - \cancel{4} \quad \cancel{5} \quad 7 \\ \quad 5 \quad 6 \\ \hline 4 \quad 7 \quad 5 \end{array}$$

Answer: 475

Here, the pupil needs to exchange to make the calculation method work. The first method here is a lot more common, though you may come across pupils using the second method. The basic principle is that there aren't enough of one value to take away the

bottom number, so you exchange 1 from the next column into 10.

Look at the first example:  $2 - 7$  would give a negative answer, so exchange 1 ten from the tens column and that becomes 10 units, to give  $12 - 7 = 5$ . The tens column now reads 2 (cross out the 3 to signify the exchange that took place).

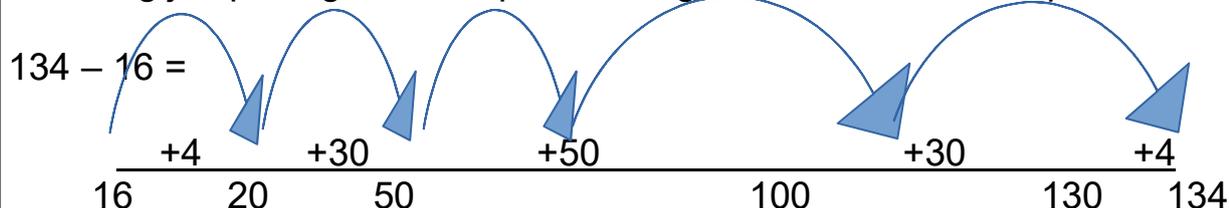
In this example, the next calculation is also tricky, as you now have  $2 - 5$ . The exchange happens again, though this time exchange 1 hundred for 10 tens. The sum now becomes  $12 - 5 = 7$ .

### Decimal subtraction

This works in exactly the same way as above and uses the same principles as decimal addition. Using zero place holders will ensure pupils exchange where necessary.

## Struggling with column method subtraction?

If a pupil is struggling with column method, they will need to go back to more concrete representations, which may include a **number line**. In this case, the pupil concentrates on **counting on** from the lowest amount, and choosing jumps to get them up to the larger number. For example:



Add up the jumps to work out the difference. In this case, it's 118.

## Multiplication

### Short multiplication

24 × 6 becomes

$$\begin{array}{r} 24 \\ \times 6 \\ \hline 144 \\ \hline 2 \end{array}$$

342 × 7 becomes

$$\begin{array}{r} 342 \\ \times 7 \\ \hline 2394 \\ \hline 21 \end{array}$$

2741 × 6 becomes

$$\begin{array}{r} 2741 \\ \times 6 \\ \hline 16446 \\ \hline 42 \end{array}$$

Short multiplication is useful for smaller multiplication problems, such as the above examples, where a number is multiplied by a single unit.

In each case, it is important to remember that the single unit has to be multiplied by ALL parts of the top number. Look at example 1:

24 × 6 is calculated in two stages →

6 × 4 = 24 (the 2 is carried to the tens column)

6 × 2 = 12 (add on the carried 2 to make 14)

### Struggling with short multiplication?

Instead of using the formal columns, pupils simply break the problem down and write in separate sums.

In example 2 above, 342 × 7, partition 342 into 300, 40 and 2:

7 × 300 = 2,100 (Tip: 7 × 3 = 21 → 7 × 30 = 210 → 7 × 300 = 2,100)

7 × 40 = 280 (Tip: 7 × 4 = 28 → 7 × 40 = 280)

7 × 2 = 14

Then add up the partitioned components, which gives 2,394.



## Division

### Short division

$$\begin{array}{r} 14 \\ 7 \overline{) 98} \\ \underline{7} \phantom{0} \\ 28 \\ \underline{28} \\ 0 \end{array}$$

Answer: 14

Short division tends to be the easiest division method for pupils to get their heads around. It can be used to solve larger problems, which will be explained later.

In this case 7 is the **divisor**.

How many times does 7 multiply into 9? 1 remainder 2, so the 1 sits on top and the 2 is carried over to make 28.

How many times does 7 multiply into 28? 4 with no remainder. So the answer is 14.

### Short division with remainders

Pupils need to be able to solve division problems with remainders. They also need to be able to interpret those remainders depending on the question. Below sets out the three types of remainder and an example context:

$$\begin{array}{r} 86 \text{ r } 2 \\ 5 \overline{) 432} \\ \underline{20} \phantom{0} \\ 23 \phantom{0} \\ \underline{20} \phantom{0} \\ 32 \\ \underline{30} \\ 2 \end{array}$$

Answer: 86 remainder 2

First, the simple **numerical remainder**. The division works as normal (see above) but you are left with 2 at the end.

