

# Maths Grade 2

## Knowledge Organiser

### 2.2 Multiply & divide by 10, 100, 1000

- **By moving the decimal point**

To **multiply** by 10 move the decimal point ONE place RIGHT

e.g.  $3.4 \times 10 = 34$

To **divide** by 10 move the dp ONE place LEFT

e.g.  $3.4 \div 10 = 0.34$

- **By moving the digits**

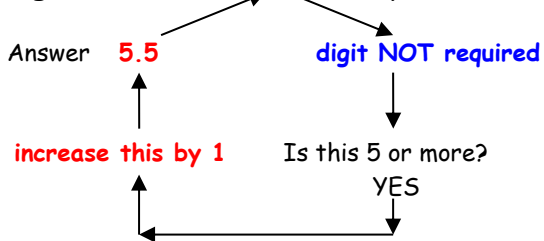
To multiply by 10 move the dp ONE place RIGHT

e.g.  $3.52 \times 10 = 35.2$

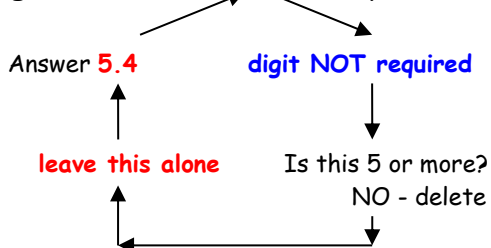
### 2.1 Rounding decimals

- Look at the digit required
- Look at the first digit NOT required

e.g. To round 5.**47** to 1dp



e.g. To round 5.**43** to 1dp



### 2.2 Equivalence of fractions and decimals

- **Fractions**

They must have the same denominator

e.g.  $\frac{5}{6}$      $\frac{7}{12}$      $\frac{2}{3}$      $\frac{3}{4}$

↓        ↓        ↓        ↓

$\frac{10}{12}$      $\frac{7}{12}$      $\frac{9}{12}$      $\frac{8}{12}$

Now the fractions can be ordered

- **Decimals**

Give them all the same number of digits

e.g. 0.3,    0.304,    0.32,    0.33

↓        ↓        ↓        ↓

0.300    0.304    0.320    0.330

Now the decimals can be ordered

- **Convert between fractions & decimals**

#### Decimals to fractions

**2.475**

↓        ↓        ↓

$\frac{4}{10}$     ↓        ↓

$\frac{7}{100}$     ↓

$\frac{5}{1000}$

#### Fractions to decimals - by changing

e.g.  $\frac{4}{5} = \frac{8}{10} = 0.8$

e.g.  $\frac{9}{12} = \frac{3}{4} = 0.75$

#### Fractions to decimals - by dividing

e.g.  $\frac{3}{8} = 3 \div 8 = 0.375$

## 2.3 Order of operations

**B**racket

**I**ndices

**D**ivide

**M**ultiply

**A**dd

**S**ubtract

} Do these in the order they appear  
} Do these in the order they appear

e.g.  $3 + 4 \times 6 - 5 = 22$   
          ↑  
          first

## 2.4 Powers and roots

$4^2$  - we say 4 squared or the square of 4

- It means  $4 \times 4 = 16$

$2^3$  - we say 3 cubed or the cube of 3

- It means  $2 \times 2 \times 2 = 8$

$3^4$  - we say 3 to the power of 4

- It means  $3 \times 3 \times 3 \times 3 = 81$

The inverse operation for 'power' is 'root'

$$\sqrt{16} = 4$$

$$\sqrt[3]{8} = 2$$

$$\sqrt[4]{81} = 3$$

There are keys on the calculator to all of these

## 2.5 Simplify fraction

See what number divides exactly into both the numerator and denominator

$$\text{e.g. } \frac{8}{12} \xrightarrow{\div 4} \frac{2}{3}$$

$$\text{e.g. } \frac{15}{40} \xrightarrow{\div 5} \frac{3}{8}$$

## 2.5 Simplify Ratio

- How it is written



Yellow : Red

$$= 2 : 6$$

- How it can be simplified



Yellow : Red

$$= 1 : 3$$

- Simplify by cancelling

Examples

$$2^{+2} : 6^{+2} = 1 : 3$$

$$10^{+5} : 15^{+5} = 2 : 3$$

## 2.6 Fractions

Add & subtract with same denominator

e.g.

