# Acknowledgements

This booklet for parents is the culmination of the work and thoughts of a number of people.

Parents themselves have been voicing their need for support in understanding the methods that their children now use to work out calculations.

Teachers in schools have been trying to meet the need by holding workshops and parents' evenings but have been trawling for suitable materials to offer parents.

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Wendy Clegg, Y5 teacher, Mile Oak Primary School
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Janet Parfitt, Y6 teacher, Balfour Junior School

Not only did they give of their time during the school holidays and after the school day but did so enthusiastically.

The support of Gill Meyne, Family Learning Coordinator, has also been invaluable in advising and assisting us in making the original idea a reality.

Finally, many thanks to Georgia Trott, Numeracy Support Officer, for the input of her creative skills in the production of this booklet.

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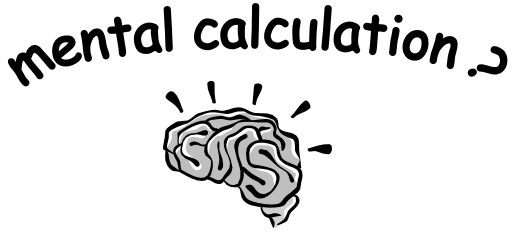
## Place value cards **p. 41**

# “They didn’t do it like that in my day!”

Do your children ask for help with their maths homework and start talking in a foreign language, using words like ‘partitioning’, ‘chunking’, ‘grid multiplication’…..?

If so, you may feel the need for some translation. This booklet is designed to explain some of the methods used to teach calculation in schools following the introduction of the National Numeracy Strategy (NNS) in 1999.

**Which is more important:**




or




This will depend on the numbers involved and the individual child.

When faced with a calculation, no matter how large or difficult the numbers may appear to be, all children should ask themselves:



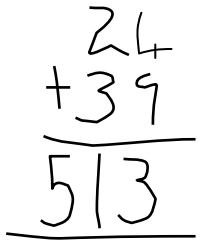
## When do children need to start recording?

The following table shows how some sort of recording is relevant throughout the primary years with mental strategies playing an important role throughout.

| Reception | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year6 |
|---|---|---|---|---|---|---|
| ← Making a record of a calculation → | | | | | | |
| | | ← Jotting to support a mental strategy → | | | | |
| | | | ← Explaining a mental strategy → | | | |
| | | | | ← Developing written methods → | | |

It is important to encourage children to look first at the problem and then get them to decide which is the best method to choose – pictures, mental calculation with or without jottings, structured recording or calculator.

Children attempting to use formal written methods without a secure understanding will try to remember rules, which may result in unnecessary and mistaken applications of a standard method.






Some of the methods explained in this booklet involve ‘partitioning’ and a set of place value cards are attached which can be pasted onto card and cut out (your child will show you how to use them).

# ADDITION

**Using an informal method by counting on in multiples of 10 with a number line**

TU + TU

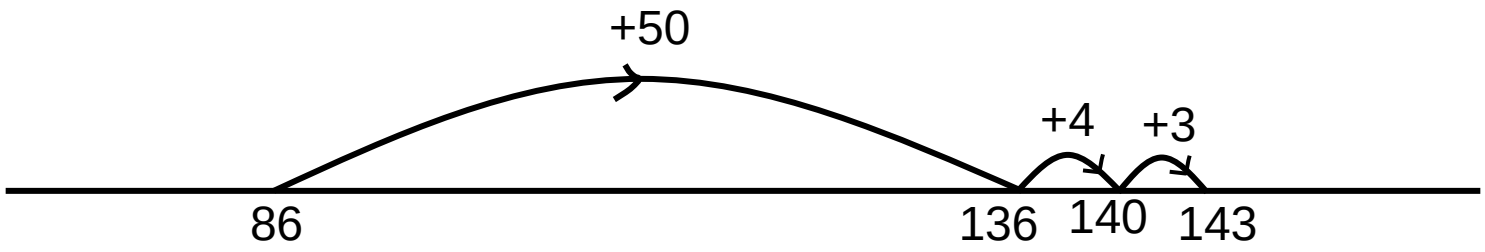
**86 + 57**



**TU + TU**

**86 + 57**

Start at 86 (the larger number) on the number line. *Partition* the smaller number 57 into tens and units and count on the multiples of 10 first and then the units.




**86 + 57 = 143**

# ADDITION

**Using a number line to add too much and then subtract *(compensate)***

HTU + TU

**754 + 96**

**Why are you subtracting when you should be adding?**

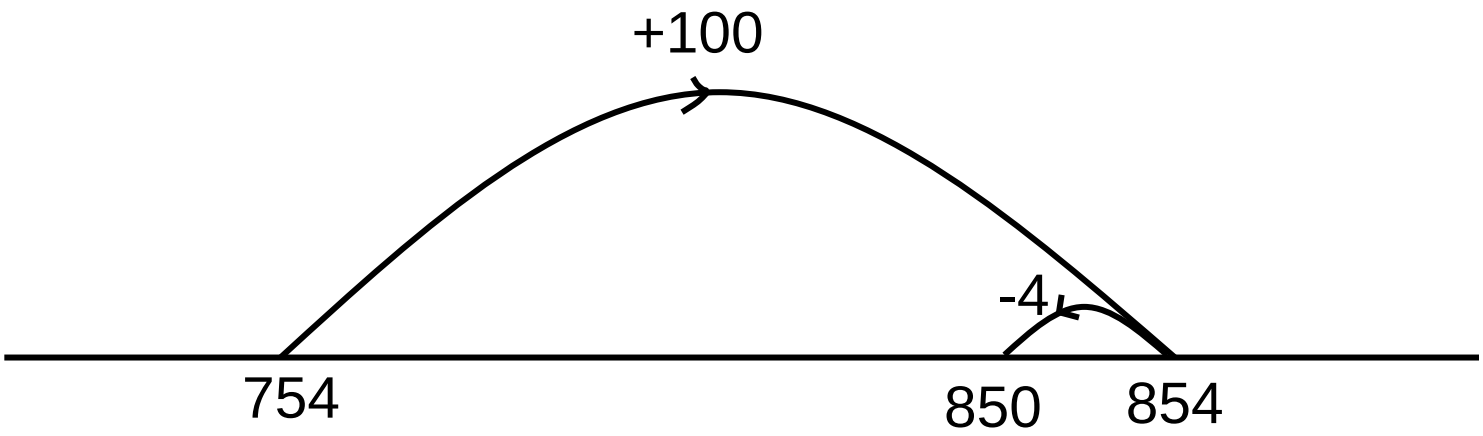
**I noticed that 96 is close to 100. 100 is easier to add than 96 but that means I've added 4 too many. I need to subtract 4 from the number I reach.**



**HTU + TU**

**754 + 96**

Start with the larger number 754. Add on 100 and then subtract 4.




