Phase 6 Maths Examples

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

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

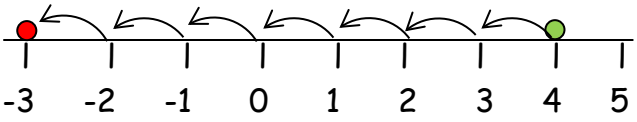
ANSWER – 500 000

3 Negative numbers

A number line is very useful for negative numbers.

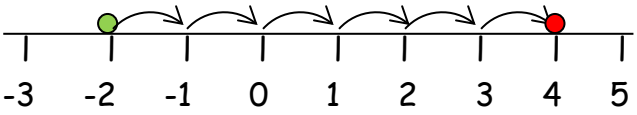
- The number line below shows:

4 - 7 = -3



- The number line below shows:

-2 + 6 = 4



4 Roman Numerals

The seven main symbols

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

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

5 Written methods for addition

- Line up the digits in the correct columns
- Start from RIGHT to LEFT

e.g. 48 + 284 + 9

H	T	O
	4	8
2	8	4
1	2	9 +
3	4	1

5 Written methods for subtraction

- Line up the digits in the correct columns
- Start from RIGHT to LEFT

e.g. 645 - 427

H	T	O	
6	$^{3}\not{4}$	$^{1}5$	
4	2	7	-
2	1	8	

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

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:

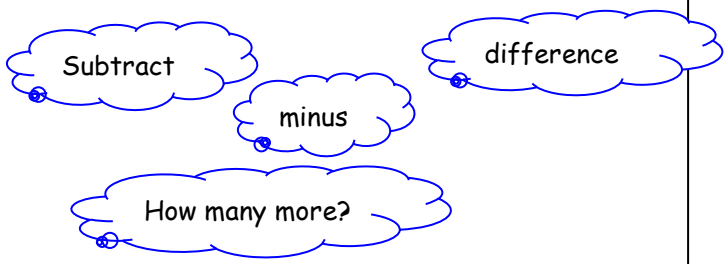
1236 836 826 821

7 Multi-step problems

Based upon 5/6.

Words associated with addition:

Words associated with subtraction:



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**

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

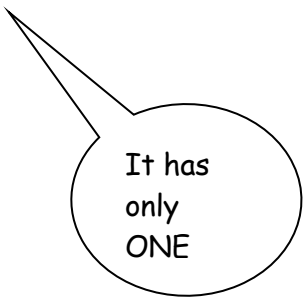
Factors of 7 are:
1, 7

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



10 Multiplication using a formal method

- **By a ONE-DIGIT number**

e.g. 3561 x 7 **COLUMN METHOD**

3561
7x
24927
3 4

e.g. 3561 x 7 **GRID METHOD**

	3000	500	60	7
7	21000	3500	420	49

21000 + 3500 + 420 + 49 = 24927

- **By a TWO-DIGIT number**

e.g. 152 x 34 **COLUMN METHOD**

152
34x
608 (x4)
4560 (x30)
5168

e.g. 152 x 34 **GRID METHOD**

	100	50	2
30	**3000**	**1500**	**60**
4	**400**	**200**	**8**

152 x 34 = 3400 + 1700 + 68 = **5168**

10 Division using a formal method

- **By a ONE-DIGIT number**

e.g. 9138 ÷ 6

1 5 2 6
6)$9^{3}1^{1}3^{1}8$

- **By a TWO-DIGIT number**

e.g. 4928 ÷ 32 **SAME METHOD**

(Except write down some of your tables down first)