$$\frac{2}{3} + \frac{2}{3} = \frac{4}{3} = 1\frac{1}{3}$$

Multiply is just repeated addition

e.g.

$$2 \times \frac{2}{3} = \frac{2}{3} + \frac{2}{3} = \frac{4}{3} = 1\frac{1}{3}$$

## 2.7 Fraction of quantity with calculator

- $\frac{4}{5}$  means  $\div 5 \times 4$

e.g. To find  $\frac{4}{5}$  of £40

$$£40 \div 5 \times 4 = £40$$

## E7 Percentage of quantity - NO calculator

Use	50%	10%	1%
	↓	↓	↓
	÷2	÷10	÷100

## 2.7 Percentage of quantity-with calculator

- **Change the percentage to a decimal**

$$\begin{array}{ll} \text{e.g. } 8\% \text{ of } \pounds 240 & 12 \frac{1}{2}\% \text{ of } 80\text{kg} \\ = 0.08 \times 240 & = 0.125 \times 80 \\ = \underline{\pounds 19.20} & = \underline{10\text{kg}} \end{array}$$

$$\begin{array}{l} 80\% \text{ of } 52 \text{ litres} \\ = 0.8 \times 52 \\ = \underline{41.6 \text{ litres}} \end{array}$$

## 2.8 Decimals

**Add & subtract-** Line up the decimal points

**Multiply** - take out decimal point

Multiply

Put decimal point back in

e.g.  $3.2 \times 0.4$

- $32 \times 4$  (remove decimal points)
- 128 (multiply)
- $1.28$  (put decimal point back in-2 decimal places)

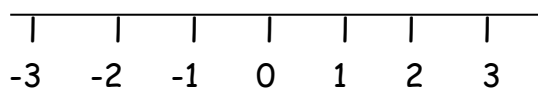
**Divide** - make divisor into a whole number

Multiply both numbers

e.g.  $2.84 \div 0.2$  (multiply both numbers by 10)

- $28.4 \div 2$
- 14.1

## 2.9 Order negative numbers



$2 > -2 \rightarrow$  We say 2 is bigger than -2

$-1 < 3 \rightarrow$  We say -1 is less than 3

## E9 Add & Subtract Negative numbers

Remember the rules:

- When subtracting go down the number line
- When adding go up the number line
  
- $8 + - 2$  is the same as  $8 - 2 = 6$
- $8 - + 2$  is the same as  $8 - 2 = 6$
- $8 - - 2$  is the same as  $8 + 2 = 10$

## 2.10 Number patterns

Look to see how numbers are connected

- **Multiples**

Multiples of 6 are: 6, 12, 18, 24, 30...

- **Factors**

Factors of 6 are: 1, 6, 3, 2

- **Prime numbers**

Prime numbers have only TWO factors

2, 3, 5, 7, 11, 13, 17, 29, 31, 37 .....

- **Sequences**

1, 4, 9, 16, 25, 36 ... are all square numbers

1, 8, 27, 64, 125 ... are all cube numbers

1, 4, 7, 10, 13, 16 ... increase by 3 each time

## 2.11 Manipulate expressions

**Only like terms can be added & subtracted**

e.g.  $a + 2b$  cannot be added

$a^2 - 2a$  cannot be subtracted

$$a + 2a = 3a$$

$$5a^2 - 2a^2 = 3a^2$$

**Terms can be simplified when multiplying**

e.g.  $a \times b = ab$

$$2a \times 3a = 6a^2$$

## E2.12 Solve equations - by balancing

e.g.  $2x - 3 = 7$  (add 3 to each side)

$$2x = 10 \text{ (divide both sides by 2)}$$

$$\underline{x = 5}$$

e.g.  $\frac{x}{2} + 1 = 5$  (subtract 1 from each side)

$$\frac{x}{2}$$

$$= 4 \text{ (multiply both sides by 2)}$$

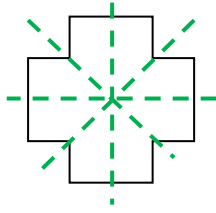
$$\frac{x}{2}$$

$$\underline{x = 8}$$

## 2. 13 Symmetries

- **Order of Line Symmetry**

this is the number of times a shape can be folded so that one side falls exactly onto the other side