**754 + 96 = 850**

# ADDITION

HTU + TU

**625 + 148**

**Expanded method: moving on from adding the *most significant digits* first to adding *least significant digits* first**

**Why switch to adding the units *(least significant digits)* first?**

**I know that I can add numbers in any order and the total will be the same. My teacher has told me that I need to practise adding the units first. The next method I will learn works this way. I must remember to line the numbers up in the correct columns.**



**HTU + HTU**

**625 + 148**

Add *most significant digits* first:
(in this example, **hundreds**)

| | |
|---|---|
| 625 | |
| + 148 | |
| 700 | 600 + 100 |
| 60 | 20 + 40 |
| 13 | 5 + 8 |
| 773 | |

Add *least significant digits* first:
(in this example, **units**)

| | |
|---|---|
| 625 | |
| + 148 | |
| 13 | 5 + 8 |
| 60 | 20 + 40 |
| 700 | 600 + 100 |
| 773 | |

**Mentally add**

**700 + 60 + 13 = 773**

**625 + 148 = 773**

# ADDITION

## Using a standard method

HTU + HTU

**587 + 475**

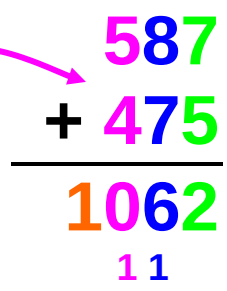
**Why do you say 80 + 70 instead of 8 + 7?**

**I need to remember the value of each digit, so I know the size of the numbers I am adding and whether my answer makes sense.**



**HTU + HTU**

**587 + 475**




**7 + 5 = 12**
**Place the 2 in the units column and carry the 10 forward to the tens column.**

**80 + 70 = 150 then + 10 (carried forward) which totals 160.**
**Place 60 in the tens column and carry the 100 forward to the hundreds column.**

**500 + 400 = 900 then + 100 which totals 1000. Place this in the thousands column.**

**587 + 475 = 1062**

# SUBTRACTION

Ⓐ Ⓑ

## Counting on or counting back?

TU - TU

**84 - 56**

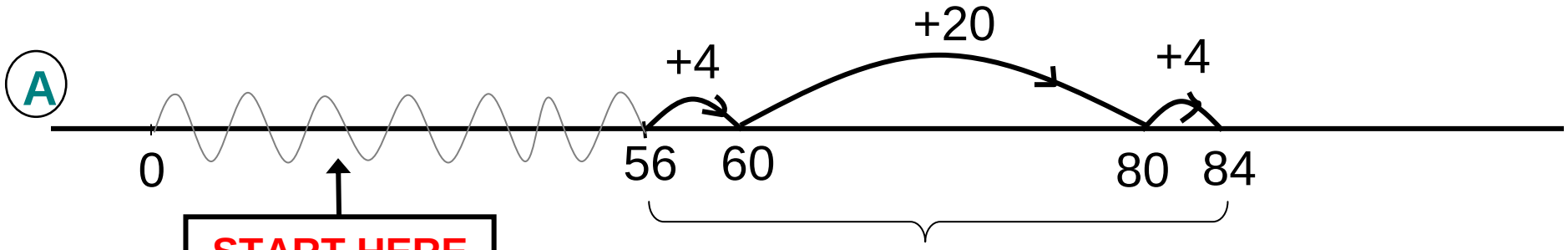
**How do you decide whether to count on or count back?**

**If the numbers are close together like 203 – 198 it's quicker to count on. If they're a long way apart like 203 – 5 it's quicker to take away. Sometimes I count on because that's easier than taking away.**



# TU - TU

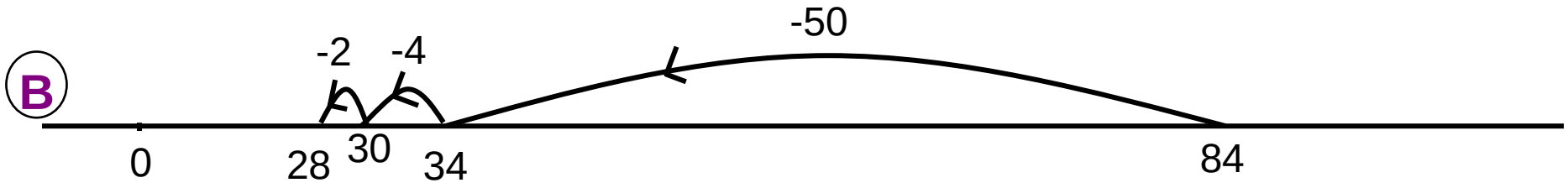
## 84 - 56




**START HERE**

Start by 'taking away' (crossing out) the 56.

Find the *difference* between the two numbers.
Count on from 56 to 84.
20 + 4 + 4 = 28




*Partition* 56 and count back (subtract) 50 and then 6.

**START HERE**

**84 – 56 = 28**

# SUBTRACTION

HTU - HTU

**954 - 586**

**Complementary addition**

**A Number line**

**B Written method**

**The number line method is very clear. Why do you use method B and write the numbers vertically?**

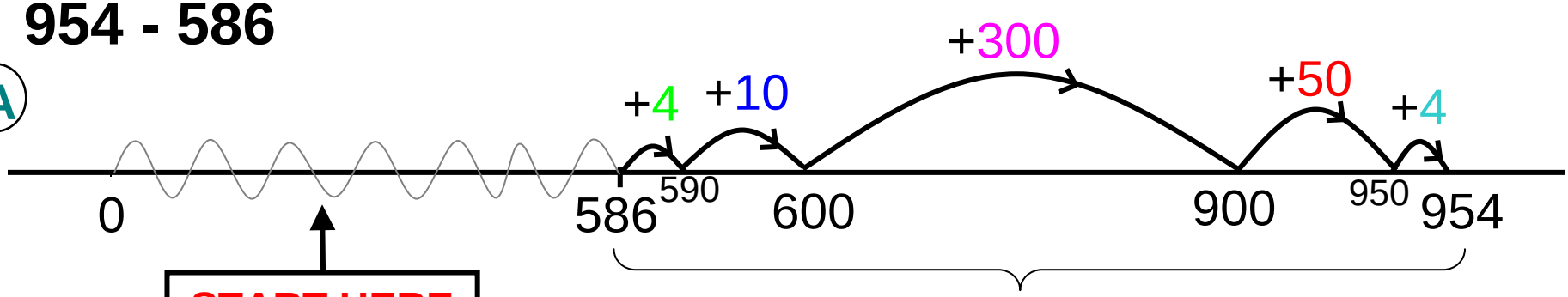
**I could make mistakes. Method B helps me line the numbers up and see what I need to add.**



# HTU - HTU

## 954 - 586

**A**




**START HERE**

'Take away' the 586.

Find the *difference* between the two numbers.
Count on from 586 to 954.
300 + 50 + 10 + 4 + 4 = 368

**B**

**START HERE**

Count on to the next multiple of 10.

Count on to the next multiple of 100.

Count on in 100s.

Count on to the larger number in the calculation which is 954.

| | |
|---|---|
| 954 | |
| - 586 | |
| 4 | To make 590 |
| 10 | To make 600 |
| 300 | To make 900 |
| 50 | To make 950 |
| 4 | To make 954 |
| 368 | |

**954 - 586 = 368**

# SUBTRACTION

**Working towards a standard method (*decomposition*)**

HTU - TU

**154 - 37**

**Why do you need to rearrange the numbers 50 + 4 and rewrite them as 40 + 14?**

**The whole number is 154. It is possible to subtract 7 but for this method I need to do one subtraction in each column. So I exchange one ten from the tens column for ten ones in the units column.**



# HTU - TU

## 154 - 37

Both these numbers are partitioned into their HTU parts, so we can do 3 easier calculations.

100 + 50 + 4

\- 30 + 7

54 is the same value as 40 10 4.
Now 7 can be subtracted from 14.

40 10

100 + 50 + 4

\- 30 + 7

100 + 40 + 14

\- 30 + 7

Subtract the units, tens, then hundreds.

100 + 10 + 7 = 117

100 – 0 = 100

40 – 30 = 10

14 – 7 = 7

Here the answers from each calculation are added to give the answer.

**154 - 37 = 117**

# SUBTRACTION

## Standard method *(decomposition)*

HTU - HTU

**754 - 286**

**Why didn't you use the standard method straight away?**

**Because all the stages I have learnt before have really helped me understand exactly what I'm doing.**



## HTU - HTU

# 754 - 286

54 is the same value as 40 10 4.
Now 6 can be subtracted from 14.

