

# Four operations Knowledge Organiser

Maths

Y6

## Key Vocabulary:

add, total, subtract, difference, exchange, place value, sum, more, altogether, difference, less, minus, column method, estimate, inverse, factors/factor pairs, multiply, divide, array, multiples, prime numbers, common multiples, divisible, composite number, square number, cube number, remainder, partition, order of operations

## Add and subtract integers – column method

When using the column method, always start with the ones column and move through each column to the left in turn. Don't forget to line up the place value columns and exchange where you need to.

**Addition**

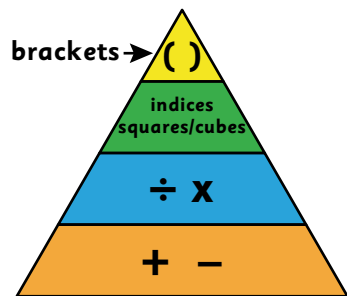
	TTh	Th	H	T	O
		1	2	8	7
+		1	6	6	9
		2	9	5	7
			1	1	1

**Subtraction**

	Th	H	T	O
	8	2	9	10
-	5	1	5	9
	3	0	4	1

## Order of operations

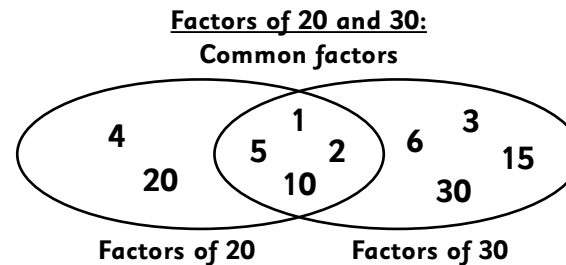
Calculations must be carried out in a certain order to get to the correct answer. These two diagrams are helpful when remembering that order.



- Brackets** ( )
- Indices**  $3^2$
- Division** ÷
- Multiplication** ×
- Addition** +
- Subtraction** -

## Common factors

Common factors are numbers that can evenly divide into two or more numbers.



## Common multiples

Common multiples are numbers that are shared in two or more times-tables.

For example:

**Multiples of 6:**

6	12	18	24	30	36	42	48
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**Multiples of 9:**

9	18	27	36	45	54	63	72
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18 and 36 are common multiples of 6 and 9.

## Square numbers

When a number is multiplied by itself, the answer is called a square number. E.g.  $3 \times 3 = 9$ .  
 Others include: 1, 4, 9, 16, 25, 36, 49, 64, 81, 100

## Primes to 100

Prime numbers have exactly two factors: 1 and itself. The opposite of a prime number is a composite number.

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

## Prime factors

Prime factors are the factors of a number that are prime numbers.

For example:

The factors of 20 are 1, 2, 4, 5, 10 and 20.

The **prime factors** are 2 and 5.

## Cube numbers

When a number is multiplied by itself twice, the answer is called a cube number. E.g.  $3 \times 3 \times 3 = 27$ .

Others include: 1, 8, 27, 64, 125, 216, 343, 512

## Multiply up to a 4-digit number by a 2-digit number

Multiplication is commutative, meaning it does not matter in which order you multiply the number. When you multiply numbers, always start from the ones and move to the left.

This is the same rule for multiplying by a 2-digit number, start with the ones and write the answer underneath.

Next, multiply by the tens and write the answer underneath.

Then, add the two answers together.

			H	T	O	
			3	2	4	5
x				3	6	
	1	9	4	7	0	
	9	7 <sup>1</sup>	3 <sup>2</sup>	5 <sup>3</sup>	0	
	1	1	6 <sup>1</sup>	8 <sup>1</sup>	2	0
		1		1		

## Short division

Use short division when you are dividing by 1-digit. Always start from the left.

	0	6	2	6	r3
9	5	6	<sup>2</sup> 3	<sup>5</sup> 7	

The 'r' means 'remainder', this is the amount left over that cannot be equally divided.

## Long division

Use long division when dividing by numbers larger than 10. E.g  $956 \div 11$

- List the multiples of 11.
- Work out how many 11s go into 95.  $8 \times 11$
- Multiply  $8 \times 11$  and subtract this from 95. Pull down the remaining 6.
- Repeat step 2. How many 11s go into 76? 6
- Subtract 66 from 76.

If you have anything left over after subtracting that cannot be divided by the number you are dividing by, this becomes the remainder.

			8	6	r10
1	1	<del>8</del>	15	6	
	-	8	8		
		0	7	6	
	-		6	6	
			1	0	

## Rules of divisibility

Knowing some rules about divisibility can help solve division problems.

A number is divisible by:

- 2 if the last digit is 0, 2, 4, 6 or 8
- 3 if the sum of the digits is divisible by 3
- 4 if halving it gives an even number
- 5 if the last digit is 0 or 5
- 6 if it is divisible by both 2 and 3
- 8 if halving it twice gives an even number
- 9 if the sum of the digits is divisible by 9
- 10 if the ones digit is 0

A 2-digit number is divisible by 11 if both digits are the same.

## Division using factor

You can make division easier by dividing using factor pairs of the number you are dividing by.

E.g.

$$420 \div 60$$

A factor pair of 60 is  $6 \times 10$ .

$$420 \div 10 = 42$$

$$42 \div 6 = 7$$

$$\text{So, } 420 \div 60 = 7$$

## Solving multiplication and division problems

To solve problems involving multiplication and division, you can use the following tools:

### Estimate

Estimate an answer first to know whether your answer is correct.

### Mental calculations

Change the order of multiplications to make them easier to work with:

$$25 \times 45 \times 4 = 25 \times 4 \times 45 = 100 \times 45 = 4,500$$

### Adjust numbers

Adjust numbers by adding or subtracting.

$$1,599 + 629 \text{ adjusts to } 1600 + 630 = 2,230$$

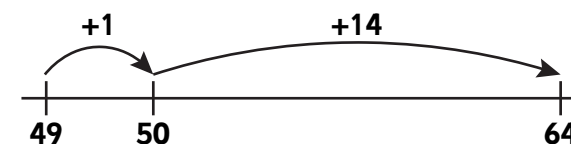
$$2,230 - 2 = 2,228 \text{ so } 1,599 + 629 = 2,228$$

### Use known facts

$$\text{If } 236 \times 10 = 2,360,$$

$$\text{then } 236 \times 9 = 2,360 - 236 = 2,124$$

### Use number lines to count on



### Estimating on a number line

Look carefully at the intervals and what they represent. Divide the interval again to estimate where a number should go.

