# Band 5 Knowledge Organiser

## 5/1 Place value in numbers to 1million

The position of the digit gives its size

| Millions | Hundred thousands | Ten thousands | thousands | hundreds | tens | ones |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Example
The value of the digit '1' is 1 000 000
The value of the digit '2' is 200 000
The value of the digit '3' is 30 000
The value of the digit '4' is 4000

## 5/2 Round numbers to nearest 10, 100, 1000, 10000, 100000

**Example** 1- Round 342 679 to the nearest 10 000

- Step 1 – Find the 'round-off digit' - 4
- Step 2 – Look one digit to the right of 4 - 2

5 or more? NO – leave 'round off digit' unchanged
- Replace following digits with zeros

ANSWER – 340 000

**Example** 2- Round 453 679 to the nearest 100 000

- Step 1 – Find the 'round-off digit' - 4
- Step 2 – Look one digit to the right - 5

5 or more? YES – add one to 'round off digit'
- Replace following digits with zeros

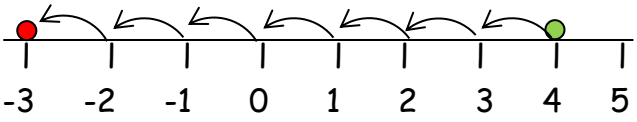
ANSWER – 500 000

## 5/3 Negative numbers

A number line is very useful for negative numbers.

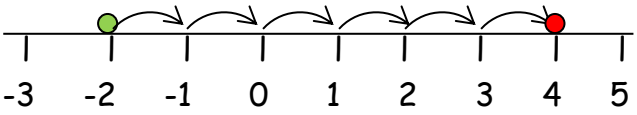
- The number line below shows:

4 – 7 = -3




- The number line below shows:

-2 + 6 = 4




## 5/4 Roman Numerals

The main symbols:

I = 1
V = 5
X = 10
L = 50
C = 100
D = 500
M = 1000

Other useful ones:
IV = 4
IX = 9
XL = 40
XC = 90

MMXVI = 1000 + 1000 + 10 + 6 = 2016
MCMXCVIII = 1000 + 900 + 90 + 8 = 1998

## 5/5 Written methods for addition and subtraction

Add – e.g. 74735 add 22386

| | TTh | Th | H | T | O |
|---|---|---|---|---|---|
| | 7 | 4 | 7 | 3 | 5 |
| | 2 | 2 | 3 | 8 | 6 |
| + | | 1 | 1 | 1 | ← |
| | 9 | 7 | 1 | 2 | 1 |

Miss a line to carry numbers from one column to the next when needed.

Subtract – e.g. 82476 take away 58637

| | TTh | Th | H | T | O |
|---|---|---|---|---|---|
| | 7 | $^{1}1$ | | | 6 |
| | ~~8~~ | ~~2~~ | $^{1}4$ | ~~7~~ | $^{1}6$ |
| | 5 | 8 | 6 | 3 | 7 |
| - | | | | | |
| | 2 | 3 | 8 | 3 | 9 |

Miss a line to borrow or exchange numbers when needed.

With this method, you cannot take a bigger number from a smaller number. 6 - 7 would equal -1 which does not work here. So we borrow or exchange from the next column. We turn 7 tens into 6 tens and 6 ones into 16 ones.

## 5/6 Mental methods for addition

- **Start from LEFT to RIGHT**

Example 1 – think of:

**45** + **3**2 as **45** + **3**0 + 2

- But in your head say:

**45 75 77**

Example 2 – think of:

**1236** + **4**15 as **1236** + **400** + **10** + 5

- But in your head say:

**1236 1636 1646 1651**

## 5/6 Mental methods for subtraction

Example 1 – think of:

**56** – **3**2 as **56** – **30** – 2

- But in your head say:

**56 26 24**

Example 2 – think of:

**1236** - **4**15 as **1236** - **400** - **10** - 5

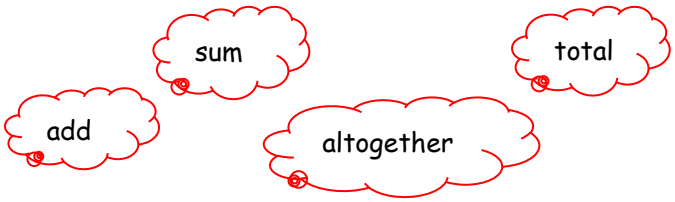
- But in your head say:

