ENTERPRISE SOUTH LIVERPOOL ACADEMY

A joint Catholic/Church of England Academy

ESLA CALCULATION STRATEGIES

Mental skills for Addition and Subtraction

Your child needs to practice the following mental skills for addition and subtraction

- **Number bonds to 10, 20 and 100**
- **Addition pairs to 9 + 9**
- **Counting on and Counting back in 10's or of 100's**
- **Partition two-digit and three-digit numbers into of 100, 10 and 1**
- **Understand and use addition and subtraction as inverse operations**

Note: *It is important that children's mental methods of calculation are practised on a regular basis*

Here are some ideas to help you practise these skills with your child:

1. Target Boards: You draw a simple grid on a piece of paper. You populate the grid with numbers and point to the numbers asking your child different questions. For example, how many ones needed to 10, how many would it take to 100, add 10 onto this number, choose a pair of numbers that total 100 etc

67	92	48
8	13	81
20	38	55

49	30	100
12	79	21
64	89	9

2. It may be helpful to have some pre-printed grids for children to work on.

   Find a partner and a 0-9 dice.

   Game 1: Each of you draw an addition grid like this:

   Take turns to throw the dice or use Virtual Dice
   http://www.bgfl.org/bgfl/custom/resources_ftp/client_ftp/ks1/maths/dice/index.htm

. After each throw of the dice, you each decide which of your cells to put that number in.

   Throw the dice four times each until all the cells are full.

   Whoever has the sum closest to 100 wins

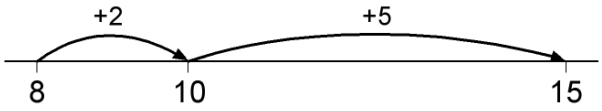
We are supporting the Liverpool Counts Quality Mark – can we count on you?

ADDITION

Stage 1: The empty number line

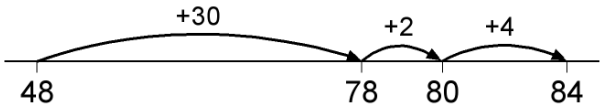
Steps in addition can be recorded on a number line. The steps often go to the next “nice” number

8 + 7 = 15



48 + 36 = 84

or:



Stage 2: Partitioning

Split the numbers up into their separate columns:

76 + 47 = (70 + 40) + (6 + 7) = 110 + 13 = 123

Partitioned numbers can be written under one another:

$$\begin{array}{rcl} 47 & = & 40 + 7 \\ +\,76 & & 70 + 6 \\ \hline & & 110 + 13 \end{array} = 123$$

or in a grid

40	7
70	6
110	13

Stage 3: Column method (efficient)

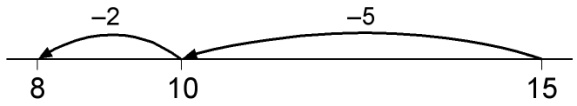
$$\begin{array}{r} 47 \\ +\,76 \\ \hline 123 \\ 1\,1 \end{array} \qquad \begin{array}{r} 258 \\ +\,87 \\ \hline 345 \\ 1\,1 \end{array} \qquad \begin{array}{r} 366 \\ +458 \\ \hline 824 \\ 1\,1 \end{array}$$

Column addition remains efficient when used with larger whole numbers and decimals. Once learned, the method is quick and reliable.

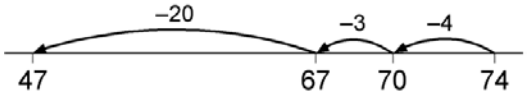
SUBTRACTION

Stage 1: Using the empty number line

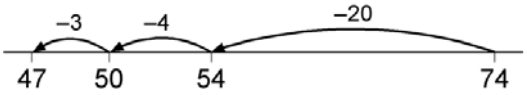
Steps in subtraction can be recorded on a number line. 15 – 7 = 8



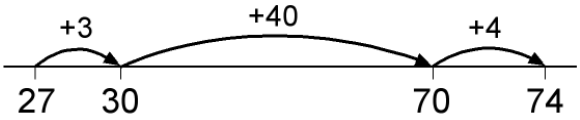
74 – 27 = 47 can be worked by counting back:



The steps can be done in a different order:



The counting-up method – sometimes called the Shop-keepers method



Stage 2: Expanded method in columns

Partitioned numbers can be written in a grid

Example: 563 – 241

-	500	60	3
	200	40	1
➔	300	20	2

322

leads to

$$\begin{array}{r} 563 \\ -\ 241 \\ \hline 322 \end{array}$$

Example: 74 – 27

-	70	4
	20	7

➔

70	4
~~60~~20	17

leads to

$$\begin{array}{r} \not{7}\not{4} \\ {}^{6}\not{5}\,{}^{1}\not{7} \\ -\ 27 \\ \hline 47 \end{array}$$

Stage 3: Column method (efficient)

$$\begin{array}{r} {}^{5}\not{6}\,{}^{1}\not{3} \\ -248 \\ \hline 315 \end{array}$$

Column subtraction remains efficient when used with larger whole numbers and decimals. Once learned, the method is quick and reliable.

