Calculation strategies

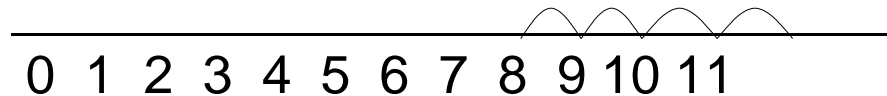## Maths is Fun!

ADDITION

Step 1

*Children will begin to record simple number sentences e.g. **2 + 3 = 5.**

*They will move on to using a number track/number line to count on in ones e.g. **7 + 4 = 11**

```
 _____‿‿‿‿
 0  1  2  3  4  5  6  7  8  9 10 11
```

*The children will be expected to know their number bonds so they can solve the missing numbers e.g. 3 + __ = 7   __ + 5 = 8   __ + __ = 6

Step 2

*The children will learn to add numbers using partitioning.

E.g. **23 + 12 = 35**

    20 + 10 = 30

     3 + 2 = 5

    30 + 5 = 35

*This method will be extended to: **25 + 18 = 43**

                                    25 + 10 = 35

                                    35 + 8 = 43

*They will be expected to work out answers using their mental strategies e.g. Add 9/11 by adding 10 and adjusting by 1.

E.g. **35 + 9 = 44**   35 + 10 - 1 = 44

<u>Step 3</u>

*The children will continue to add numbers using partitioning. (H, T and U)

E.g. 358 + 73 = 431

358 + 70 = 428

428 + 3 = 431

*This will lead on to the informal vertical method e.g. 358 + 73 = 431

358

+ 73

11 (Add the units first)

120 (Next add the tens)

300 (Then add the hundreds)

431 (Finally add up the numbers starting with the units column!)

*The children will be encouraged to begin to approximate their answers first by rounding to the nearest 100.

E.g. **358 + 73 = 431**   400 + 100 = 500

Steps 4/5

*The children will be expected to approximate their answers first by rounding to the nearest 10. e.g. **358 + 73 = 431**   360 + 70 = 430

*The children will be expected to use the formal vertical method
e.g. **358 + 73 = 431**

```
  358
+  73
  431
   1 1
```

*The children will also be using this strategy to add decimals.
E.g. **124.9 + 117.25 = 242.15**

```
  124.90      *Insert a zero to keep the place value
+ 117.25
  242.15
   1 1
```
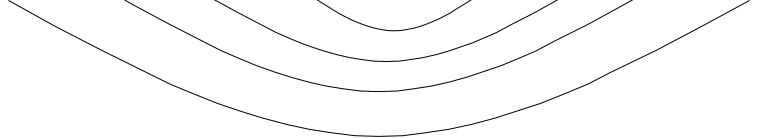
Maths Questions

*Now, have a go at answering the following questions trying not to use the vertical methods that you were taught at school!

*Make sure you can talk about how you worked out the answers.

$1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + 10 + 11 =$

$147 + 85 =$

Maths Answers

1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + 10 = 55

147 + 85 = 232   147

147 + 80 = 227   + 85

227 + 5 = 232   12 (U)

                     120 (T)

                     100 (H)
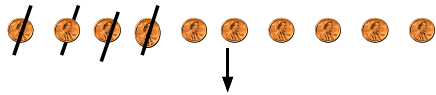
                     232

SUBTRACTION

Step 1

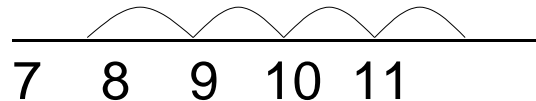*The children will be encouraged to use pictures, marks, number tracks, number lines to help them subtract numbers.

E.g. Sam spent 4p. What was his change from 10p?

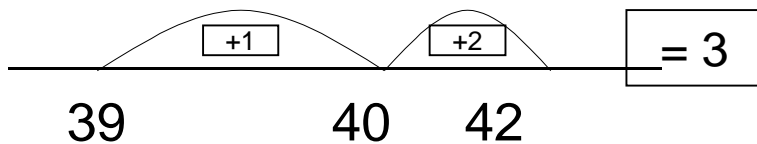*Number tracks - From **5**, jump back **3** to **2**