**1236 836 826 821**

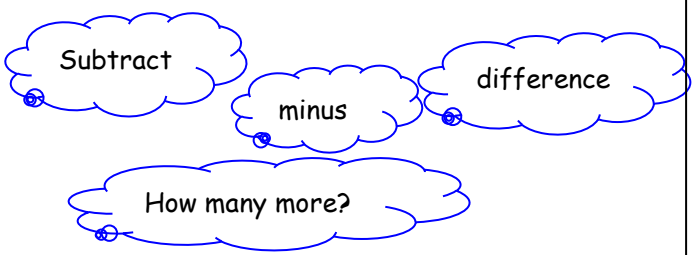
## 5/7 Multi-step problems

**Based upon 5/6.**

**Words associated with addition:**




Words associated with subtraction:




## 5/8 Multiples & factors

- **FACTORS** are what divides exactly into a number

e.g. Factors of 12 are:

| | |
|---|---|
| 1 | 12 |
| 2 | 6 |
| 3 | 4 |

Factors of 18 are:

| | |
|---|---|
| 1 | 18 |
| 2 | 9 |
| 3 | 6 |

The common factors of 12 & 18 are: 1, 2, 3, 6,
The Highest Common Factor is: 6

- **MULTIPLES** are the times table answers

e.g. Multiples of 5 are:
5 10 15 **20** 25 .....

Multiples of 4 are:
4 8 12 16 **20** .....

The Lowest Common Multiple of 5 and 4 is: **20**

## 5/9 Prime numbers

**Prime numbers have only TWO factors**

The factors of 12 are:
**1, 2, 3, 4, 6, 12**

**12 is NOT prime**
**It is composite**

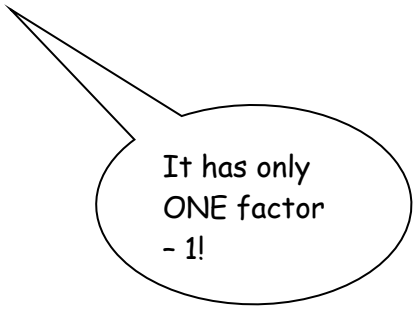
Factors of 7 are:
**1, 7**

**7 IS prime**

**Prime numbers to 20**

| | | | | |
|---|---|---|---|---|
| 1 | **2** | **3** | 4 | **5** |
| 6 | **7** | 8 | 9 | 10 |
| **11** | 12 | **13** | 14 | 15 |
| 16 | **17** | 18 | **19** | 20 |

**The number '1' is NOT prime**



## 5/10 Multiplication using a formal method

- **By a ONE-DIGIT number**

Example: 6342 x 7

| TTh | Th | H | T | O |
|---|---|---|---|---|
| | 3 | 8 | 3 | 4 2 |
| | | | | 7 |
| x | | 5 | 2 | 2 1 |
| 2 | 6 | 8 | 3 | 9 4 |

Like addition, miss a line to carry numbers from one column to the next when needed.

- **By a TWO-DIGIT number**

e.g. 152 x 34

Multiply by the 4 (ones) first then multiply by the 30 (tens).

| H | T | O |
|---|---|---|
| | 1 | 5 2 |
| | | 3 4 |
| x | | |
| | 6 | 0 8 |
| | 4 | 5 6 0 |
| + | | 1 |
| 5 | 1 | 6 8 |

When multiplying by a tens, a place holder is needed as the number is 10 times larger.

Use this in your book to help you:

O x O – ones x ones
O x T – ones x tens
O x H – ones x hundreds
PH – Place holder as now multiplying by tens
T x O = tens multiplied by ones
T x T = tens multiplied by tens
T x H = tens multiplied by H

If you have hundreds, then continue the pattern – but TWO place holders would be need as you are multiplying by 100.

## 5/10 Division using a formal method

- **By a ONE-DIGIT number**

e.g. 9138 ÷ 6

$$6\overline{)9^{3}1^{1}3^{1}8} \quad 1\,5\,2\,6$$

- **By a TWO-DIGIT number**

e.g. 4928 ÷ 32 **Long Division**

First write out key multiples:

1 x 32 = 32
2 x 32 = 64
5 x 32 = 160
10 x 32 = 320

If you know 2 x 32 = 64, you know that 20 x 32 is 640.

If you know 5 x 32 = 160, you know that 50 x 32 is 1600.