32
64
96
128
160

0 1 5 4
32)$4^{4}9^{17}2\ ^{12}8$

4928 ÷ 32 = **154**

e.g. 4928 ÷ 32 **ALTERNATE METHOD**

- Divide
- Multiply
- Subtract
- Bring down - Make a new number
- Divide …

0 1 5 4
32) 4 9 2 8
-3 2
1 7 2
-1 6 0
1 2 8
-1 2 8
0 0 0

4928 ÷ 32 = **154**

11 Multiply & divide by 10, 100, 1000

- **By moving the decimal point**

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

e.g. 13 X 10 = 130

3.4 x 10 = 34

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

e.g. 1 3 ÷ 10 = 1.3

3.4 ÷ 10 = 0.34

- **By moving the digits**

To multiply by 10 move the digits ONE place LEFT

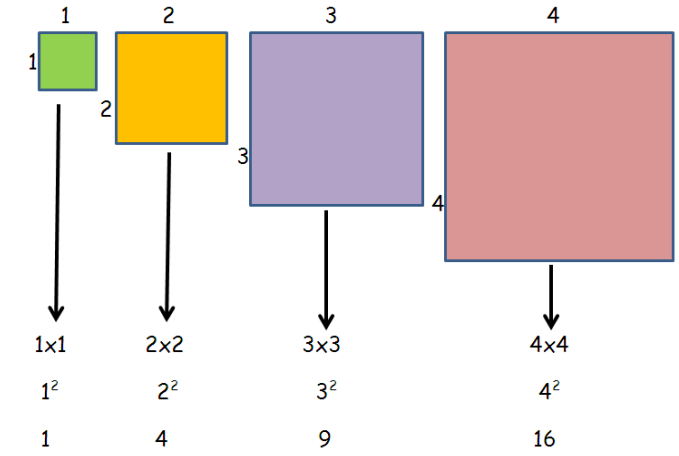
e.g. 3.52 x 10

= 3 5 . 2

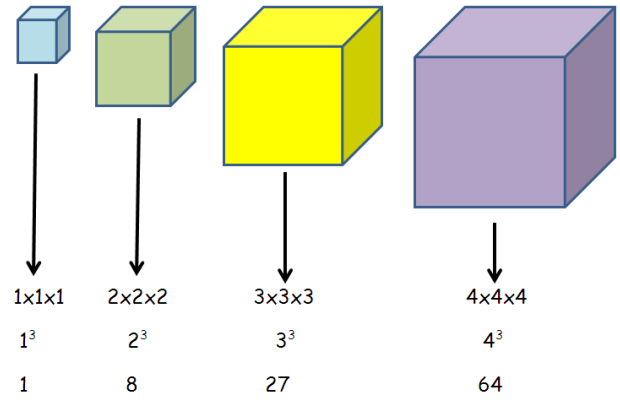
To multiply or divide by 100 move TWO places
To multiply or divide by 1000 move THREE places

12 Square & Cube numbers

Square numbers



Cube numbers



13 Fractions

- To compare fractions
  - the denominators must be the same

$\frac{2}{3}$ and $\frac{5}{6}$ →

$\frac{4}{6}$ and $\frac{5}{6}$ →

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

13 To add subtract fractions (cont)

When the denominators are different

$\frac{3}{8} + \frac{1}{4}^{(\times 2)}$

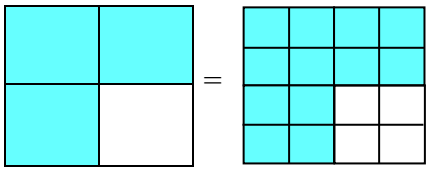
$\downarrow$

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

Multiply to make the denominators the same

14 Equivalent fractions

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



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

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

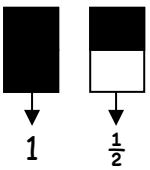
Fractions can also be divided to make the fraction look simpler – this is called CANCELLING or LOWEST FORM

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

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

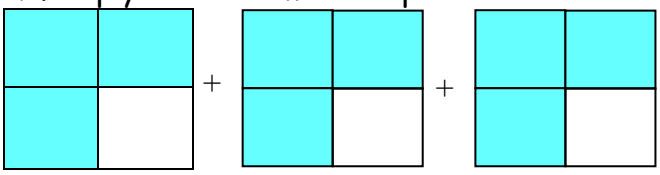
- A mixed number can be changed back into an improper fraction

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

$$2\frac{3}{4} = \frac{11}{4}$$

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

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

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

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				$\frac{617}{1000}$		

18 Order decimals

Example – To order 0.28, 0.3, 0.216

- Write them under each other
- **Fill gaps with zeros**
- Then order them
-

0.28 → 0.280
0.3 → 0.300
0.216 → 0.216

smallest largest
Order: 0.216 0.28 0.3

19 Decimal & Percentage equivalents

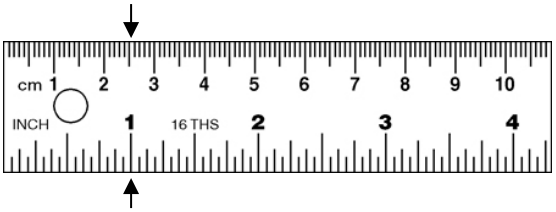
Learn

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'