740 is the same value as 600 + 100 + 40.
Now 80 can be subtracted from 140.

Or, more efficiently the *standard method.*

$$\begin{array}{r} 700 + {}^{40}\cancel{50} + {}^{1}4 \\ -\ 200 + 80 + 6 \end{array}$$

$$\begin{array}{r} {}^{600}\cancel{700} + {}^{1}40 + 14 \\ -\ 200 + 80 + 6 \end{array}$$

$$\begin{array}{r} 600 + 140 + 14 \\ -\ 200 + 80 + 6 \\ \hline 400 + 60 + 8 = 468 \end{array}$$

$$\begin{array}{r} {}^{6}\cancel{7}{}^{1}{}^{4}{}_{1}\cancel{5}4 \\ -\ 286 \\ \hline 468 \end{array}$$

**754 – 286 = 468**

# MULTIPLICATION

**Introducing multiplication on a number line**

TU X U

**14 x 5**

**How is multiplication the same as repeated addition?**

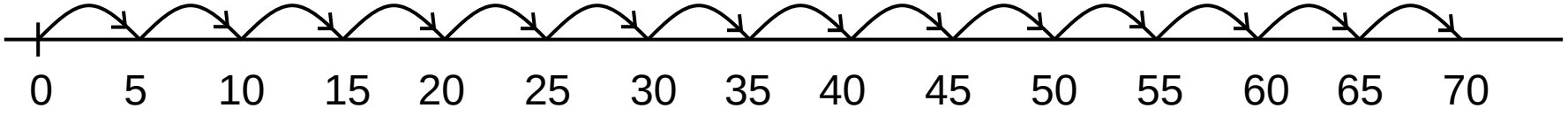
**The number line helps me see each group of 5 clearly. If I add 5 fourteen times, that is the same as 5 multiplied by 14 (5 x 14). I can make 14 individual jumps of 5 along the number line, or 1 jump of 5 x 10 and 1 jump of 5 x 4. Table facts will help me do this more quickly.**



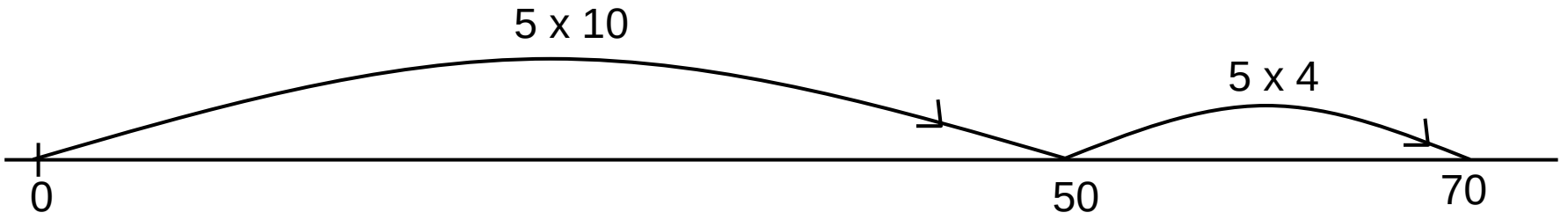
**TU x U**

# 14 x 5

The number line shows 5 multiplied by 14. This is equal to 14 multiplied by 5 (14 jumps of 5 on the number line).




Multiplication is *repeated addition*.



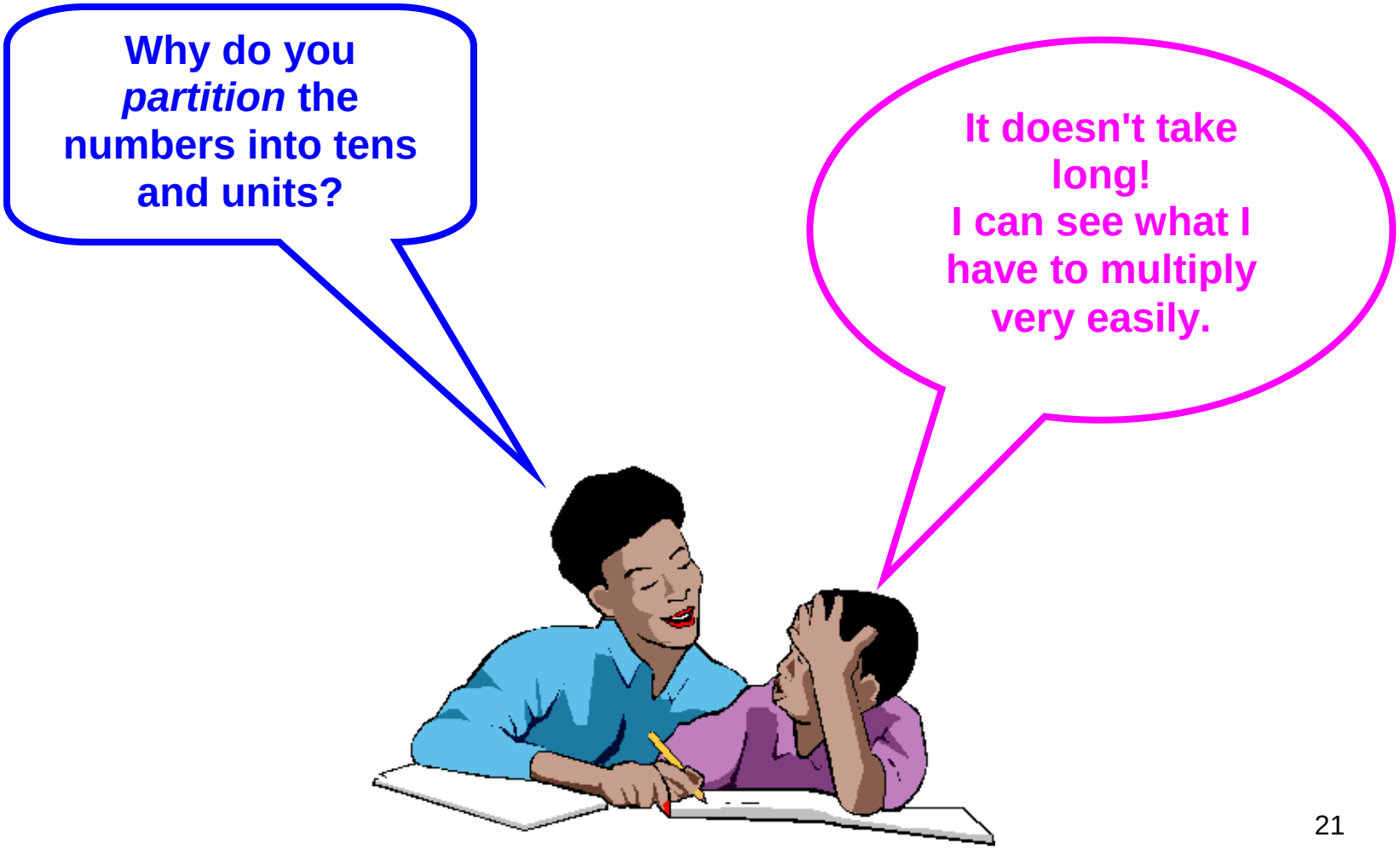

Using table facts to make bigger jumps is more efficient.

**14 x 5 = 70**

# GRID MULTIPLICATION

TU X U

**14 x 5**



**TU x U**

**14 x 5**

*Partition* TU number into tens and units parts.