If you know 10 x 32 = 320, you know that 100 x 32 is 3200.

$$\begin{array}{r} 0\,1\,5\,4 \\ 32\overline{)\,4\,9\,2\,8} \\ -\,3\,2\,0\,0 \quad \times 100 \\ \hline 1\,7\,2\,8 \\ -\,1\,6\,0\,0 \quad \times 50 \\ \hline {}^{0}\!\not{1}\,{}^{1}2\,8 \\ -\quad 6\,4 \quad \times 2 \\ \hline 0\,6\,4 \\ -\quad 6\,4 \quad \times 2 \\ \hline 0\,0 \end{array}$$

Take off chunks of the number using your key multiples.

Once you get to zero, or a number LOWER than the divisor, you need to add the chunks to find your answer.

4928 ÷ 32 = **154**

## 5/11 Multiply & divide by 10, 100, 1000

To **multiply** by 10 move the numbers ONE place RIGHT

| hundreds | tens | ones | • | tenths |
|---|---|---|---|---|
| | 3 | 5 | • | 6 |
| | | | • | |
| 3 | 5 | 6 | • | |

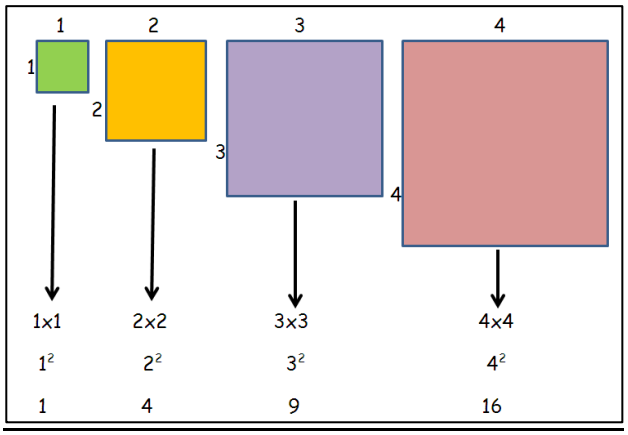
To **divide** by 10 move the numbers ONE place LEFT

| tens | ones | • | tenths |
|---|---|---|---|
| 3 | 5 | • | |
| | | • | |
| | 3 | • | 5 |

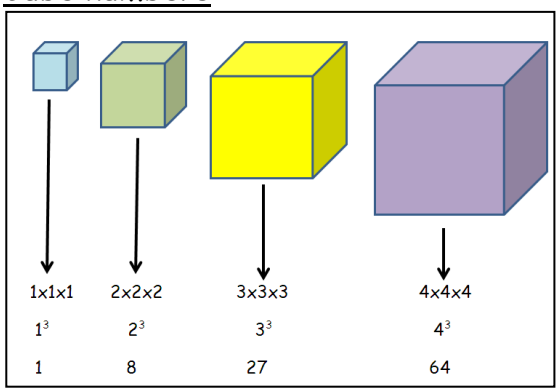
To multiply or divide by 100 move TWO places
To multiply or divide by 1000 move THREE places

## 5/12 Square & Cube numbers

### Square numbers




### Cube numbers




## 5/13 Fractions

- To compare fractions
  - the denominators **must** be the same

$\frac{2}{3}$ and $\frac{5}{6}$ →

$\frac{4}{6}$ and $\frac{5}{6}$ →

(x2) (x1)

SO $\frac{5}{6}$ is bigger than $\frac{2}{3}$

- To add and subtract fractions

**When the denominators are the same**

$\frac{5}{8} + \frac{1}{8} = \frac{6}{8}$

**Do not** add the denominators

$\frac{5}{8} - \frac{1}{8} = \frac{4}{8}$

**Do not** subtract the denominators

## 5/13 To add subtract fractions (cont)

**When the denominators are different – find the lowest common multiple (LCM)**

Right out the 4 and 8 times tables until you find the LCM.