$\frac{11^{(\times 4)}}{25_{(\times 4)}} = \frac{44}{100} = 0.44 = 44\%$

- 1 inch is about 2.5cm



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

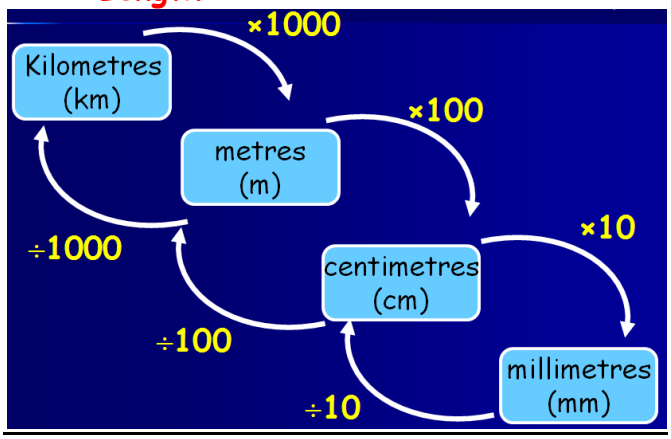
- 1kg is about 2.2pounds

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

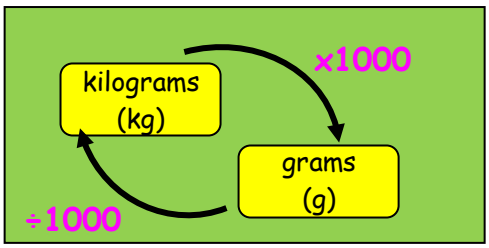
- A gallon is about 4.5 litres

20 Convert metric measure

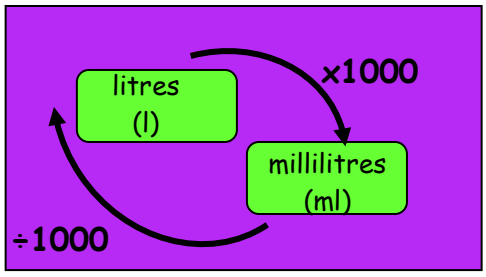
- **Length**



- **Mass or weight**



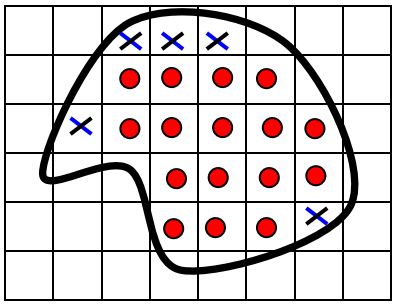
- **Capacity or volume**



20 Imperial measure

21 Area & Perimeter

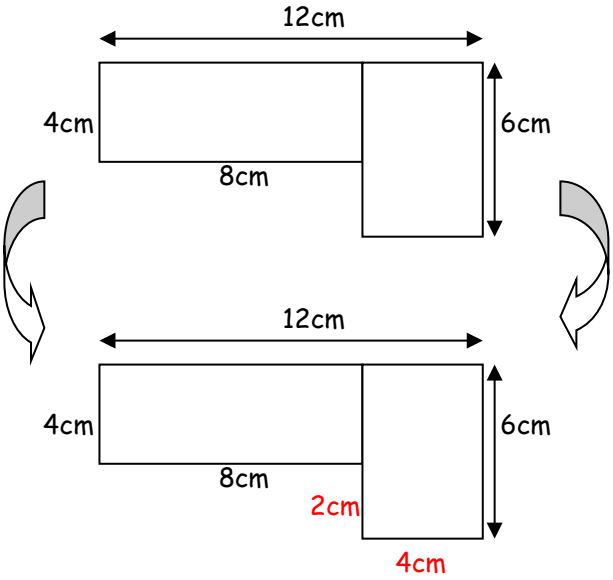
- **Estimate area**



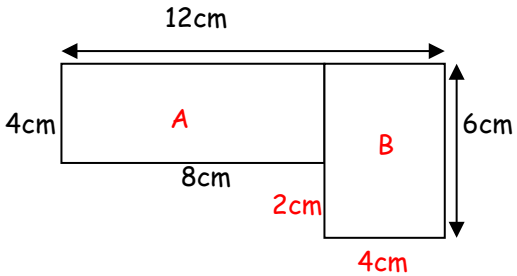
Number of whole squares (●) = 16
Number of ½ or more (×) = 5
Estimated area = 21 squares