This shape has line symmetry ORDER 4

- **Order of Rotational Symmetry**

this is the number of times a shape falls into its outline in one complete turn

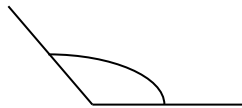
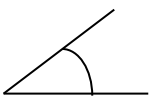


A parallelogram has rotational symmetry order 2

## 2.14 Angles

### Types of angles

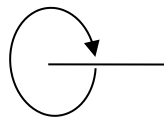
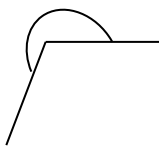
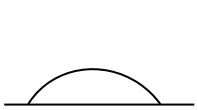
**Acute** (less than  $90^\circ$ )      **Right** (Exactly  $90^\circ$ )      **Obtuse** (Between  $90^\circ$  &  $180^\circ$ )



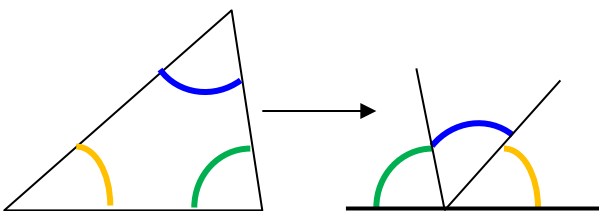
**Straight line** ( $180^\circ$ )

**Reflex** (Between  $180^\circ$  &  $360^\circ$ )

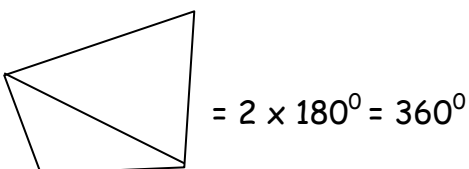
**Complete turn** ( $360^\circ$ )



**Angles of a triangle**- add up to  $180^\circ$



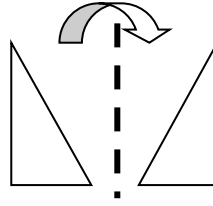
**Angles of a quadrilateral** add up to  $360^\circ$



## 2.15 Transform Shapes

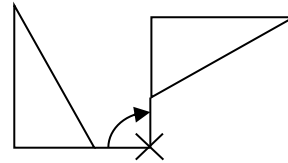
- **Reflection**

A shape flipped over a line



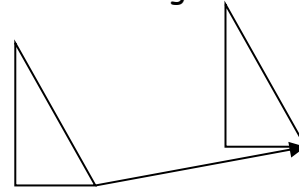
- **Rotation**

A shape turned round a point



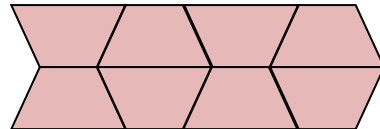
- **Translation**

A shape moved along a line



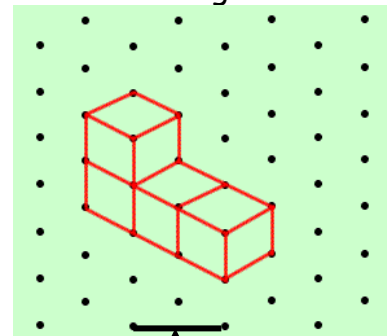
- **Tessellation**

Shapes are joined without gaps or overlapping  
e.g.



## 2.16 2D drawings of 3D shapes

- **Isometric drawing**

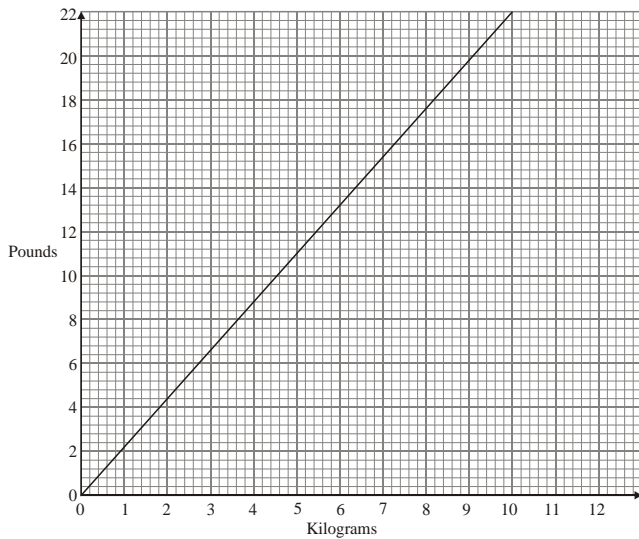


Never join the dots horizontally

- **Nets**

## 2.17 Read & interpret conversion graphs

e.g. To convert kg and pounds



- Draw lines on to take readings
- Read the scale carefully

e.g. Read & interpret timetables

Station	Time of leaving
Peterborough	08 44
Huntingdon	09 01
St Neots	09 08
Sandy	09 15
Biggleswade	09 19
Arlesey	09 24