*Number line 11 - 4 = 7

7   8   9   10   11

*The children will be expected to use their number bonds so they can solve

the missing numbers e.g. 10 - __ = 7   __ - 2 = 8   __ - __ = 10

__Step 2__

*The children will subtract numbers using a number line to count on from the smallest number to the largest number e.g. **42 - 39 = 3**
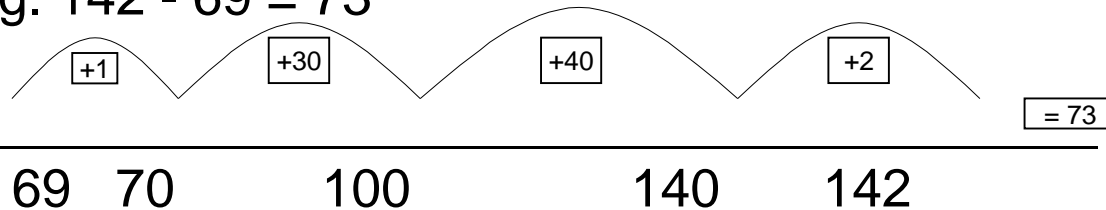

39   40   42

*They will be expected to work out answers using their mental strategies e.g. Subtract 9/11 by taking away 10 and adjusting by 1.
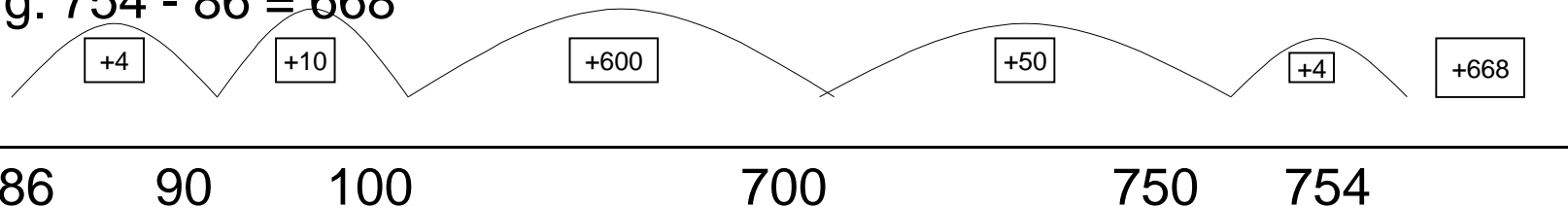
E.g. **35 - 9 = 26**   35 - 10 + 1 = 26

Step 3

*The children will continue to subtract numbers using a number line to count on from the smallest number to the largest number using larger numbers

e.g. 142 - 69 = 73

| +1 | +30 | +40 | +2 | = 73 |

69 70   100   140   142

E.g. 754 - 86 = 668

| +4 | +10 | +600 | +50 | +4 | +668 |

86   90   100   700   750   754

*The children will be encouraged to begin to approximate their answers first,

by rounding to the nearest 10/100. e.g. **142 - 69 = 73**   140 - 70 = 70

754 - 86 = 668   800 - 100 = 700 or 750 - 90 = 660

*The children will also use number lines to solve problems including time, money and decimals.

Steps 4/5

*The children will be expected to continue to approximate their answers first, by rounding to the nearest 10/100.

*The children will move on to the standard written method where the children will be exchanging numbers which is known as decomposition.

E.g. **352 - 178 = 174**

```
  2  14   1
   3 5 2
 - 1 7 8
   1 7 4
```

Maths Questions

*Now, have a go at answering the following questions trying not to use the vertical methods that you were taught at school!

*Make sure you can talk about how you worked out the answers.

72 - 47 =

413 – 99 =

Maths Answers

72 - 47 = 25

72 – 40 = 32

32 – 7 = 25

413 – 99 = 314

413 – 100 = 313

313 + 1 = 314

MULTIPLICATION

Step 1

* The children will begin to solve problems of multiplication using pictures.
E.g. There are 3 sweets in one bag. How many sweets are there in 5 bags?

* They should understand that multiplication is the same as repeated addition.
E.g. 2 + 2 + 2 is the same as 3 lots/groups/sets of 2 .
*They will be introduced to the multiplication sign to write multiplication sentences. E.g. 2 x 3 = 6

Step 2

*The children will be expected to begin to learn their tables and then use

these facts to fill in missing number sentences. E.g.

$7 \times 2 = \underline{}$ $\underline{} = 2 \times 7$

$7 \times \underline{} = 14$ $14 = \underline{} \times 7$

$\underline{} \times 2 = 14$ $14 = 2 \times \underline{}$

$\underline{} \times \underline{} = 14$ $14 = \underline{} \times \underline{}$

*They should realise that the order of multiplication can be
reversed and the answer will be the same
E.g. 3×4 gives the same answer as 4×3

*They will begin to double numbers by partitioning.
E.g. $15 \times 2 = 30$
    $10 \times 2 = 20$ $5 \times 2 = 10$ $20 + 10 = 30$

Step 3

*As children's tables knowledge develops, they will be encouraged to use the known facts to answer more difficult calculations.