14 becomes 10 and 4

**14 x 5**

| x | 10 | 4 | |
|---|---|---|---|
| 5 | 50 | 20 | **70** |

50 comes from multiplying 10 by 5. It is called a *part-product*.

20 comes from multiplying 4 by 5. Another *part-product*.

The *part – products* are totalled to give the *final product* or answer of 70.

**14 x 5 = 70**

# GRID MULTIPLICATION

TU X TU

**46 x 32**

**Isn't it difficult to multiply 40 by 30?**

**I know that 30 is 3 x 10 and multiplying by 10 is easy so I do 40 x 3 x 10 = 120 x 10 = 1200.**



**You've got to do a lot of calculations – don't you get confused?**

**The layout of the grid helps me organise what I have to do. I like this method.**

**TU X TU**

**46 x 32**

Both numbers are *partitioned* into their tens and units parts, 46 becomes 40 and 6 and 32 becomes 30 and 2.

**46 x 32**

| X | 40 | 6 | |
|---|---|---|---|
| 30 | 1200 | 180 | 1380 |
| 2 | 80 | 12 | 92 |
| | | | **1472** |

The *part products* are added in stages to give the final *product* or answer of 1472.

**46 x 32 = 1472**

# MULTIPLICATION

**Grid method, Expanded method and Compact method**

TU X U

**23 x 8**

**What are the brackets for in the expanded method?**

**They remind me which numbers I am multiplying.**
**I also have to remember to line the numbers up as hundreds, tens and units.**



**Why do you multiply 3 by 8 first in the compact method?**
**In all the other methods I've noticed that you've multiplied the tens number first!**

**I multiply the units first so I can carry forward any tens I need to!**
**This method is very quick but I have to remember to add on any numbers I carry forward.**

# TU x U

# 23 x 8

## GRID METHOD

| X | 20 | 3 | |
|---|---|---|---|
| 8 | 160 | 24 | 184 |

## EXPANDED METHOD

20 multiplied by 8 equals 160.
3 multiplied by 8 equals 24.

Final product from totalling the *part-products*.

HTU
23
x 8
160 (20 x 8)
24 (3 x 8)
184

## COMPACT METHOD
**(short multiplication)**

HTU
23
x 8
184
2

3 multiplied by 8 equals 24 (the first *part product*).

2 is the 2 tens that need to be carried forward and added to the next *part product*.

20 multiplied by 8 equals 160 (2nd *part product*), **plus** the 2 tens equals 180.

The digits are put in the correct columns, to give the answer 184.

**23 x 8 = 184**

# MULTIPLICATION

**Grid method, Expanded method and Compact method**

TU X TU

**46 x 32**

I recognise the long multiplication method. How do you multiply 46 by 30?

Well!… I know that 46 x 30 is the same as 46 x 3 x 10. I know my answer will end in zero when I multiply this whole number by 10. So… I put the zero in first. Then I multiply 46 x 3 using the short multiplication method.



# TU X TU
# 46 x 32

## GRID METHOD

| X | 40 | 6 | |
|---|---|---|---|
| 30 | 1200 | 180 | 1380 |
| 2 | 80 | 12 | 92 |
| | | | 1472 |

## EXPANDED METHOD

The 4 *part products* are set out vertically underneath the calculation.

*Part products* totalled to give final product.

```
  46
x 32
----
1200   (40 x 30)
 180   (6 x 30)
  80   (40 x 2)
  12   (6 x 2)
----
1472
```

## COMPACT METHOD
**(long multiplication)**

```
  46
x 32
----
1380   (46 x 30)
  92   (46 x 2)
----
1472
```

46 x 30 is the same as 46 x 3 x 10.

46 x 2 mentally or by short multiplication.

**46 x 32 = 1472**

# DIVISION

## Introducing division on a number line

TU ÷ U

**29 ÷ 3**

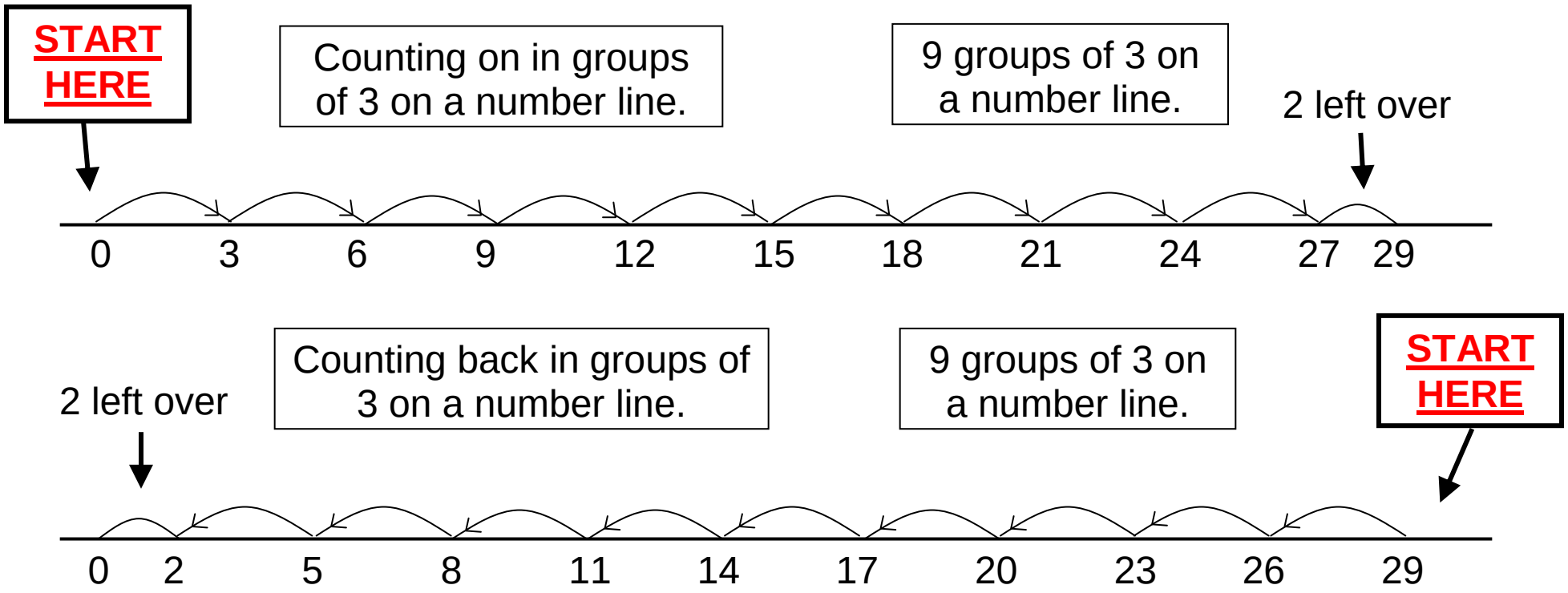
**Why are you adding on one line and subtracting on the other? And what has subtraction got to do with division?**

**I need to see how many groups of 3 there are in 29, so I either add on or take away groups of 3 until I can't add or take any more. Using the subtraction method will help me later on.**



# TU ÷ U

## 29 ÷ 3




There are 9 groups of 3 in 29, with 2 left over.