If you were sharing out objects, like pencils in a school, each class could receive 86 pencils and there would be 2 pencils left over.

$$\begin{array}{r} 45 \text{ r } 1 \\ 11 \overline{) 496} \\ \underline{44} \phantom{0} \\ 56 \phantom{0} \\ \underline{55} \phantom{0} \\ 1 \end{array}$$

Answer:  $45\frac{1}{11}$

Secondly, **fraction remainders**, which are easier than they sound! The division works exactly the same way, but the numerical remainder forms the top number (numerator) of the fraction, whilst the divisor (what you're dividing by) becomes the bottom number (denominator).

In this case, imagine sharing out pizzas in a school. Each class would receive 45 and  $\frac{1}{11}$ th of a pizza.

$$\begin{array}{r} 20.5 \\ 6 \overline{) 123.30} \end{array}$$

Thirdly, **decimal remainders**. The division works the same way as above, but instead of stopping with a numerical remainder (in this example it would have been 3) simply add .0 to the original number. Remind the pupil that this does not change the number!

Now the remainder carries over, but this time into the tenths column.

Imagine sharing £123 between 6 people. You end up with £20.50 each.

Please note: You can carry on adding decimal places again and again and again. Simply add another 0 every time you get another remainder.

### Division with larger numbers

Pupils generally find dividing larger numbers the hardest of all operations, as there is no 'quick' way or 'trick' to solving them. They simply have to work hard at times tables or use repeated addition to solve them. If a pupil cannot get their head around long division, but is happy with short division, writing out the times table in question is one way to help them:

$$\begin{array}{r} 28 \text{ r } 12 \\ 15 \overline{) 432} \end{array}$$

In this case, pupils should write out some facts for 15 times table to the side, and then they can complete short division as normal. It is likely that the pupil will not know their 15 times table! In this case, remind them to think of it as **repeated addition** rather than multiplication, and it will hopefully feel less daunting.

$1 \times 15 = 15$	$2 \times 15 = 30$	$3 \times 15 = 45$
$4 \times 15 = 60$	$5 \times 15 = 75$	$6 \times 15 = 90$
$7 \times 15 = 105$	$8 \times 15 = 120$	$9 \times 15 = 135$

Although this may not seem like an efficient method, for some pupils it will be the best way to approach it and so the most efficient for them.



# Arithmetic

Athletes, and people who play sport, warm up their bodies. Musicians warm up their instruments. Mathematicians need warm up their brains! Have a go at some of these quick arithmetic sections to get you warmed up. Don't worry if you need a bit of help... remember that mistakes help us to learn.

Once you have completed these in your sessions you could even have a go at making up your own, or make some up for your tutor and see if they get it right!

Only spend 10 minutes on these – if you don't finish a section come back to it in your next tutoring session. Use any space on the page if you need to write anything down, or some spare paper. You might be able to do some of them in your head.

## Arithmetic practice 1

- a)  $4 \times 5 = 20$
- b)  $60 \div 5 = 12$
- c)  $15 \times 6 = 90$
- d)  $50\% \text{ of } 800 = 400$
- e)  $1,693 + 347 = 2,040$
- f)  $2,409 \div 3 = 803$
- g)  $13 \times 14 = 182$
- h)  $93.4 - 62.1 = 31.3$

## Arithmetic practice 2

- a)  $3 \times 6 = 18$
- b)  $77 \div 7 = 11$
- c)  $84 \div 12 = 7$
- d)  $372 \div 6 = 62$
- e)  $367.5 + 126.3 = 493.8$
- f)  $443 \times 6 = 2,658$
- g)  $7,385 - 595 = 6,790$
- h)  $11,109 \div 7 = 1,587$

**Arithmetic practice 3**

a)  $3 \times 7 = 21$

b)  $55 \div 5 = 11$

c)  $753 + 752 = 1,505$

d)  $8,332 - 5,219 = 3,113$

e)  $0.2 + 0.14 = 0.34$

f)  $13 \times 5 = 65$

g)  $7,365 \div 15 = 491$

h)  $15 \times 14 = 210$

i) 8  $\times 4 = 32$

j)  $100 \div$  4  $= 25$

k) Circle the largest number:

0.2 , 0.3 , 0.1 , 0.4 , 0.25**Arithmetic practice 4**

a)  $6 \times 4 = 24$

b)  $49 \div 7 = 7$

c)  $13.75 + 10.47 = 24.22$

d)  $138.4 - 27.5 = 110.9$

e)  $2.96 - 1.05 = 1.91$

f)  $675 \div 3 = 225$

g)  $1,440 \div 6 = 240$

h)  $23 \times 12 = 276$

i)  $3 \times$  9  $= 27$

j) 36  $\div 6 = 6$

k) What are the next two numbers in this sequence?