4, 8, 12, 16, 20
8, 16, 24, 32, 40

$\frac{3}{8} + \frac{1}{4}$

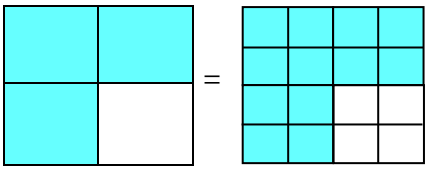
$\frac{3}{8} + \frac{2}{8} = \frac{5}{8}$

**(x1) (x2)**

**Whatever you do to the denominator, you do to the numerator!**

## 5/14 Equivalent fractions

These fractions are the same but can be drawn and written in different ways



$$\frac{3}{4} = \frac{12}{16}$$

$$\frac{3}{4}\ {}^{(\times 4)} = \frac{12}{16}$$

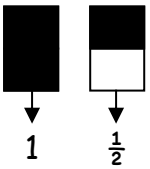
Fractions can also be divided to make the fraction look simpler – this is called CANCELLING or LOWEST FORM

$$\frac{12}{16}\ {}^{(\div 4)} = \frac{3}{4}$$

## 5/15 Mixed & improper fractions

- **An improper fraction is top heavy & can be changed into a mixed number**

$\frac{3}{2}$ can be shown in a diagram




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

Improper fraction — Mixed number

- **A mixed number can be changed back into an improper fraction**

$$1\overset{+1}{\underset{\times 2}{\frac{1}{2}}} = \frac{3}{2}$$

$$2\overset{+3}{\underset{\times 4}{\frac{3}{4}}} = \frac{11}{4}$$

Multiply the denominator by the integer (whole number) and then add the numerator.

2 x 1 = 2
2 +1 = 3

## 5/16 Multiply fractions

Multiply is the same as repeated addition

$$\frac{3}{4} + \frac{3}{4} + \frac{3}{4}$$

$$\frac{3}{4} \times 3 = \frac{3}{4} + \frac{3}{4} + \frac{3}{4} = \frac{9}{4} = 2\frac{1}{4}$$

OR

$$\frac{3}{4} \times 3 = \frac{9}{4} = 2\frac{1}{4}$$

Multiply the numerator by the whole number. Do not change the denominator.

## 5/17 Round decimals

Rules for rounding

1. **Find the 'round off' digit**
2. **Move one digit to its right**
3. **Is this digit 5 or more**
   Yes – add one to the round off digit
   No – don't change the round off digit

- **To the nearest whole number**

e.g. 1 – To round 5.62 to the nearest whole

'round off' digit — this digit is 5 or more

5.62 rounded to nearest whole = 6

e.g. 2 – To round 5.32 to the nearest whole

'round off' digit — this digit is NOT 5 or more

5.32 rounded to nearest whole = 5

- **To one decimal place**

e.g. 1 – To round 12.37 to 1 decimal place

'round off' digit — this digit is 5 or more

12.37 rounded to 1dp = 12.4

e.g. 2 – To round 12.32 to the nearest whole

'round off' digit — this digit is NOT 5or more

12.37 rounded to 1dp = 12.3

## 5/18 Read & write decimals

The value of each digit is shown in the table

| hundreds | tens | ones | • | tenths | hundredths | thousandths |
|---|---|---|---|---|---|---|
| 3 | 5 | 2 | • | 6 | 1 | 7 |
| 300 | 50 | 2 | | $\frac{6}{10}$ | $\frac{1}{100}$ | $\frac{7}{1000}$ |
| 352 | | | | $\frac{61}{100}$ | | $\frac{7}{1000}$ |
| 352 | | | | $\frac{617}{1000}$ | | |

## 5/18 Order decimals

Example – To order 0.28, 0.3, 0.216

- Write them under each other
- **Fill gaps with place holders (0)**
- Then order them
-

0.28 → 0.280
0.3 → 0.300
0.216 → 0.216

smallest largest
Order: 0.216 0.28 0.3

## 5/19 Decimal & Percentage equivalents

**Learn**

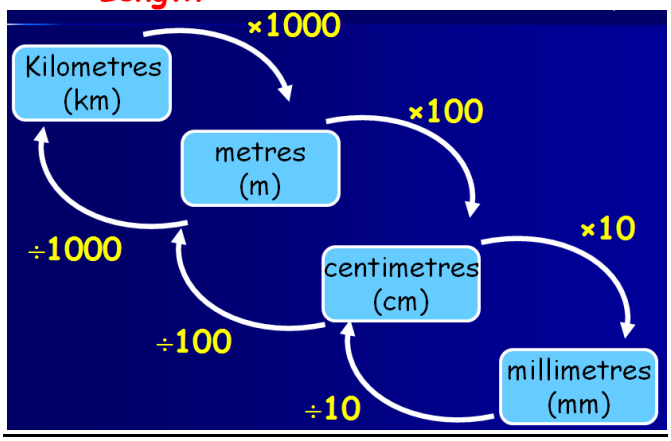
| Fraction | Decimal | Percentage |
|---|---|---|
| $\frac{1}{2}$ | 0.5 | 50% |
| $\frac{1}{4}$ | 0.25 | 25% |
| $\frac{1}{5}$ | 0.2 | 20% |
| $\frac{1}{10}$ | 0.1 | 10% |
| $\frac{1}{100}$ | 0.01 | 1% |