**29 ÷ 3 = 9 r2**

# DIVISION

## Chunking on a number line

TU ÷ U

**72 ÷ 5**

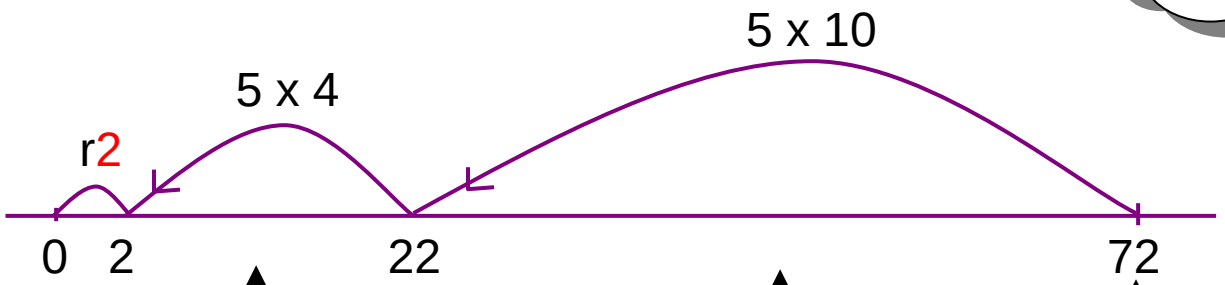
**I've never heard of chunking before! How does this help with division?**

**If I can, I try to take out 10 groups of the number I'm dividing by. This is a big chunk and makes the calculation easier. But I can take out chunks that are any number of groups.**



# TU ÷ U

## 72 ÷ 5




Subtract 4 groups of 5 (20) from 22 to land on 2.

Subtract 10 groups of 5 (50) from 72 to land on 22.

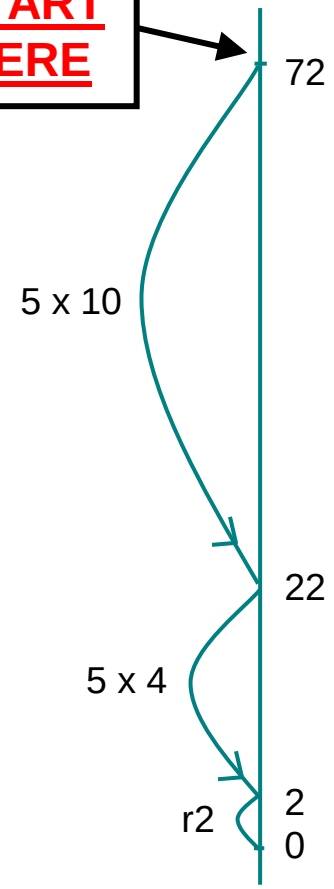
START HERE

14 groups of 5 subtracted altogether.

2 left! This is the *remainder*.

**Numberlines can be vertical or horizontal.**

START HERE




**72 ÷ 5 = 14 r2**

# DIVISION BY CHUNKING

HTU ÷ U

**256 ÷ 7**

**How do you decide what size chunk to subtract?**

**I look for chunks of 10 first. If I take bigger chunks it makes the calculation quicker and easier. Method (C) is shorter and more efficient than (B) .**

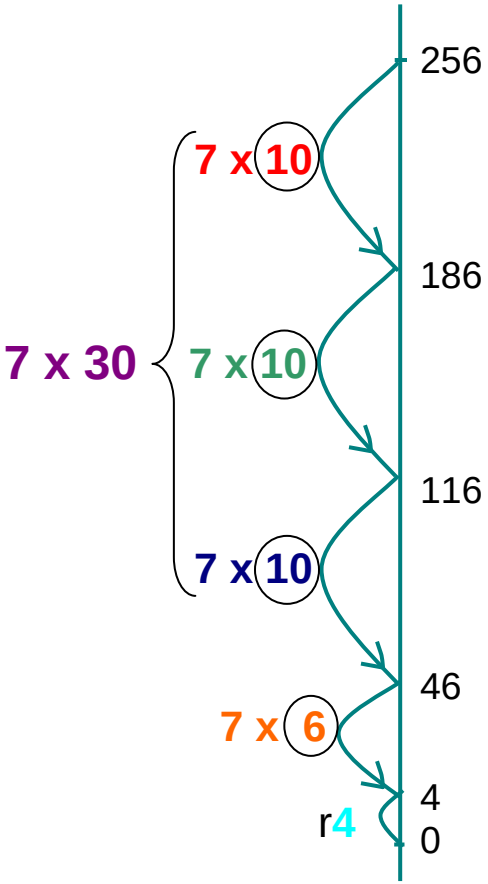


# HTU ÷ U

## 256 ÷ 7

How many groups of 7 in 256?

**A**




**B**

256
-70 (7 x 10)
186
-70 (7 x 10)
116
-70 (7 x 10)
46
-42 (7 x 6)
4

Subtract chunks of 70 (7 x 10).

How many groups of 7 in 46?

Total the numbers of groups of 7.

10 + 10 + 10 + 6 = 36

**C**

256
-210 (7 x 30)
46
-42 (7 x 6)
4

Subtract one large chunk of 210 (7 x 30).

36 groups of 7 have been subtracted and there is 4 left over.

**256 ÷ 7 = 36 r4**

# SHORT COMPACT DIVISION

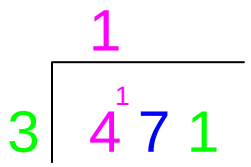
Isn't it easier to say 'how many 3s in 4?'

I need to remember the value of each digit so I know whether my answer makes sense. I will only use this method when I am confident with mental and chunking methods of division.

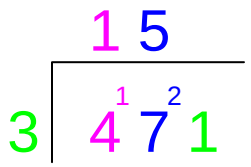


# HTU ÷ U

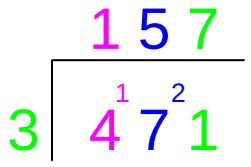
## 471 ÷ 3




**Q:** What is the largest number of hundreds that will divide exactly by 3?
**A:** 300 divided by 3 = 100. This leaves 100 which is exchanged for ten tens in the tens column.




**Q:** What is the largest number of tens that will divide exactly by 3?
**A:** 150 divided by 3 = 50. This leaves 20 which is exchanged for 20 units in the units column.




**Q:** What is the largest number of units that will divide exactly by 3?
**A:** 21 divided by 3 = 7

**471 ÷ 3 = 157**

# CALCULATIONS IN CONTEXT

All the methods in this booklet support children in using their mental and written skills to solve calculations. Children need to be encouraged to use the method that they understand and can use confidently.

It is important that children are able to choose the most appropriate method for the calculation. For example:

**4003 - 3998**

These numbers are very close together and so counting up on a number line (actual or imagined) would be the most efficient method.

**200 ÷ 4**

Dividing by 4 is the same as halving and halving again. As it is easy to halve 200 and easy to halve 100, this would be the most efficient method.

Using and applying appropriate skills is very important, when calculations are needed to solve a problem.

**4 C.DS at £2.99 – how much altogether?**

£2.99 is almost £3.00 and so round up, multiply, then adjust:

4 x £3.00 = £12.00

£12.00 – 4p = £11.96

# Improving your own skills

Many adults think that they aren't very good at Maths. If you think it's time that you did something about your own Maths, there are lots of sources of help.

- Family Learning courses are held every term in Brighton and Hove Primary Schools and pre-school settings – workshops, 6 week courses, or longer courses that run for a term or more. These courses give parents an opportunity to find out how their children are being taught at school nowadays, and an opportunity to learn how they can support their children's learning at home and at school. You can ask at your child's school about the next Family Learning course, or phone 01273 294205 for further information.

- In Brighton and Hove, the main providers of courses for Basic Skills are:

  | | |
  |---|---|
  | City College, Pelham Street, Brighton. | Tel: 01273 667788 |
  | Portslade Community College, Chalky Road, Portslade. | Tel: 01273 422632 |
  | Friends Centre, Ship Street, Brighton. | Tel: 01273 327835 |
  | Varndean College, Surrenden Road, Brighton. | Tel: 01273 508011 |
  | Nacro Services, Enterprise Point, Lewes Road, Brighton. | Tel: 01273 704016 |

  All of these provide a range of free courses for adults who wish to improve their own skills.