0 , 25 , 50 , 75 , 100 , 125

**Arithmetic practice 5**

a)  $6 \times 5 = 30$

b)  $9 \times 11 = 99$

c)  $234.6 + 12.3 = 246.9$

d)  $4,819 + 461 = 5,280$

e)  $28 \times 14 = 392$

f)  $23,142 \div 21 = 1,102$

g)  $2.04 + 0.3 = 2.34$

h)  $486 \div 3 = 162$

i) 67 =  $42 + 25$

j)  $30 + 50 = \underline{70} + 10$

k) Circle the smallest number:

1.2 , 2.5 , 0.99 , 1.8 , 0.1**Arithmetic practice 6**

a)  $7 \times 3 = 21$

b)  $12 \times 5 = 60$

c)  $375.8 - 14.9 = 360.9$

d)  $99 + 99 = 198$

e)  $34 \times 15 = 510$

f)  $48,015 \div 15 = 3,201$

g)  $6.598 - 1.259 = 5.339$

h)  $68 \times 4 = 272$

i)  $104 - \underline{15} = 89$

j)  $55 - 5 = 100 \div \underline{2}$

k) What are the missing gaps in this sequence?

-10 , -5 , 0 , 5 , 10 , 15

**Arithmetic practice 7**

a)  $7 \times 4 = 28$

b)  $9 \times 8 = 72$

c)  $2.013 + 1.25 = 3.263$

d)  $5,846 + 153 = 5,999$

e)  $23 \times 15 = 345$

f)  $975 \div 15 = 65$

g)  $1.658 + 2.01 = 3.668$

h)  $15 \times 12 = 180$

i) 8  $\times 7 = 56$

j) 8  $+ 12 = 30 - 10$

k) Circle the largest number:

11.1 , 1.01 , 1.11 , 1.1 , 11.01**Arithmetic practice 8**

a)  $6 \times 3 = 18$

b)  $12 \times 4 = 48$

c)  $5.65 - 1.025 = 4.625$

d)  $999 + 999 = 1,998$

e)  $17 \times 18 = 306$

f)  $832 \div 16 = 52$

g)  $8,000 - 999 = 7,001$

h)  $125 \div 2 = 62.5$

i)  $8 \times$  9  $= 72$

j)  $400 \div 2 =$  4  $\times 50$

k) Fill in the missing gaps in this sequence:

-30 , -15 , 0 , 15 , 30 , 45

**Arithmetic practice 9**

a)  $4 \times 6 = 24$

b)  $81 \div 9 = 9$

c)  $16 \times 4 = 64$

d)  $25\% \text{ of } 800 = 200$

e)  $1,983 + 587 = 2,570$

f)  $9312 \div 4 = 2,328$

g)  $17 \times 23 = 391$

h)  $98.4 - 62.21 = 36.19$

i)  $\underline{30} \times 8 = 240$

**Arithmetic practice 10**

a)  $3 \times 6 = 18$

b)  $77 \div 7 = 11$

c)  $84 \div 12 = 7$

d)  $372 \div 6 = 62$

e)  $367.5 + 126.3 = 493.8$

f)  $443 \times 6 = 2,658$

g)  $7,385 - 595 = 6,790$

h)  $11,109 \div 7 = 1,587$

i)  $35 \times \underline{5} = 175$

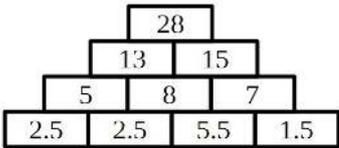
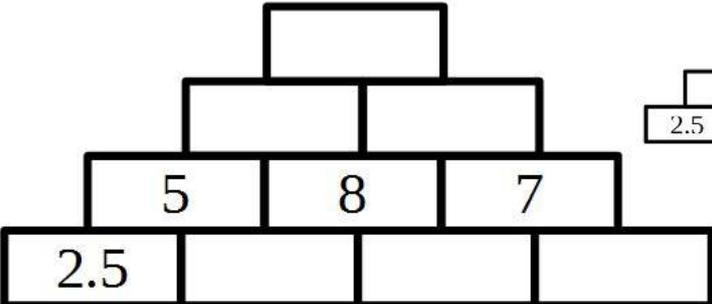
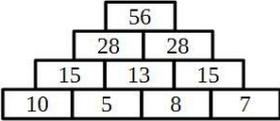
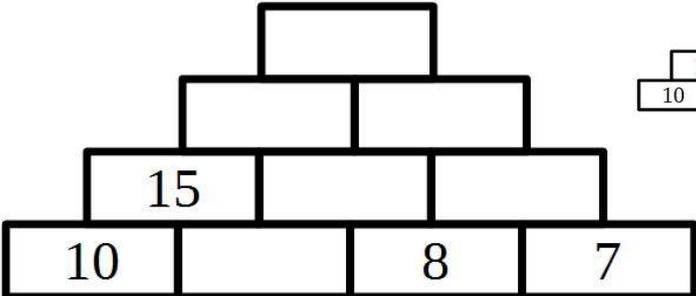
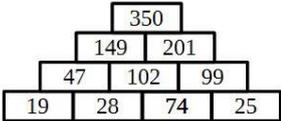
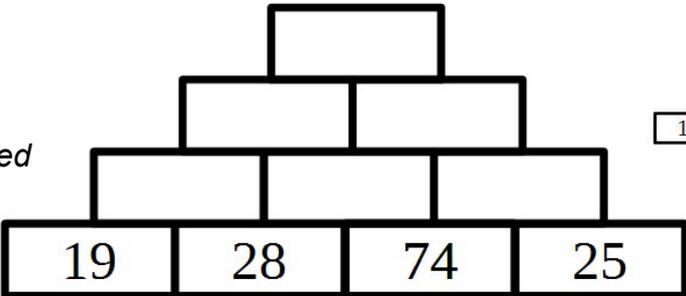
# Brain Teasers