Mental skills for Multiplication and Division

Your child needs to practice the following mental skills for addition and subtraction

- **Recall all multiplication facts and division facts to 10 × 10**
- **Partition number into multiples of one hundred, ten and one in different ways**
- **Work out products such as 70 × 5, 70 × 50, 700 × 5 or 700 × 50 using the related fact 7 × 5**
- **Add two or more single-digit numbers mentally**
- **Add multiples of 10 (such as 60 + 70) or of 100 (such as 600 + 700) using the related addition fact, 6 + 7**
- **Know how to find a remainder working mentally – for example, find the remainder when 48 is divided by 5**
- **Understand and use multiplication and division as inverse operations**

Note: *It is important that children's mental methods of calculation are practised on a regular basis*

Here are some ideas to practise this with your child:

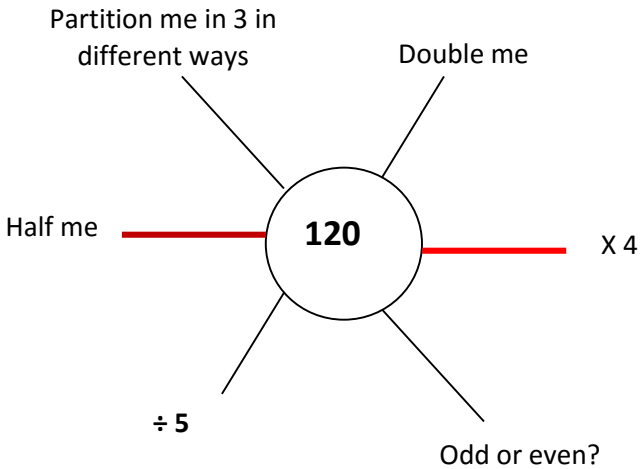
Each of you draw a multiplication grid like this or provide a pre drawn version (laminated if you wish to re-use)

Throw the dice three times each until all the cells are full.

Whoever has the product closest to 100 wins.

You can vary the target to make it easier or more difficult.

Number of the day



Always returning to the centre number as your starting point, you can ask various questions about that number.

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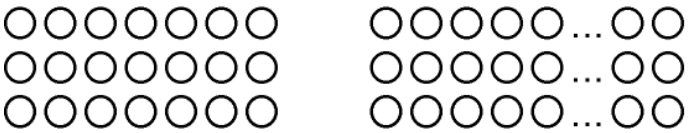
MULTIPLICATION

Stage 1: Mental multiplication using partitioning *(towards informal)*

Children can use their knowledge of the 2, 5 and 10 times tables to work out multiples of 7:



$7 \times 3 = (5 + 2) \times 3 = (5 \times 3) + (2 \times 3) = 15 + 6 = 21$

This would be done through practical activities with counting equipment

"You have shown me 5 lots of 3. If I needed to know what 7 lots of 3 is, what could I do?"

Stage 2: The grid method (partitioning)

38 x 7 =

x	7
30	210
8	56
	266

56 x 27 =

x	20	7	
50	1000	350	1350
6	120	42	162
			1512

Stage 3: Efficient multiplication

Ask children to estimate first.

38 x 7 is approximately 40 x 7 = 280

60 × 30 = 1800

56 × 27 is approximately

```
  38
×  7
 266
  5
```

```
  56
x 27
 392
1120
1512
 1
```

56 x 7

56 x 20

DIVISION

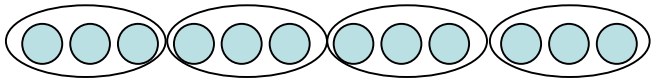
Stage 1: Sharing

Children understand that they are sharing equally so that each group has the same amount. Practical resources eg. counters help.

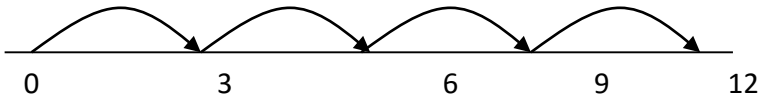
Sharing 12 cakes equally between 3

Stage 2: Grouping

Children work practically in grouping activities, moving onto representing this using a number line



How many threes are there in12?



