## Multiplication methods

Less effective method especially for bigger multiplication

| | H | T | O |
|---|---|---|---|
| | 1 | 8 | 7 |
| × | | | 9 |

Long multiplication (column)

| × | 100 | 80 | 7 |
|---|---|---|---|
| 9 | | | |

Grid method

1 8 7
1 8 7
1 8 7
1 8 7
1 8 7
1 8 7
1 8 7
1 8 7
+ 1 8 7

Repeated addition

**Multiplication with decimals**

Perform multiplications as integers
eg 0.2 x 0.3 → 2 x 3

Make **adjustments** to your answer to match the question: 0.2 x 10 = 2
0.3 x 10 = 3
Therefore 6 ÷ 100 = 0.6

**Estimations:** Using estimations allows a 'check' if your answer is reasonable

## Division methods

3584 ÷ 7 = 512

Short division

$$7 \overline{)\,3\,{}^{3}5\;8\;{}^{1}4} \quad 5\;1\;2$$

Complex division

÷ 24 = ÷ 6 ÷ 4
Break up the divisor using factors

**Division with decimals**

The placeholder in division methods is essential – the decimal lines up on the dividend and the quotient

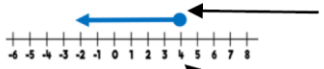
24 ÷ 0.02 → 24 ÷ 0.2 → 240 ÷ 2

All give the same solution as represent the same proportion
Multiply the values in proportion until the divisor becomes an integer

## Perform calculations that cross zero

Number lines are useful to help you visualise the calculation crossing 0

4 – 6 = -2



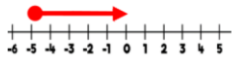
Use the number line to guide subtraction of 6

Start at 4

-5 + 5 = 0

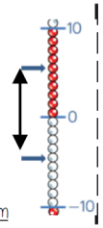
Rearrangements of the same equation

5 – 5 = 0



Find the difference between 6 and -4

From 6 to 0
6
From 0 to -4
4



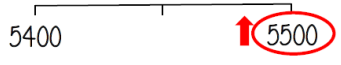

10 beads between them

## Round to powers of 10 and 1 sig figure

R If the number is halfway between we "round up"

5495 to the nearest 1000


5475 to the nearest 100

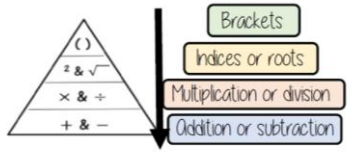



5475 to the nearest 10


370 to 1 significant figure is 400
37 to 1 significant figure is 40
3.7 to 1 significant figure is 4
0.37 to 1 significant figure is 0.4
0.00037 to 1 significant figure is 0.0004

Round to the first non-zero number

## Order of operations

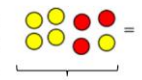



If you have multiple operations from the same tier work from left to right

eg 10 – 3 + 5 → 10 – 3 → 7 + 5

6 x 4 + 8 x 2
24 + 16 = 40

## Subtract directed numbers

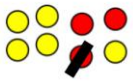
Representation for calculation

2 "Subtract" – means take away or remove

2 - - 1 = 3

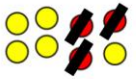
Take away one

Start with the representation of 2



= 3

2 - - 3 = 5



= 5

Generalisation

- - = +

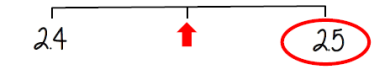
## Round to decimal places

2.46192

Focus on the numbers **after** the decimal point

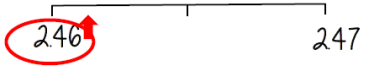
"To 1dp" – to one number after the decimal
"To 2dp" – to two numbers after the decimal

2.46192 (to 1dp) - Is this closer to 24 or 25




2.4 6192 This shows the number is closer to 25

2.46192 (to 2dp) - Is this closer to 246 or 247




2.46 192 This shows the number is closer to 246

## Add directed numbers


2 + - 4 = -2

Zero pair
(-1 + 1 = 0)

Two "– 1" left
= -2

8 + -3 = 5

Partitioning

8 + -3 = 5

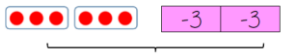
5 + 3 + - 3 = 5

Partition the value to create a zero pair calculation

Generalisation

+ – = –

## Multiply/ Divide directed numbers



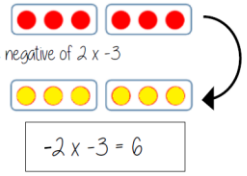

Two representations of the same calculation

2 x -3 = -6

**Negative, Negative calculation**

-2 x -3

This is the negative of 2 x -3



The act of making counters into their negative is turning them over

-2 x -3 = 6

Divisions are the inverse operations

## Estimate the calculation

Round to 1 significant figure to estimate

4.2 + 6.7 ≈ 4 + 7 ≈ 11 This is an **overestimate** because the 6.7 was rounded up more

The equal sign changes to show it is an estimation

21.4 x 3.1 ≈ 20 x 3 ≈ 60 This is an **underestimate** because both values were rounded down

It is good to check all calculations with an estimate in all aspects of maths – it helps you identify calculation errors.

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