You can use these as a warm up, or for a break during a session if you need one. You may even just want to have a go at some of them for fun!

## Brain Teaser 1 - Adding pyramids

Add two adjacent numbers together to create the block sitting on top:

*This is an easier brain teaser and a good one to start with if your pupils are low on confidence and need a break.*



## Brain Teaser 2 – Triangle madness!

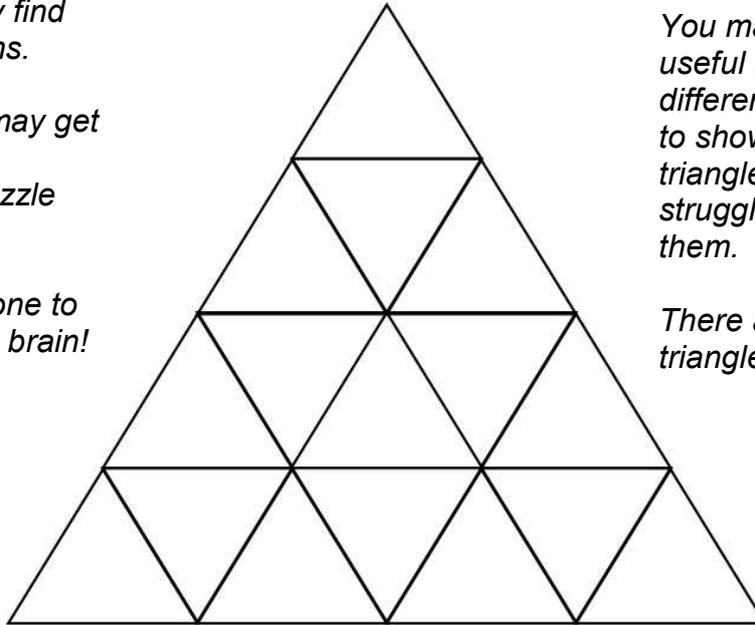
How many triangles are there in the diagram below?

Clue: the answer is not 18!

*Pupils can vary in how easy they find visual problems.*

*Some pupils may get frustrated with getting this puzzle wrong.*

*Probably not one to do with a tired brain!*



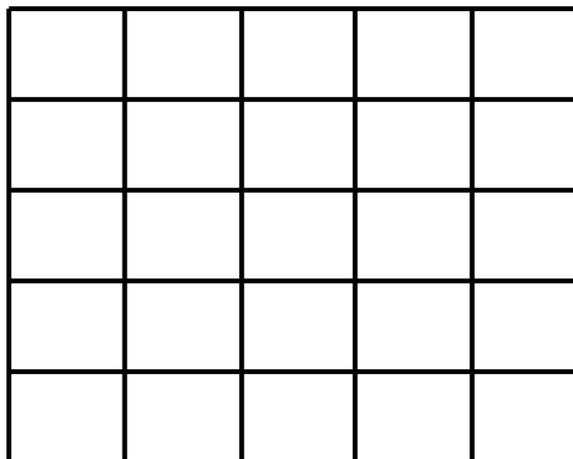
*You may find it useful to use different colour pens to show the different triangles if pupils are struggling to see them.*

*There are 27 triangles*

## Brain Teaser 3 – Twice is too much!

Put the following symbols into the grid below, so every symbol is used once in each row, column and diagonal:

*This is a logic puzzle and as it has several solutions can be a good one to come back to (see if they can find a different solution).*