Some fractions have to be changed to be 'out of 100'

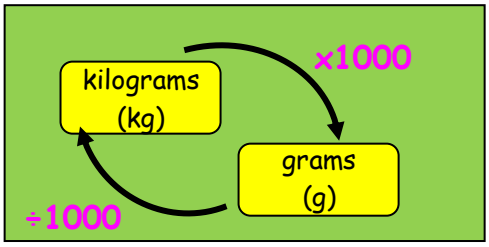
$\frac{11^{(x4)}}{25_{(x4)}} = \frac{44}{100} = 0.44 = 44\%$

## 5/20 Convert metric measure

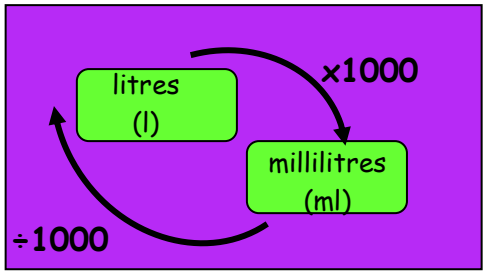
- **Length**




- **Mass or weight**

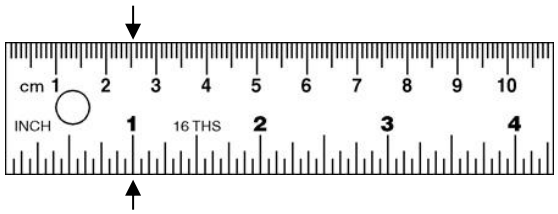



- **Capacity or volume**




## 5/20 Imperial measure

- 1 inch is about 2.5cm




- 1km = 1.6 miles or 5miles = 8km

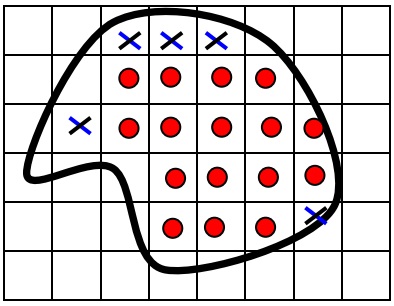
- 1kg is about 2.2pounds


- A litres of water's a pint and three quarters

- A gallon is about 4.5 litres

## 5/21 Area & Perimeter

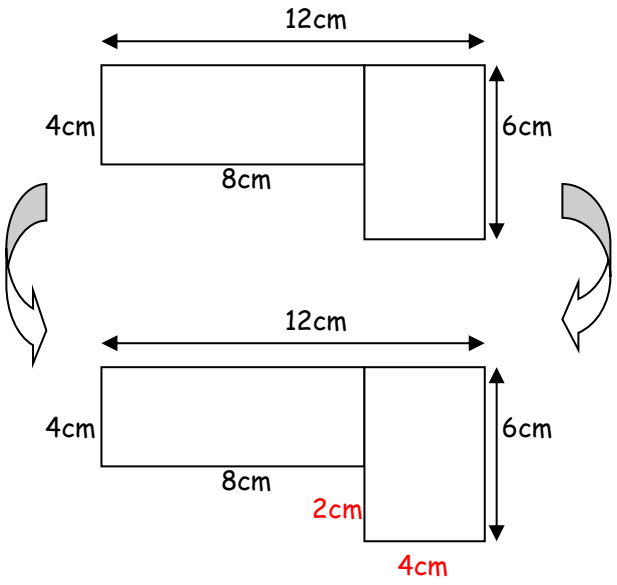
- **Estimate area**



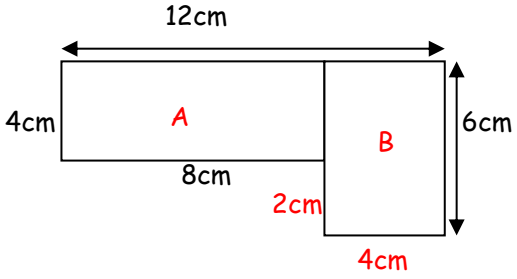
Number of whole squares(●) = 16
Number of ½ or more (×) = 5
Estimated area = 21 squares