- There are national telephone and internet helplines available to help find an appropriate course.

  | | | |
  |---|---|---|
  | Learndirect: | www.learndirect.co.uk | 0800 100 900 |
  | Basic SkillsAgency: | www.basic-skills.co.uk/learners | 0800 700 987 |
  | BBC Skillswise: | www.bbc.co.uk/skillswise | |

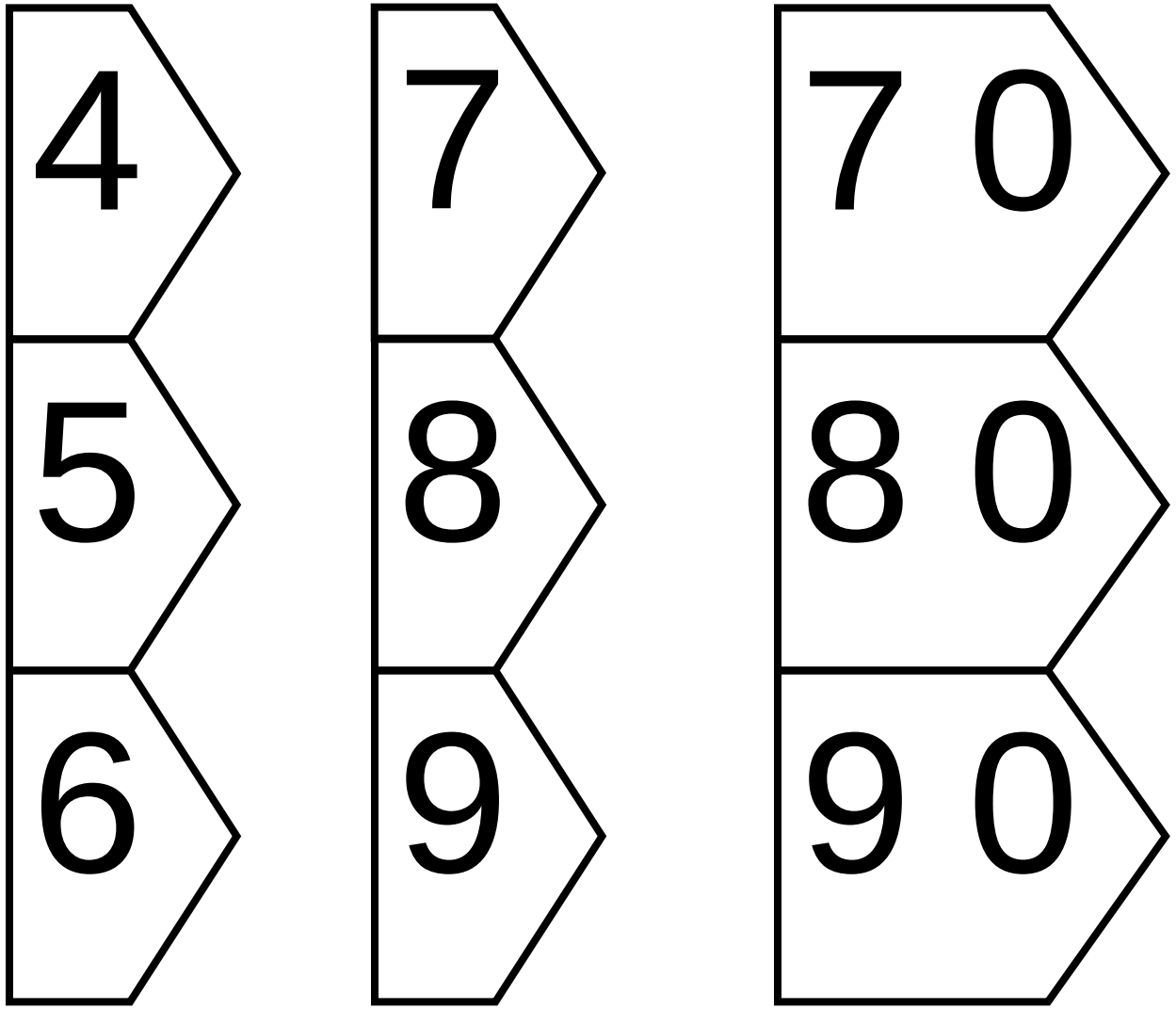
- There are several websites designed to help students of all ages find out about different topics in Maths:

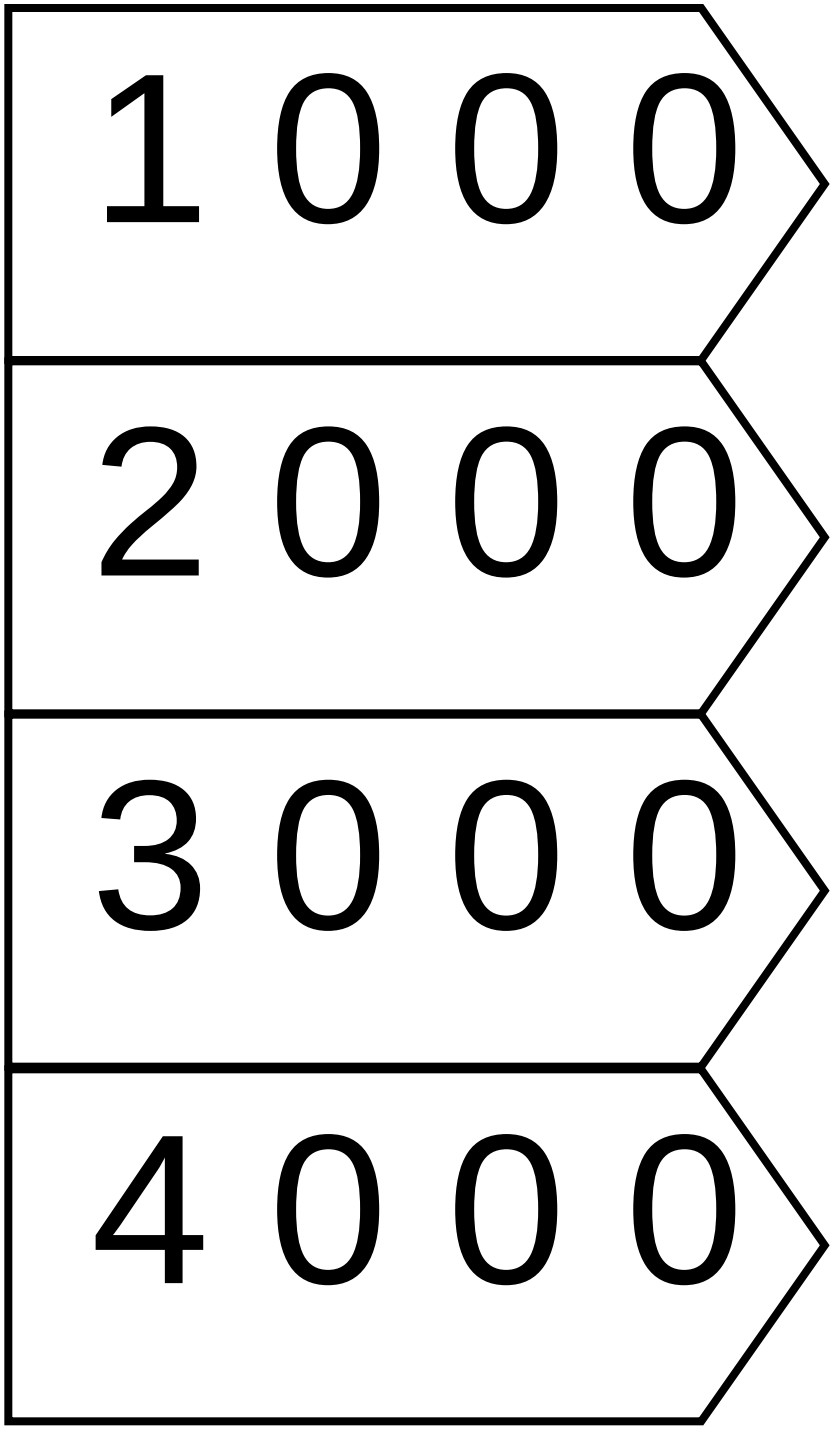
  - The BBC site (www.bbc.co.uk) has excellent sections for revision at KS2 and KS3 (www.bbc.co.uk/revisewise),and the GCSE and Skillswise sections also give worked examples of mathematical problems`- particularly useful when your child doesn't understand her homework and you don't either……