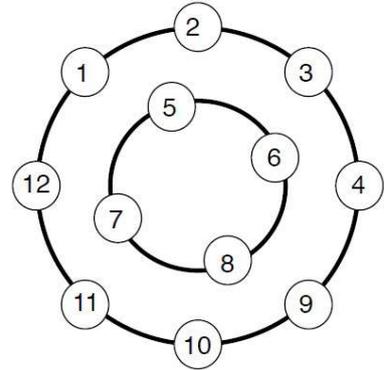
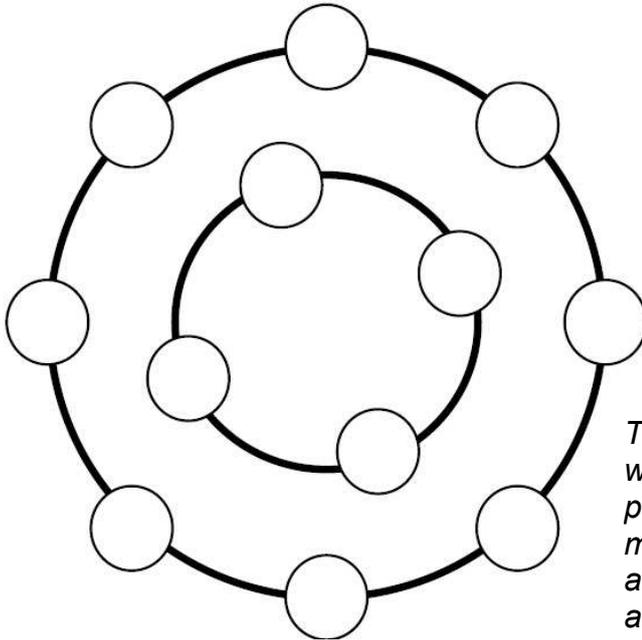
■	★	◆	●	▲
●	▲	■	★	◆
★	◆	●	▲	■
▲	■	★	◆	●
◆	●	▲	■	★

*It could be worth doing if pupils are struggling with calculation as it doesn't involve any numbers.*

*There are different solutions. Above shows one of them.*

### Brain Teaser 4 – Circular sums

Put the numbers 1 – 12 in each small circle. They must only be used once.  
The total of the inner circle must be half the total in the outer circle.



*This could take pupils some time to work out – but can be a good puzzle for promoting a growth mindset and not giving up! It is accessible as it only requires addition and halving (or doubling).*

### Brain Teaser 5 – Magic 100!

Complete the magic square so that each row, column and both centre diagonals add up to 100.

60			14
	16		
10		6	
	62	12	

60	2	24	14
22	16	58	4
10	20	6	64
8	62	12	18

*Once pupils get started this should be relatively straight forward. The first step is recognising where they have 3 numbers in a row and can work out the last (diagonal, bottom right square is the first to work out).*

## Brain Teaser 6 – What's it worth?

Work out the value of each shape:

$$\square + \bigcirc = 10$$

$$\triangle + \triangle = 6$$

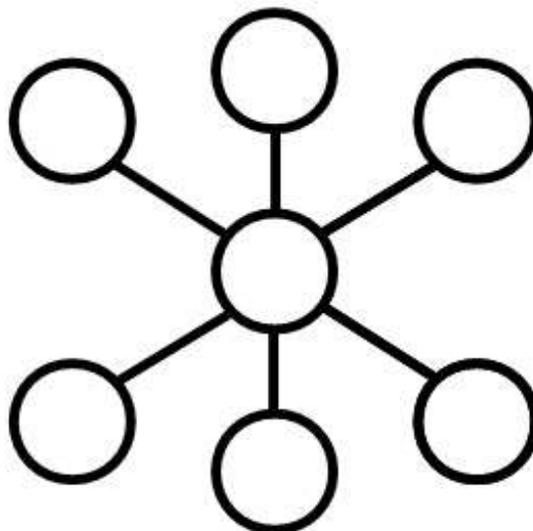
$$\triangle + \bigcirc = 5$$

$$\text{Triangle} = 3 \quad \text{Circle} = 2 \quad \text{Square} = 8$$

*This relies on pupils spotting the triangle is the first shape they can work out. Allow them time to see if they can spot this. If not ask an open question about why each equation could be the odd one out and see if they realise the middle one has two shapes the same.*

## Brain Teaser 7 – Totally equal!

Put the numbers 1 – 7 in each of the circles so that each straight line of three numbers ends up with the same total:



*This can be a trial and error activity. Spotting that the two numbers opposite each other have to add to the same thing is key. In the answer given the numbers opposite each other add to 7.*

*With 7 in the middle, starting at top left circle:  
1, 4, 5, 6, 3, 2*

*There are multiple options – an extension activity could be to find other ways to complete it.*

These are very accessible but need careful reading. Could be difficult for pupils who struggle with comprehension or have English as an additional language.

## Brain Teaser 8 – Calendar club

If Thursday is in 3 days' time, what day is it today?

*Monday*

Yesterday, it was 4 days until Saturday. What day is it today?

