Maths Knowledge Organiser

Year 6: Four Operations

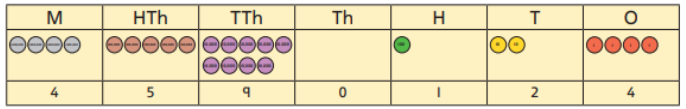
Prior Knowledge (Y5 Unit 3, 5, 7)

- Add and subtract whole numbers with more than 4 digits
- Use formal written methods (columnar)
- Using rounding to estimate and check
- Add and subtract numbers mentally
- Solve addition and subtraction multi-step problems
- Decide which operations/methods to use and why
- Find all factor pairs of a number, and common factors of two numbers
- Solve problems involving multiplication and division, including scaling by simple fractions
- Recognise and use square numbers and cube numbers
- Recall prime numbers up to 19

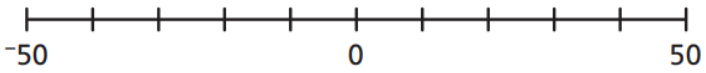
Structures and Representations

For column methods and short/long division, see below

Place Value Grid



Number Line



Grid Method - Multiplication

	2,000	300	40	5
4	8,000	1,200	160	20

Order of Operations

B	Brackets	$10 \times (4 + 2) = 10 \times 6 = 60$
O	Order	$5 + 2^2 = 5 + 4 = 9$
D	Division	$10 + 6 \div 2 = 10 + 3 = 13$
M	Multiplication	$10 - 4 \times 2 = 10 - 8 = 2$
A	Addition	$10 \times 4 + 7 = 40 + 7 = 47$
S	Subtraction	$10 \div 2 - 3 = 5 - 3 = 2$

- add, subtract
- sum, total, difference
- multiply, multiplication
- product, approximation
- divide, division
- short/long division
- factor, multiple
- divisor, dividend, remainder
- inverse grid method
- fraction, simplify
- numerator, denominator

Add and Subtract Whole Numbers

Column Methods

	4	5	8	6	4
+	2	3	4	9	7
	6	9	3	6	1
		1	1	1	

Starting with the ones, add each column in turn. Regroups tens, hundreds, thousands, ten thousands as required.

	3	5	$^{6}\not{7}$	$^{13}\not{4}$	$^{1}2$
-		3	4	7	6
	3	2	2	6	6

Starting with the ones, subtract each column in turn. Exchange tens, hundreds, thousands and/or ten thousands as required.

Multiply up to 4-Digit x 2-Digit

Long Multiplication

1	$\not{3}$	$\not{2}$	
	1	5	4
×		2	6
	9	2	4
3	0	8	0
4	0	0	4
1	1		

Starting with the ones.

154 x 6 = 924
154 x 20 = 3080
3080 + 924 = 4004

*The green zero is a **placeholder** which shows that in the second half of the calculation, we are multiplying by 20, not 2.*

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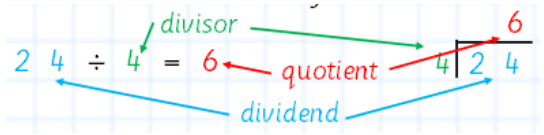
Divide 4-Digit by 2-Digit Numbers



Short Division

Start from the left.

		4	4	0	5
12	5	5 2	4 8	6	6 0

5 ÷ 12 = 0 r5
52 ÷ 12 = 4 r4
48 ÷ 12 = 4
6 ÷ 12 = 0 r6

Long Division

1 x 14 = 14
2 x 14 = 28
3 x 14 = 42
4 x 14 = 56

```
      0 3 2 1  r 4
   ┌──────────
14 ) 4 4 9 8
     4 4
   - 4 2
     0 2 9
       - 2 8
         1 8
       - 1 4
         ---
           4
```

Factors, Multiples & Prime Numbers

Factors of 48

1	2	3	4	6	8	12	16	24	48

Factors of 30

1	2	3	5	6	10	15	30

Common factors: 1, 2, 3, 6

Factors are whole number that can multiply by other whole numbers to make the product.

Multiples of 3

3	...	18	21	24	...	39	42

Multiples of 7

7	14	21	28	35	42

Common multiples: 21, 42...

A **multiple** is a number which can be divided by another number without a remainder.

A **prime number** is a whole number greater than 1 which is divisible by only itself and 1.

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	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Top Tips!

- 2 is the only even prime number.
- There are no prime numbers that end in 5, except for 5.
- The digits can't add up to 3, except 3.

Squares and Cubes

Square numbers result from a number being multiplied by itself (e.g. 5 × 5 = 25):

1, 4, 9, 16, 25, 36, 49, 64, 81, 100

Cube numbers result from a number being multiplied by itself twice (2 × 2 × 2 = 8):
1, 8, 27, 64, 125

Multi-step Problems, Estimate, Check

1) One drink costs £1.67 and I buy 4. 2) If I pay with a £20 note, how much change will I get?

1) Read the question and break it down into parts.

2) Work out the calculation £20- (4 x £1.67)

3) Solve each part. £1.67 x 4 = £6.68
£20—£6.68 =£13.32

```
  1 . 6 7
x       4
  6 . 6 8

  2 0 . 0 0
-   6 . 6 8
  1 3 . 3 2
```

4) Check your answer fits the question.
£1.67 + £1.67 + £1.67 + £1.67 + **£13.32** = £20

Check

```
30,127 + 2,953
30,000 + 3,000 = 33,000
30,127 + 2,953 = 33,080
```