e.g. Time taken to travel from Peterborough to Sandy

0844      0900      0915

16min + 15min = 31min

## 2.18 Units of measure

- Metric units

Length	Weight	Capacity
10mm = 1cm	1000g = 1kg	1000ml = 1 litre
100cm = 1m		10ml = 1 centilitre
1000m = 1km		

- Imperial units

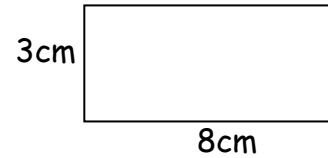
Length	Weight	Capacity
1 inch = 2.5cm	2.2 pounds ≈ 1kg	1 gallon ≈ 4.5 litres
1 foot = 30cm		
1 mile ≈ 1.6km		

## 2.19 Area and perimeter of rectangle

Area is the amount of space inside the outline of a shape

Perimeter is the length of the outline of a shape

- Area of rectangle = length × width



$$\begin{aligned} \text{Area of rectangle} &= l \times w \\ &= 8 \times 3 \\ &= \underline{24\text{cm}^2} \end{aligned}$$

- Perimeter of the rectangle

$$\begin{aligned} \text{Perimeter} &= 3 + 8 + 3 + 8 \text{ OR } 2 \times 3 + 2 \times 8 \\ &= \underline{22\text{cm}} \end{aligned}$$

## 2.20 Probability

- Calculate probability

$$P(\text{event}) = \frac{\text{No. of outcomes which give the event}}{\text{Total number of outcomes}}$$

- Probability of an event NOT happening

If  $p(\text{event}) = p$

$$P(\text{event NOT happening}) = 1 - p$$

e.g. If  $p(\text{rain}) = 0.3$

$$p(\text{no rain}) = 1 - 0.3 = 0.7$$

## 2.21 Averages and Range

Mode - most frequent measure

Median - middle measure (put them in order)

Mean - total of measures ÷ no. of measures

Range - Highest minus lowest measure

- Range measures how spread out the measures are
- Mode, median & mean gives an average
- The range and one of the averages is used to compare distributions

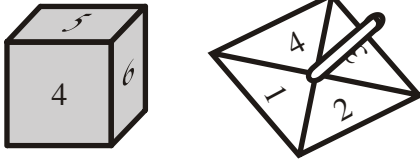
## 2.22 Find all possible outcomes

Outcomes can be presented:

- In a list
- In a table or sample space

### Example of a sample space

To show all possible outcomes from spinning a spinner and rolling a dice



		Dice						
		+	1	2	3	4	5	6
Spinner	1	2	3	4	5	6	7	
	2	3						
	3	4						
	4	5						

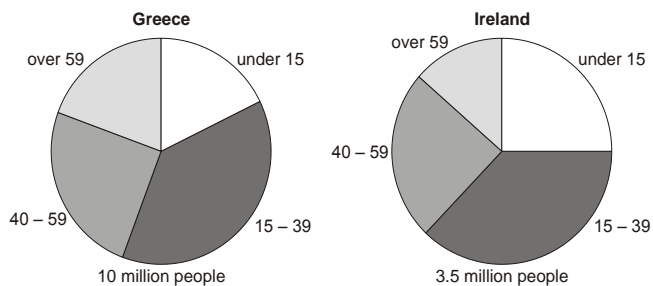
## 2.23 Construct a pie chart

Transport	Frequency	Angle
Car	13 x 9	117°
Bus	4 x 9	36°
Walk	15 x 9	135
Cycle	8 x 9	72

Total frequency = 40

$$360^\circ \div 40 = 9^\circ \text{ per person}$$

## 2.23 Interpret pie charts



- Here we are not told how many people are in the survey
- We can therefore only comment on proportion by comparing the sizes of sectors in each pie chart

e.g. there is a larger proportion of the population under 15 in Ireland than Greece

**It does not mean there are more people**