*Wednesday*

In two days' time it will have been 3 days since Sunday. What day is it today?

*Monday*

The day before yesterday was six days before Wednesday. What day is it today?

*Saturday*

Make up one of these tricky teasers for your tutor!

## Brain Teaser 9 – Birthday dates

My birthday is March 4<sup>th</sup>. What date will it be a fortnight afterwards?  
(Some pupils may struggle with knowing how long a 'fortnight' is.)

*18<sup>th</sup>*

Dave's birthday is 15<sup>th</sup> May. What date will it be 3 weeks after?

*5<sup>th</sup> June*

Christina's birthday is 5<sup>th</sup> July. What is the date a week before her birthday?

*28<sup>th</sup> June*

March						
S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25

May						
S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

When is your birthday?

What date will it be:

a) a week before?

b) a week after?

c) two weeks before?

d) two weeks after?

June						
S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24

July						
S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

## Brain Teaser 10 – In a muddle!

Can you unscramble these mathematical anagrams?  
*Pupils may not understand the word 'anagrams'. You can explain it as a word, phrase or name formed by rearranging the letters of another. E.g. listen and silent.*

*It is difficult to tell how easy or difficult pupils will find these. If they are struggling try to give them mathematical clues rather than telling them the answer.*

*If they are still struggling you could give them the first letter of the word.*

### 2D Shapes:

RTAINGEL

Triangle

CRILCE

Circle

ARSUEQ

Square

APARLELARMLGO

Parallelogram

### 3D Shapes:

CBUE

Cube

YRPDAIM

Pyramid

CIYNDRLE

Cylinder

SEHPER

Sphere

### Mathematical vocabulary:

MTUAITLOINCLPI

Multiplication

IDNIO SVI

Division

FCAROT

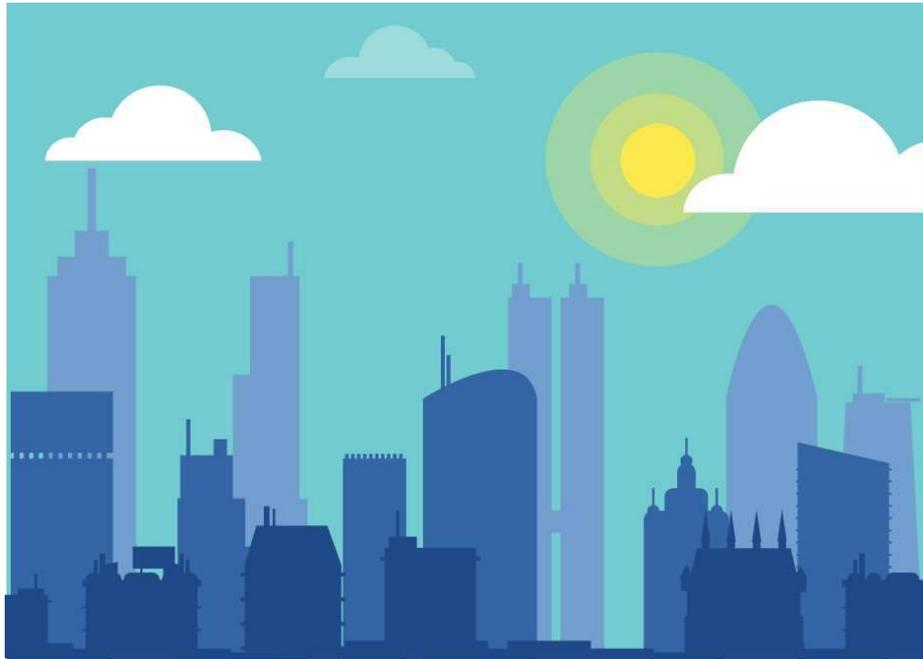
Factor

RIPME

Prime

Why don't you make up some for your tutor?

# Skylines and Skyscrapers



Skyford is an exciting and expanding city in the heart of England. It is an amazing area to live in and there are lots of things to do, places to see and people to meet!

However, the City Council needs YOUR help. With an enormous amount of new people arriving to live in the city every month, they need to build new housing, schools, parks, libraries and shops.

Your challenge is to help the council solve some of their problems... they need YOU and your fantastic mathematical skills. Good luck with your new job!



## Activity 1 – Housing

### *I am practising my calculating skills*

The first problem Skyford City Council has is knowing how many houses to build for the new people arriving in the city.

1. Below shows the numbers of people moving in the first month, how many people moved in total?

#### **Month 1**

Week 1: 253

Week 2: 346

Week 3: 278

Week 4: 229

$$253 + 346 + 278 + 229 = 1,106$$

*Encourage pupils to use column addition*

\_\_\_\_\_ people

2. To help the council estimate numbers, they need you to round the monthly number to the nearest thousand...

*1,115 rounds down to 1,000*

\_\_\_\_\_ people

3. Each house in Skyford allows 4 people to live there. Based on your estimation in Q2, how many houses will be needed in the first six months?