- **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

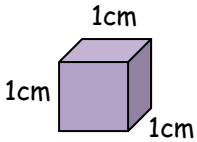


Area of shape = Area of A + B
= (8x4) + (6x4)
= 32 + 24
= 56cm²

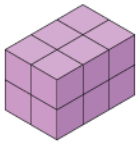
22 Volume

Volume is measured in cubes

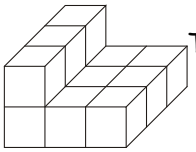
The 1 cm cube



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



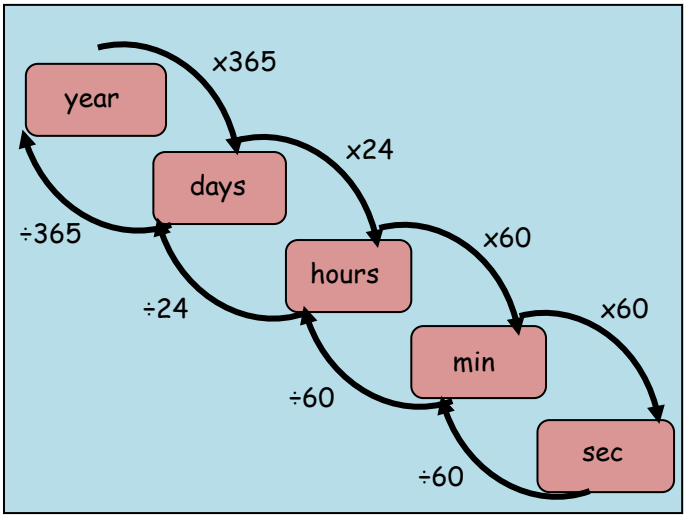
This cuboid contains 12 cubes
So the volume is 12 cm³



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

23 Units of time

- **Time conversion**



- **Time intervals**

Always go to the next whole hour first

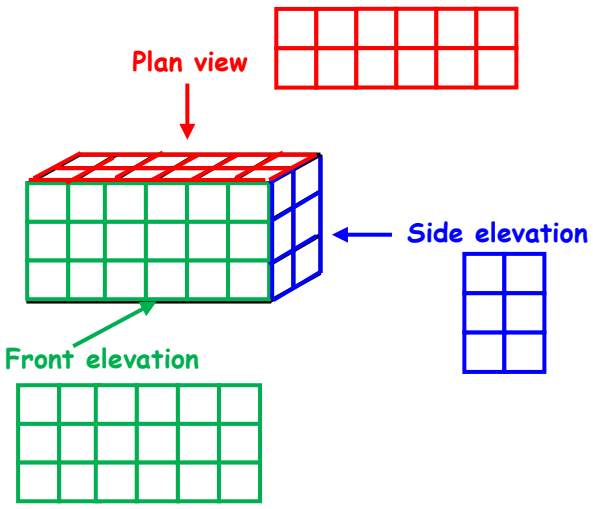
Example: 0830 to 1125

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

0830 0900 1125

24 2D representations of 3D shapes

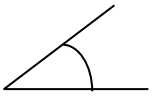
- There are 3 views:



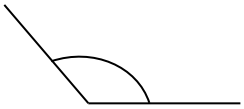
25 Angles

- **Types of angles**

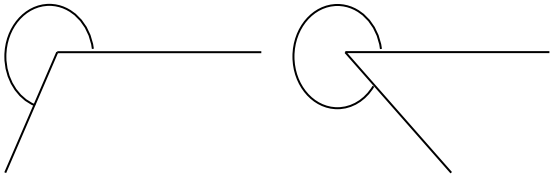
Acute
(less than 90^0)



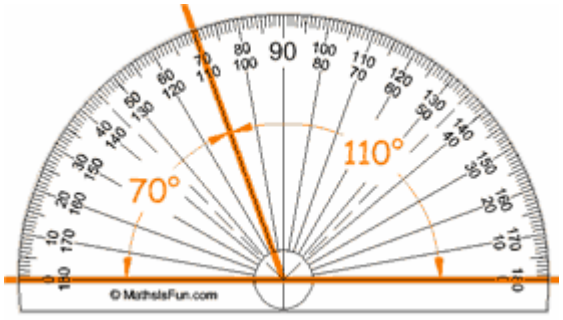
Obtuse
(Between 90^0 & 180^0)



Reflex
(Between 180^0 & 360^0)