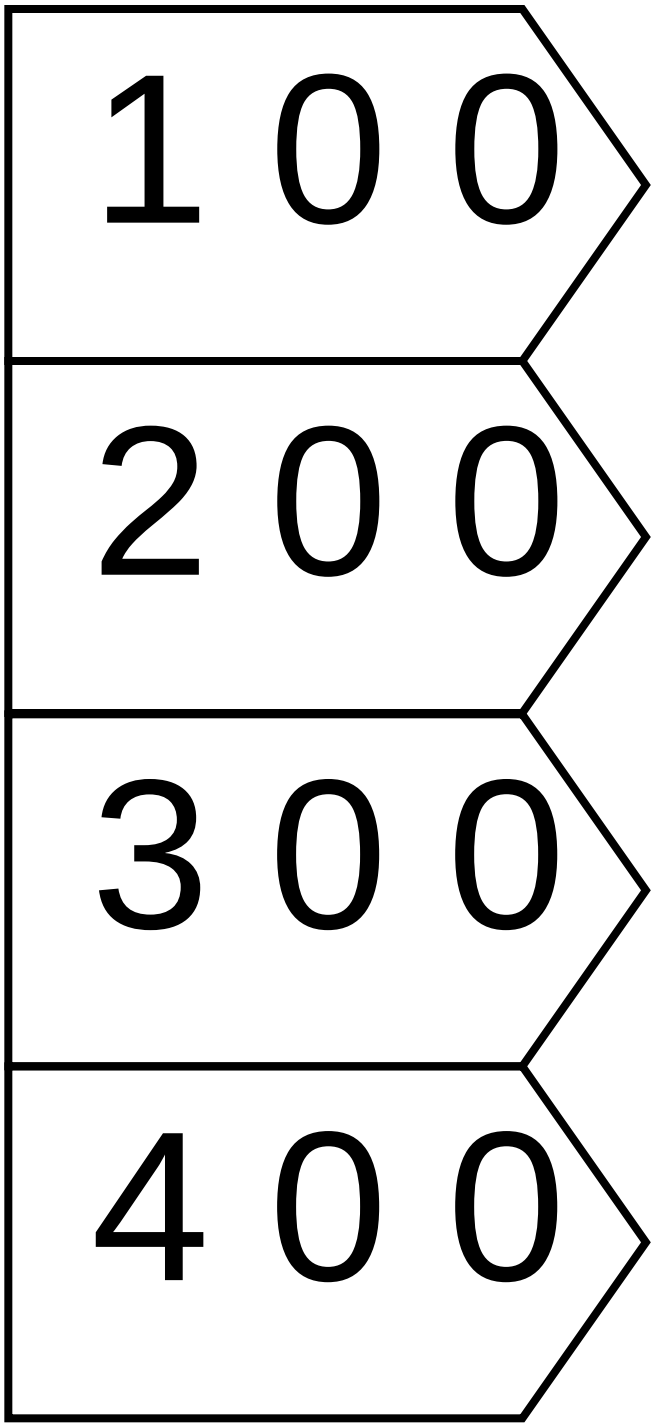
- The DfES0 site for parents (www.parentcentre.gov.uk) is the best source of information about teaching in schools, and how to support your child's learning at home.

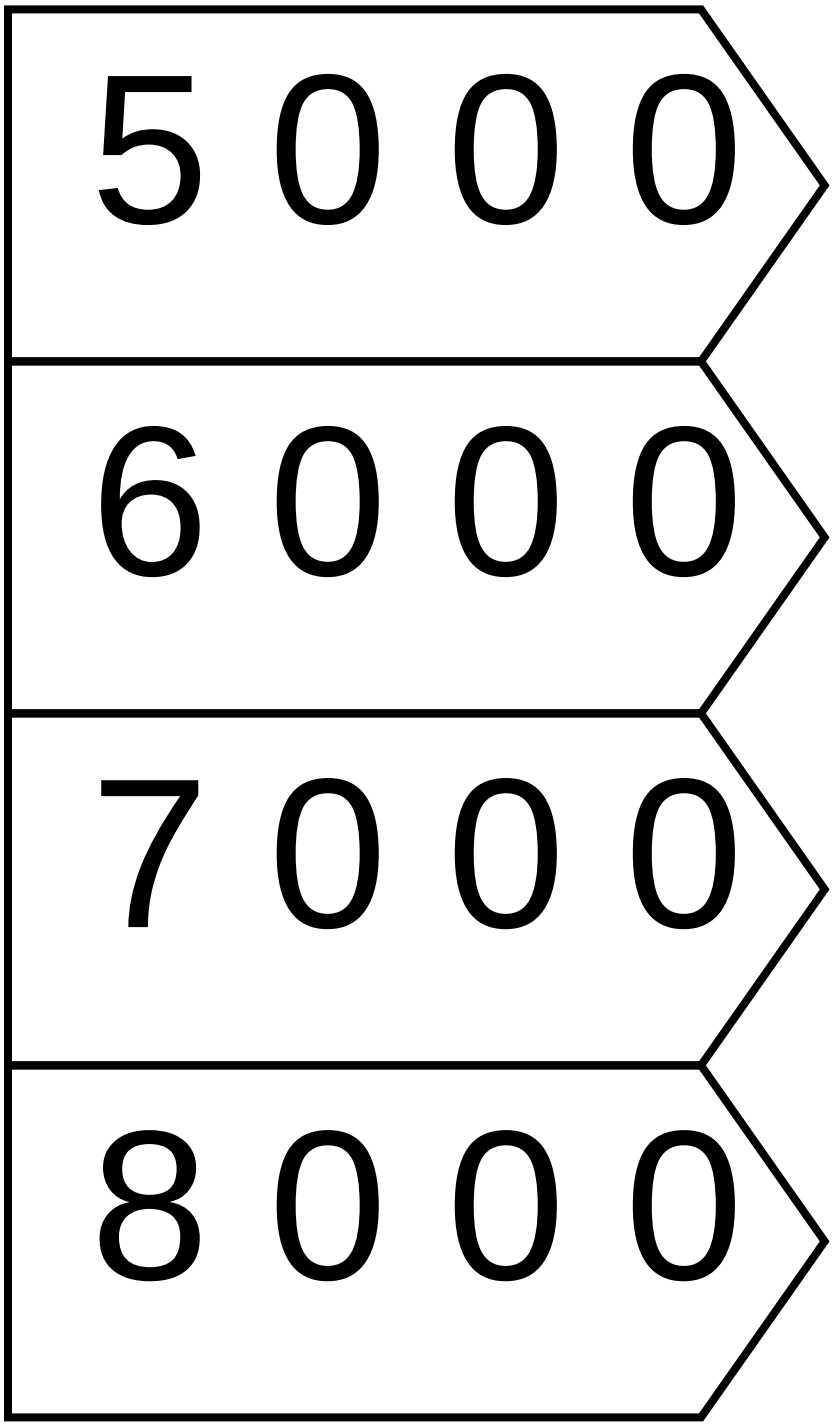
- The Parents Online site (www.parentsonline.gov.uk) gives information about children's education, and how parents can support children's education – particularly using the Internet.