*6 months = 6,000 people*

*each house fits 4 people*

*so  $6,000 \div 4 = 1,500$  houses*

\_\_\_\_\_ houses

4. Over the year 12,084 new people move to Skyford. In that time 1,987 people move away. How many are left in the city?

$$12,084 - 1,987 = 10,097$$

*Encourage the pupils to use subtraction column method*

**The difference is \_\_\_\_\_**



## Activity 2 – Population Survey

*I am practising working with percentages*

Each month, on average, 1,000 new people are moving to Skyford.

1. 25% of people coming to Skyford are men and 15% are boys. What **percentage** is that in total?

$$25 + 15 = 40\%$$

\_\_\_\_\_ %

2. 10% of people coming to Skyford are girls. What **percentage** of people coming to Skyford each month are women?

$$25 \text{ (men)} + 15 \text{ (boys)} + 10 \text{ (girls)} = 50$$

*therefore 50% are women*

\_\_\_\_\_ %

3. On average, **how many** women are coming to Skyford **each month**?

$$50\% \text{ of } 1,000 = 500$$

*(÷2 or half)*

\_\_\_\_\_ women

4. On average, **how many** men are coming to Skyford in a **year**?

$$25\% \text{ of } 1,000 = 250$$

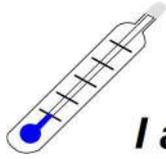
*(calculate 25% by ÷4 or halving, then halving again)*

*12 months in a year, so 250 x 12*

$$\begin{array}{r} 250 \\ \times \quad 12 \\ \hline 500 \quad (250 \times 2) \\ + 2500 \quad (250 \times 10) \\ \hline 3000 \end{array}$$

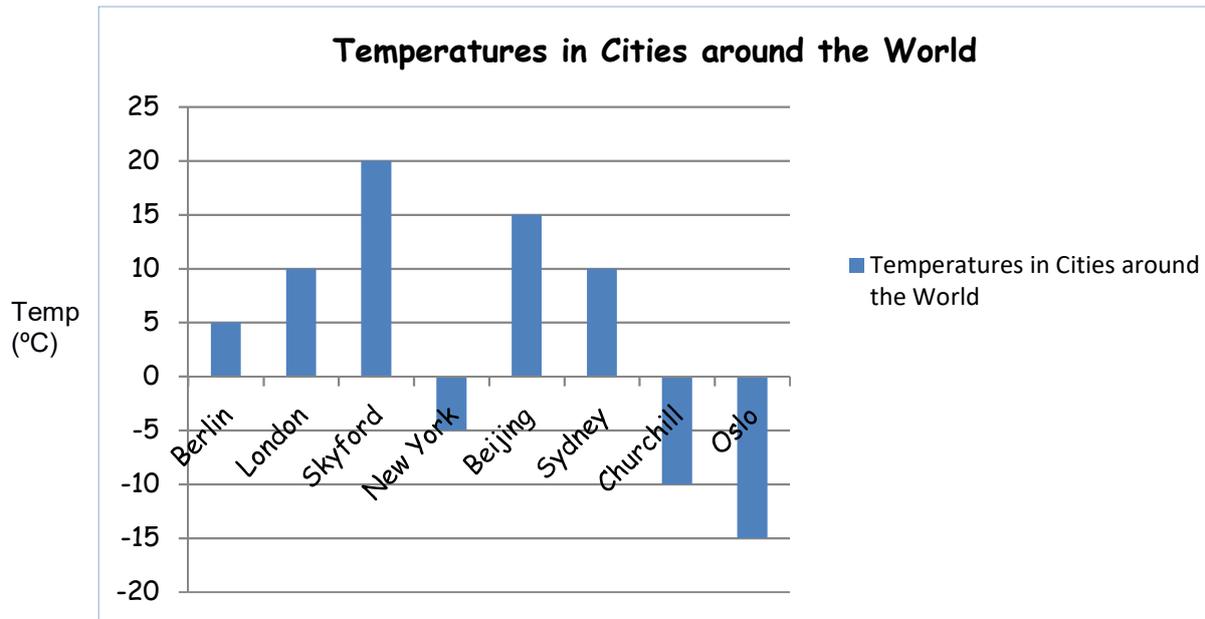
\_\_\_\_\_ men

## Activity 3 - Climate



***I am practising how to read bar graphs***  
***I am practising working with negative numbers***

This table shows average temperatures in different cities around the world. How does Skyford compare?



