## Knowledge Organiser

| Year Group | Subject | Topic |
|---|---|---|
| 6 | Mathematics | The Four Operations (+ - x ÷) |

### The Big Picture

During this four week unit, children will develop their confidence with the four operations (+, -, x, ÷). They will consolidate their knowledge of column addition and subtraction, reinforcing the language of exchange, etc. Children will begin with smaller numbers before progressing to multi-digit calculations. They will consider whether the column method is always appropriate, for example when adding 999, it is easier to add 1000 and then subtract 1, applying these skills to solve multi-step problems in a range of texts. They will identify common factors, multiples and prime numbers. Children will multiply and divide large numbers using a range of methods including the formal written methods, as well as learn and apply their knowledge of the order of operations. Children will revise finding square and cube numbers. They will continue to develop their ability to recite all times tables to twelve with automaticity.

### Enquiry Question

**What is important to remember when multiplying by 10? Does the answer differ when we do not follow the order of operations? Why do we need to follow an order? Is there a different strategy you could use? Can the inverse operation be used?**

### Key Vocabulary

| | |
|---|---|
| Order of Operations | The order in which a calculation must be carried out in order to achieve the correct answer (See BIDMAS). |
| B.I.D.M.A.S | **B**rackets, **I**ndices, **D**ivision, **M**ultiplication, **A**ddition, **S**ubtraction |
| Factor | A whole number that divides exactly into another whole number. |
| Multiple | The result of that number multiplied by an integer |
| Prime Number | A whole number greater than 1 whose only factors are 1 and itself. |
| Lowest Common Factor (LCF) | The lowest factor shared by two or more numbers |
| Highest Common Factor (HCF) | The highest factor shared by two or more numbers |
| Lowest Common Multiple (LCM) | A multiple shared by two or more numbers. |
| Index (Plural: Indices) | The index of a number says how many times to use the number in a multiplication. It is written as a small number to the right and above the base number. $8^2 = 8 \times 8 = 64$ |
| Divisor | The amount you want to divide by. |
| Dividend | The amount that you want to divide up. |

### Factors, Prime and Multiples

Factors of 12
1, 2, 3, 4, 6, 12
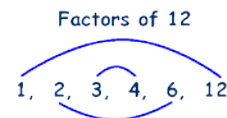
You can also think of **factors** as being the numbers that you multiply to get another number, so 2 and 3 are **factors** of 6 (and so are 1 and 6). What are the factors of 12? What is the LCF of 6 and 12?

| Multiples of 8 | Multiples of 12 |
|---|---|
| 8 | 12 |
| 16 | 24 |
| 24 | 36 |
| 32 | 48 |
| 40 | 60 |
| 48 | 72 |
| 56 | 84 |
| 64 | 96 |
| 72 | 108 |
| 80 | 120 |

Being able to quickly recognise common multiples between numbers will enable children to quickly calculate equivalent fractions, which is an invaluable skill when adding together fractions with different denominators. What is the LCM of 8 and 12? What is the LCM of 6,8 and 12?

Prime numbers are integral to mathematical understanding as they help students to recognise that:
a) a fraction cannot be simplified further if it contains a prime number as its denominator
b) this amount cannot be shared equally except by the number its self or by 1.


Prime Numbers

## Formal Written Methods

| | | | |
|---|---|---|---|
| | | 7 13 | Column method |
| 4 2 6 7 | 1 2 6 0 3 6 | 8 4 13 - | 5 6 7 + |
| × 3 4 | 3,612 ÷ 14 | 5 5 6 | 1 9 9 |
| | | 2 8 7 | 7 6 6 |
| **Multiplication** | **Division** (often referred to as 'Bus Stop Method) | **Subtraction** | **Addition** |

**Long Multiplication**

```
      1 5
    × 1 2
  +   3 0
  + 1 5 0
    1 8 0
```

**Long Division**

```
1 - 24        543
2 - 48    24 ⟌ 13032
3 - 72      - 120
4 - 96        103
5 - 120      - 96
6 - 144        72
7 - 168      - 72
8 - 192        00
9 - 216
```

## Order of Operations

Children will learn to use the rules of BIDMAS to help them recognise the rules of operations. Instead of solving this equation from left to write, they will begin with the first operation prevalent in the calculation from the list BIDMAS.

**6 times table**
1 x 6 =  6
2 x 6 = 12
3 x 6 = 18
4 x 6 = 24
5 x 6 = 30
6 x 6 = 36
7 x 6 = 42
8 x 6 = 48
9 x 6 = 54
10 x 6 = 60
11 x 6 = 66
12 x 6 = 72
Timestables.co.uk

**9 times table**
1 x 9 =   9
2 x 9 =  18
3 x 9 =  27
4 x 9 =  36
5 x 9 =  45
6 x 9 =  54
7 x 9 =  63
8 x 9 =  72
9 x 9 =  81
10 x 9 =  90
11 x 9 =  99
12 x 9 =108
Timestables.co.uk

**8 times table**
1 x 8 =  8
2 x 8 = 16
3 x 8 = 24
4 x 8 = 32
5 x 8 = 40
6 x 8 = 48
7 x 8 = 56
8 x 8 = 64
9 x 8 = 72
10 x 8 = 80
11 x 8 = 88
12 x 8 = 96
Timestables.co.uk

## Useful websites

https://www.bbc.co.uk/bitesize/topics/zfq7hyc - BBC Bitesize - This website has some useful links and explanations of the terms prime number, factor and multiple.
https://www.khanacademy.org/math/pre-algebra/pre-algebra-factors-multiples/pre-algebra-factors-mult/v/finding-factors-and-multiples Khan Academy - Great teaching tool and opportunities to practise.

### What can my child do at home?

✓ Have a look through the Knowledge Organiser and study the key terminology, ensuring that they understand what they mean.
✓ Use the useful links above, particularly if there is a unit that you find more difficult to grasp
✓ Learn weekly times tables and number facts. These will be tested on the same day as spellings.
✓ Login to Mathletics to revise topics taught.