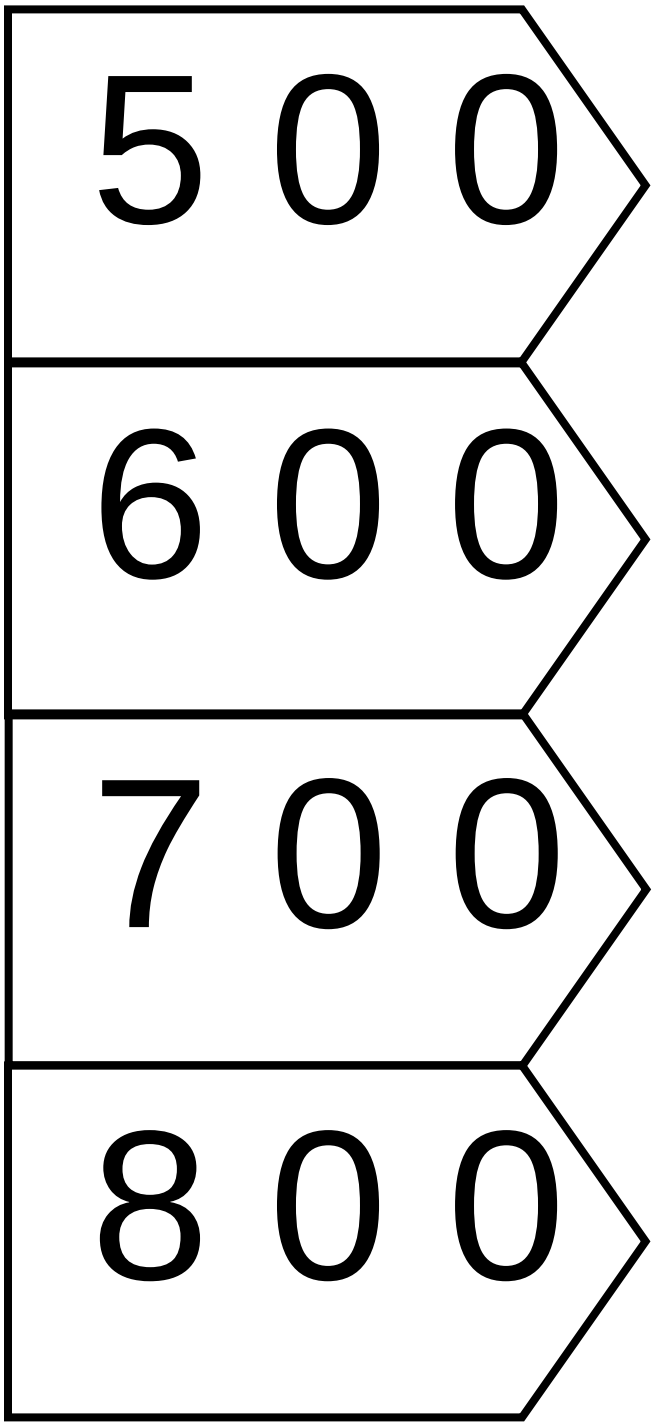
# Place Value Cards

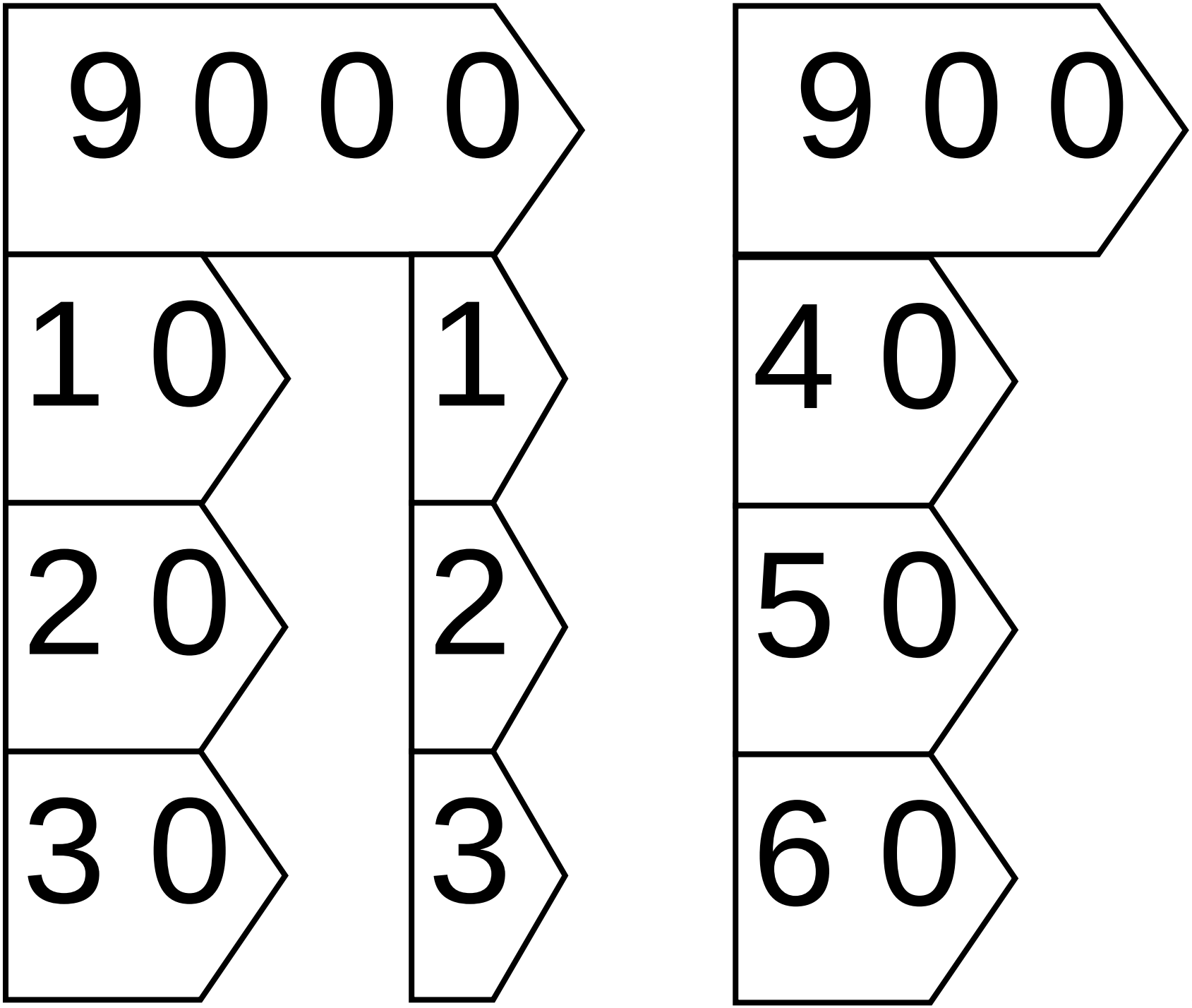



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