E.g. 3 x 5 = 15 so 3 x 50 = 150

*The children will be introduced to different methods of written calculation using partitioning and they will be expected to use their tables facts to help them to approximate the answer.

E.g. 2 digit x 1 digit (TU x U) 23 x 7 is approximately 20 x 10 = 20

Informal standard written method

```
    23
  x  7
    21 (3 x 7)
   140 (20 x 7)
   161
```

The grid method   35 x 2

x	30	5
2	60	10

Steps 4/5

*The above 2 methods will be practiced and extended using higher numbers and decimals.

Leading to:

72 x 38 =

and possibly

X	70	2
30	2100	60
8	560	16

= 2160

= _576_

= 2_736_

1

1 1 2 5

x _____7

7 8 7 5

1   3

Maths Questions

*Now, have a go at answering the following questions trying not to use the vertical methods that you were taught at school!

*Make sure you can talk about how you worked out the answers.

18 x 6 =

25 x 19 =

Maths Answers

18 x 6 = 108

10 x 6 = 60

8 x 6 = 48

60 + 48 =108

X	10	8	
6	60	48	= 108

25 x 15 =

X	20	5	
10	200	50	= 250
5	100	25	= 125

Total 375

DIVISION

*The children will be encouraged to do grouping activities using pictures and marks

E.g. 12 children get into teams of 4 to play a game. How many teams are there?

*They will be encouraged to recognise and use the division (÷) sign in simple number sentences.

Step 2

*The children will continue to be encouraged to do grouping activities using pictures/marks and to record the division sentence. E.g. Sharing - 6 sweets are shared between 2 people. How many do they have each?

   •   •

   I I I   I I I

Grouping – There are 6 sweets. How many people can have 2 each?
(How many 2's make 6?) How many people have 3 each?
(How many 3's make 6?) 6 ÷ 2 = 3   6 ÷ 3 = 2

*They will also be encouraged to insert the missing signs and numbers.
E.g. 6 ÷ 2 = __   6 ÷ __ = 3   __ = 6 ÷ 2

*The children will be taught to see the relationship between division and multiplication facts
e.g. 6 ÷ 2 = 3   6 ÷ 3 = 2 and   2 x 3 = 6   3 x 2 = 6

*Some problems will involve remainders e.g.16 ÷ 3 = 5 r1
Sharing - If 16 is shared between 3, how many are left over?
Grouping – How many 3's make 16, how many are left over?

Step 3

*The children will continue using a range of equations to fill in the missing signs and numbers.

*They will still be encouraged to use pictures and marks to solve number problems deciding whether to round up or down in a context can be problematic.

e.g. I have **19** marbles. **1** bag holds **6** marbles.

How many bags will be needed? **19 ÷ 6 = 3 r1** I need **4** bags. **(round up)**
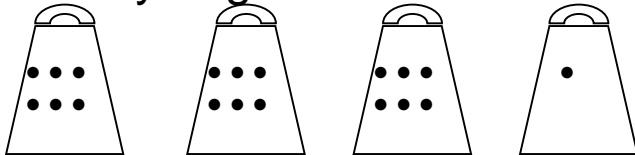
*This will lead to a written calculation method - chunking. **71 ÷ 6 =**

 71

-60 (10 x 6)

 11

  6 (1x 6)

  5

The children will be encouraged to make an estimation so that they appreciate the size of the numbers they are working with. E.g. 71 ÷ 6 is near to 10 x 6 = 60.

Steps 4/5

*The children will continue to use the chunking method to divide numbers and then will be taught the conventional "bus shelter" method for division

e.g**. 196 ÷ 6 = 32 r4 .**

```
6⟌196
-  180  (30x6)
     16
  -  12  (2x6)
      4
```

*This will lead on to the compact method which should be used with the more able pupils.   32 ÷ 6 =

```
      3   2 r4
  6⟌1  9 ¹6
```

Maths Questions

*Now, have a go at answering the following questions trying not to use the vertical methods that you were taught at school!

*Make sure you can talk about how you worked out the answers.

250 ÷ 10 =

136 ÷ 6 =

Maths Answers

71 ÷ 6 = 11r5   71

                                       <u>60</u> (10 x 6)

                                         11

                                          <u>6</u> (1 x6)

                                           5

136 ÷ 6 = 22r4

$$6 \overline{) 1 \; 3 \; {}^1 6} \quad = 2 \; 2 \; r4$$