- **Shapes composed of rectangles**

Put on all missing lengths first
For perimeter – ADD all lengths round outside
For area - split into rectangles & add them together




Perimeter = 12 + 6 + 4 + 2 + 8 + 4 = 36cm

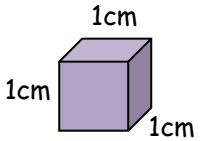



Area of shape = Area of A + B
= (8x4) + (6x4)
= 32 + 24
= 56cm²

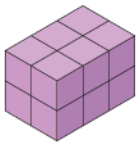
## 5/22 Volume

Volume is measured in cubes

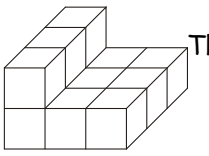
**The 1 cm cube**




The volume of this cube is 1 cm³
(1 cubic centimetre)
**It holds 1ml of water**



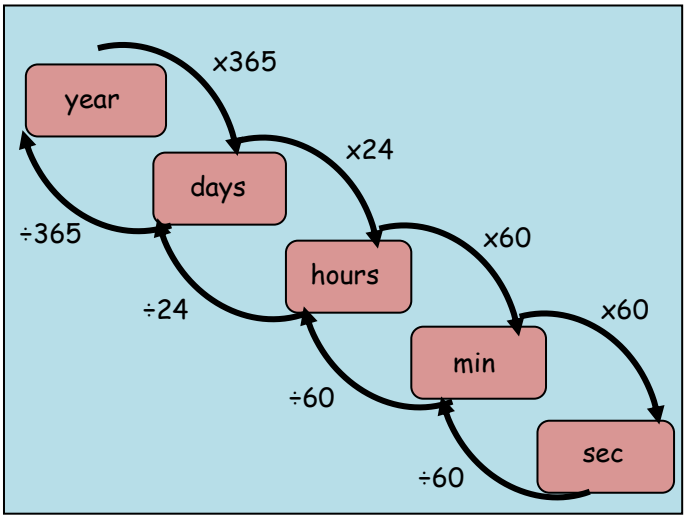
This cuboid contains 12 cubes
So the volume is 12 cm³



This 3D shape contains 12 cubes
So the volume is 12 cm³

## 5/23 Units of time

- **Time conversion**




- **Time intervals**

Always go to the next whole hour first

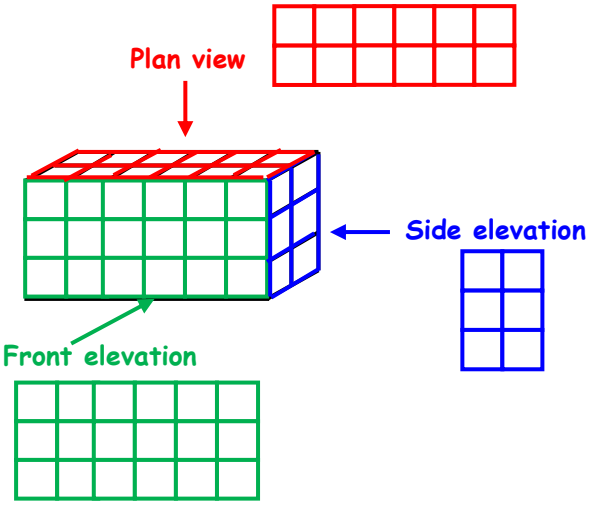
Example: 0830 to 1125

30min + 2h 25min = 2h 55min

0830 0900 1125

## 5/24 2D representations of 3D shapes

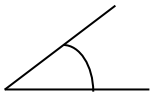
- There are 3 views:



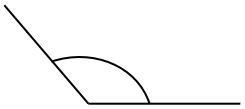

## 5/25 Angles

- **Types of angles**

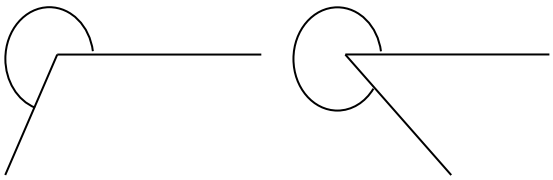
Acute
(less than $90^0$)



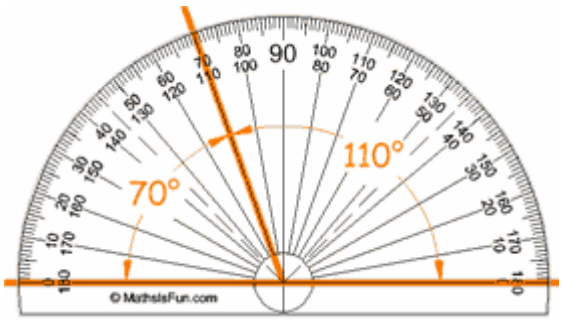
Obtuse
(Between $90^0$ & $180^0$)