1. Which city is the hottest? What average temperature does it have?  
*Skyford 20°C*

2. Which city is the coldest? What's its average temperature?  
*Oslo -15°C*

3. Which city is 15 degrees warmer than Churchill?  
*Berlin*

4. Which city is 25 degrees colder than Beijing?  
*Churchill*

5. What is the difference in temperature between Skyford and Berlin?  
*20 – 5 = 15°C*

6. What is the difference in temperature between Skyford and Oslo?

*Top tip: To find the difference between positive and negative numbers, you can add them together: 20 + 15 = 35°C*

*It works because if you count from the positive number to 0 (in this case 20) and then count from 0 to the negative number (in this case 15) you have a total of 35°C difference.*

Finished early?

Make up some questions for your tutor, asking them to work out the differences between different temperatures on the graph. Can they get them right? *At this point have a look at some more differences on the graph with the pupil – can they make up some questions to test you?!*

**For fun!**

Which city from the graph would you or your tutor rather live in and why?



## Activity 4 – Population Word Problems

*I am practising how to solve word problems*

1. Out of 770 men who have come to Skyford, 332 are from Wales and the rest are from Scotland. How many men are from Scotland?

*Column method*  
 $770 - 332 = 438$

2. There are 905 girls coming to Skyford. They are going to be divided across 5 different schools in the city. How many girls will go to each school?

*Short division method*  
 $905 \div 5 = 181$

3. The boys coming to Skyford are going to be divided into 6 different schools. In each school there will be 91 boys. How many boys are coming to Skyford in total?

*Short multiplication method*  
 $91 \times 6 = 546$

4. If Skyford started with 10,345 people, and ended up with 27,804, how many new people have arrived?

*Column method*  
 $27,804 - 10,345 = 17,459$

5. Skyford would like their city to keep growing. It started with 24,000 residents. So far, 37,865 have joined. How many **more** people does it need to attract to reach its goal of 100,000?

$24,000 + 37,865 = 61,865$   
 $100,000 - 61,865 = 38,135$

*Discuss the difficulties when dealing with numbers with lots of zeros – means lots of carrying. Some might find the number line method more useful here.*

## Activity 5 – Hop on, hop off!



### *I am practising my mental arithmetic*

In Skyford there are lots of amazing sites to see. There is a special Tour Bus that goes around the city. People get on and get off the bus at different times of the day. The Tour Bus company is trying to track the number of passengers who get on and off the bus at each stop. Try to do these in your head.

1. 13 passengers start on the bus in Skyford. 5 more get on at Stop A. How many are there now? **18**
2. How many are there if 7 get off at Stop B? **11**
3. How many are there if 5 get on at the next stop? **16**
4. Half get off at stop D, but another 5 get on. How many on the bus now?  
**13**
5. By the final stop lots of people have got on and the **original** number of passengers has **tripled**. How many people are on the bus at the end?  
 **$13 \times 3 = 39$**



## Activity 6 – Bus Company



### *I am practising calculating fractions of amounts*

Complete the sentences about Skyford's Bus Company using the information you are given:

**There are 30 buses in total.**

1. Half of them are red and a third are yellow. The rest are green. How many of each colour should there be?

**Red** \_\_\_\_\_ **Yellow** \_\_\_\_\_ **Green** \_\_\_\_\_

**Red = 15**      **Yellow = 10**      **Green =  $30 - (15 \text{ red} + 10 \text{ yellow}) = 5$**

2. 20 of them are driven by men. What fraction is this? \_\_\_\_\_  
*20 out of 30 simplifies down to 2 out of 3, so 2/3*

3. 1/6 of the buses need refueling before the next day. Each bus takes half an hour to refuel. How long does the petrol attendee need to work before they can go home? (Remember to write your unit e.g. hours, minutes)  
*1/6 of 30 = 5*  
*5 x half hour = 2 and a half hours*

---

4. 3/5 of the buses need their windscreens cleaning. Each windscreen takes 10 minutes to clean. How long does the cleaner have to work before they can go home?

*1/5 of 30 = 6      so 2/5 = 6 x 2 = 12*  
*12 x 10 minutes = 120 minutes*  
*60 minutes in an hour, so 2 hours in total*

---

**There are 120 employees in total.**

5. Half the company employees drive the buses, a quarter work in the office and the rest are maintenance staff. How many employees work in each section?

*Drivers = Half of 120 = 60*  
*Office workers = Quarter of 120 = 30*  
*Maintenance = 30*

**Drivers \_\_\_\_\_ Office \_\_\_\_\_ Maintenance \_\_\_\_\_**

6. 3/10 of the employees speak French. How many people is this?

*1/10 of 120 = 12*  
*so 3 x 12 = 36*

\_\_\_\_\_ **employees**

7. 3/4 of the employees speak German. How many people is this?

*1/4 of 120 = 30*  
*3 x 30 = 90*

\_\_\_\_\_ **employees**