Stage 3: Short division

Short division method is recorded like this:

$$3\overline{)8\,{}^{2}1}\quad 2\ 7$$

The carry digit '2' represents the 2 tens that have been exchanged for 20 ones

Partitioning numbers

$291 \div 3 = (270 + 21) \div 3$

$= (270 \div 3) + (21 \div 3)$

$= 90 + 7$

$= 97$

This is then shortened to:

$$3\overline{)2\ 9\,{}^{2}1}\quad 9\ 7$$

Stage 4: Long division

$$24\overline{)560}$$

480 $\quad 24 \times 20$

80

72 $\quad 24 \times 3$

8

Answer: 23 R 8

In effect, this is the long division method, though conventionally the digits of the answer are recorded above the line as shown here to the left.

$$24\overline{)560}\quad 23$$

-480

80

-72

8

Answer: 23 R 8

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There are lots of different activities you can do with your son or daughter to build up their confidence in their numerical skills.

Some other activities for you to try are:

Four a day

Each calculation should be undertaken with the strategy that the individual child is most secure with.

222456 + 32243 =	**462453 – 33216 =**
2413 X 4=	**2435 ÷ 5 =**

Guess my number:

What number am I thinking of ?

It is an odd number between 1000 and 2000.

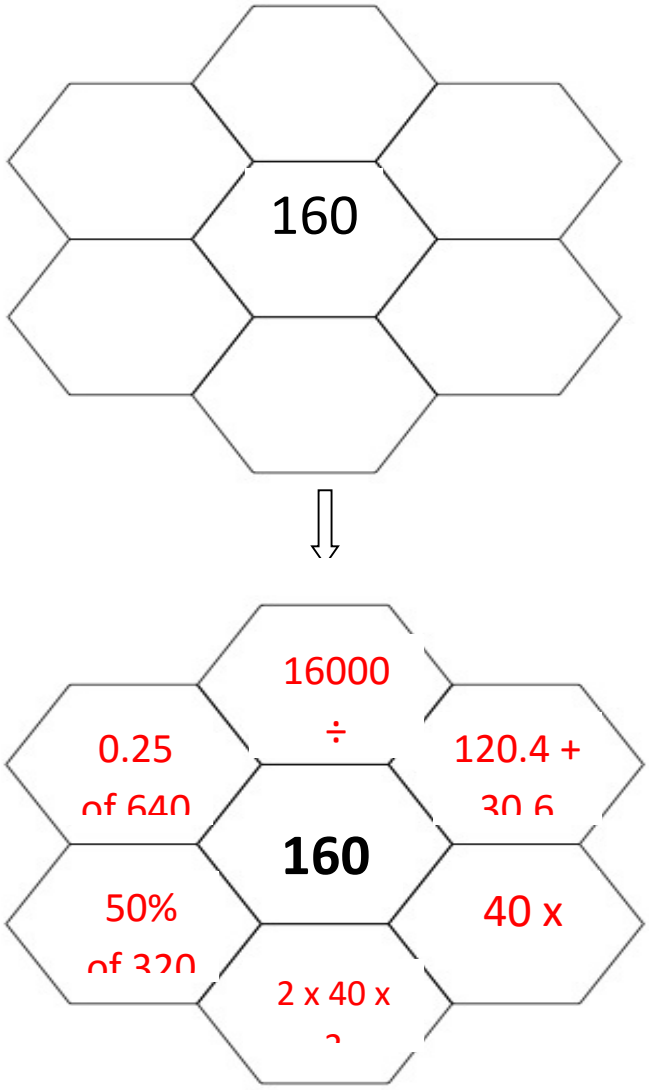
It is a multiple of 5.

It is also a multiple of 3.

It has 4 tens. (1245)

What else do I know?

This is a good activity to find out what your child already knows. Tell them the answer is 160, can they think of different questions to ask.



Here are some useful websites for you to visit with your son/daughter:

BBC bitesize

Sumdog.com

Mymaths

Mathswatch

www.ictgames.com

And just a puzzle for fun…

Zeller 's Algorithm

Do you know on what day of the week you were born?

Zeller's Algorithm is a way to calculate what day of the week a given date was.

Zeller 's Algorithm

Let day number =
D month number =
M year = Y

If M is 1 or 2, add 12 to M, and subtract 1 from Y.

Let C be the first two digits of Y and K be the last two digits of Y.

Add together the integer parts of (2.6M—5.39), (K/4) and (C/4). Add to this D and K, and subtract 2C. (The integer part of a number is the whole number part: integer part of 2.3 is 2, and of 6.7 is 6. Note that the integer part of –1.7 is –2).

Find the remainder when this number is divided by 7.

If this remainder is 0 the day is Sunday, 1 is Monday, 2 is Tuesday, etc.

Example : 15 May 19 91

D = 15
M = 5
Y = 1991

C = 19
K = 91

(2.6M—5.39) = 7.61 = 7 (K/4) = 22.75 = 22
(C/4) = 4.75 = 4

7 + 22 + 4 + 15 + 91—38 = 101

101 ÷ 7 = 14 r 3

Remainder is 3, so 15 May 1991 was a Wednesday.

Can you figure out what day of the week you were born on?