Reflex
(Between $180^0$ & $360^0$)

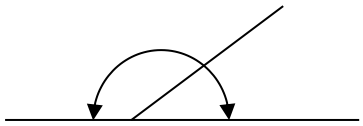


- **Measure and draw angles**

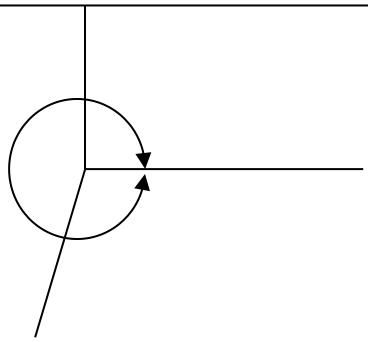



To be sure, count the number of degrees between the two arms of the angle

## 5/26 Angles



Angles on a straight line add up to $180^0$
or 2 right angles ($2 \times 90^0$)

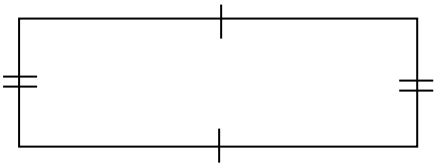


Angles about a point add up to $360^0$
or 4 right angles ($4 \times 90^0$)

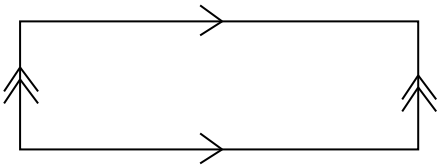
## 5/27 Properties of the rectangle

- A rectangle is a quadrilateral (4 sided shape)
- All angles are $90^0$

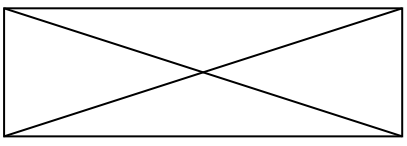
- Opposite sides are equal



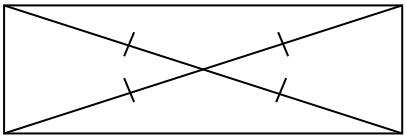
- Opposite sides are parallel



- Diagonals are equal



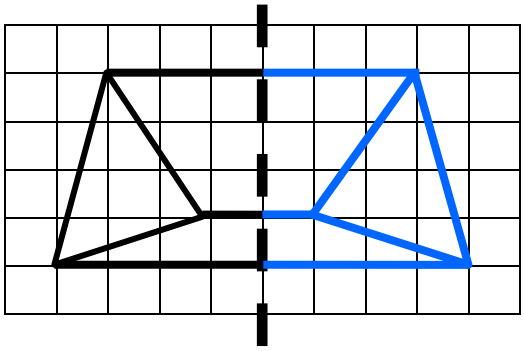
- Diagonals bisect each other (cut in half)



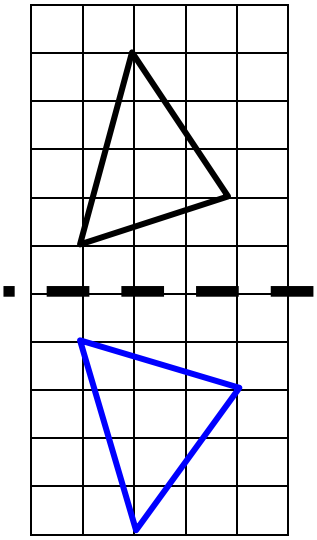
- **A square is a special rectangle**

## 5/28 Reflection

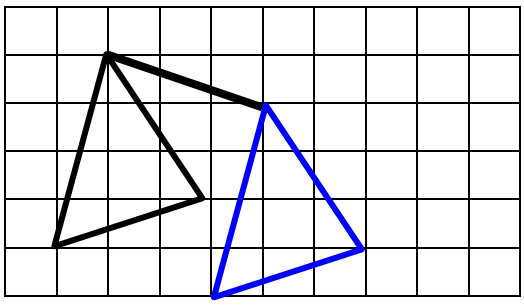
- **Reflection in a vertical line**



- **Reflection in a horizontal line**



## 5/28 Translation – 4 right & 1 down

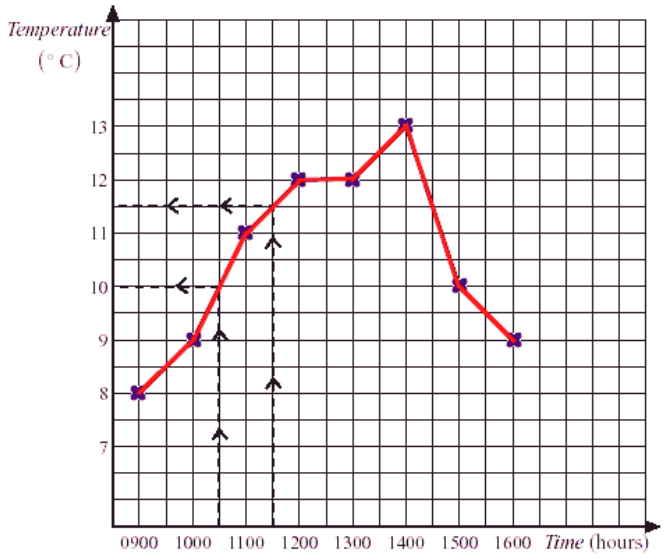


- In reflection and translation the shapes remain the same size and shape – CONGRUENT
- In reflection the shape is flipped over
- In translation the shape stays the same way up
- To translate or reflect a shape, draw jumps on the coordinate grid to show where the new shapes vertices are.

## 5/29 Line graphs

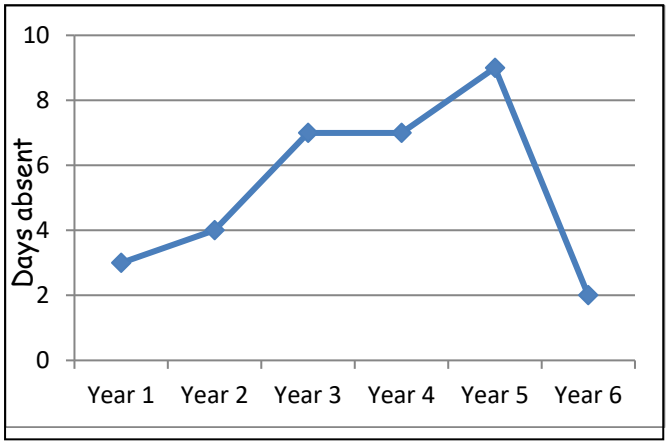
- **Find the difference**

Example 1 : What was the difference in temperature between 1030 and 1130?
Answer: $11.5^0C - 10^0C = 1.5^0C$




- **Find the sum of the data**

Example: What was the total number of days absent over the 6 years?
Answer: 3 + 4 + 7 + 7 + 9 + 2 = 32 days



## 5/30 Interpret information in tables

- **Distance table**

Example: Find the distance between **Leeds** and **York**
Answer: 40miles

| | | | | |
|---|---|---|---|---|
| Hull | | | | |
| 100 | Leeds | | | |
| 162 | 73 | Manchester | | |
| 110 | 60 | 65 | Sheffield | |
| 63 | 40 | 118 | 95 | York |

- **Timetable**

Example: How long is the film?
Answer: 1.10 – 2.35 = 1h 25min = 85min

| | |
|---|---|
| 6.30am | Educational programme |
| 7.00 | Cartoons |
| 7.25 | News and weather |
| 8.00 | Wildlife programme |
| 9.00 | Children's programme |
| 11.30 | Music programme |
| 12.30pm | Sports programme |
| 1.00 | News and weather |
| 1.10 - 2.35pm | Film |

- **Table of results of goals scored**

Example: Did boys or girls score the most goals?
Answer: Boys: 6+3+3+6=18
Girls: 7+5=12
Boys scored the most goals

| | Game 1 | Game 2 | Game 3 | Game 4 | Game 5 | Frequency |
|---|---|---|---|---|---|---|
| Peter | 1 | 0 | 0 | 2 | 3 | 6 |
| John | 0 | 2 | 1 | 0 | 0 | 3 |
| Ryan | 1 | 0 | 1 | 1 | 0 | 3 |
| Claire | 2 | 0 | 2 | 1 | 2 | 7 |
| Bill | 3 | 1 | 1 | 0 | 1 | 6 |
| Susan | 0 | 1 | 3 | 1 | 0 | 5 |