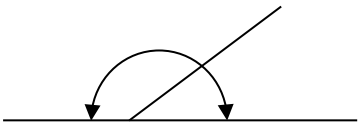


- **Measure and draw angles**

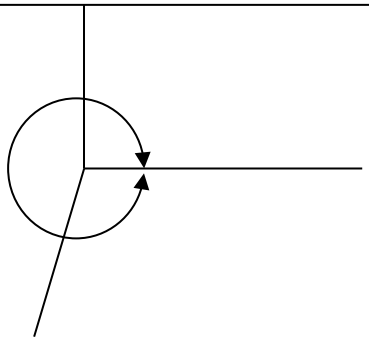


To be sure, count the number of degrees between the two arms of the angle

26 Angles



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

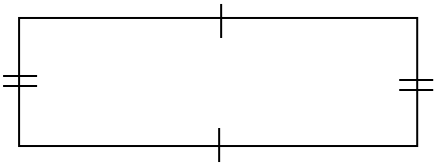


Angles about a point add up to 360^0 or 4 right angles (4×90^0)

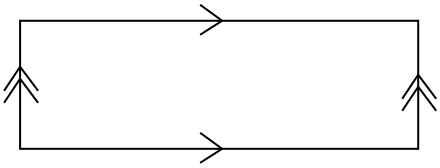
27 Properties of the rectangle

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

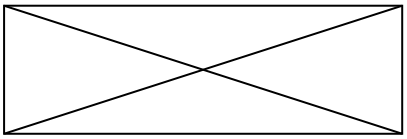
- Opposite sides are equal



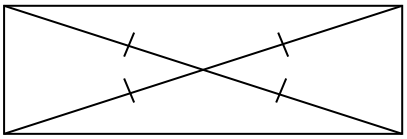
- Opposite sides are parallel



- Diagonals are equal



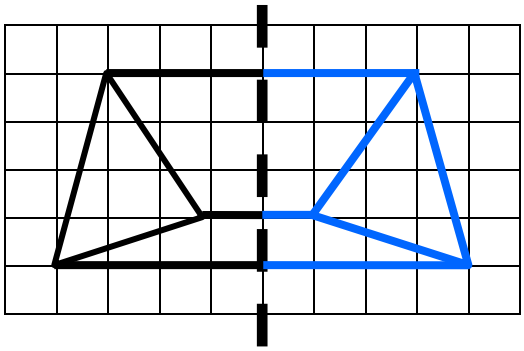
- Diagonals bisect each other (cut in half)



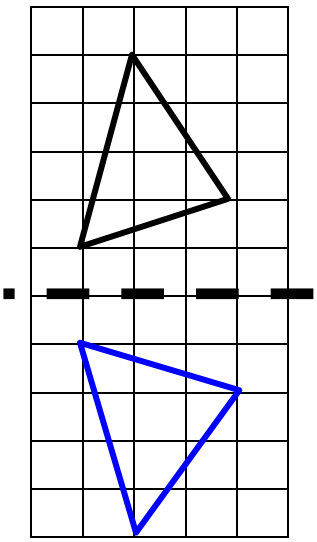
- **A square is a special rectangle**

28 Reflection

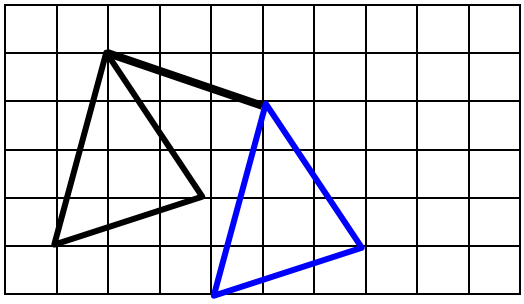
- **Reflection in a vertical line**



- **Reflection in a horizontal line**



28 Translation – 4 right & 1 down

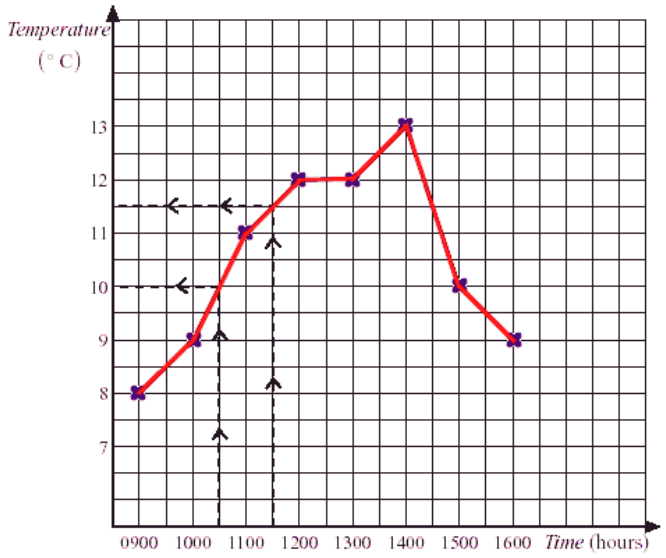


- In reflection and translation the shapes remain the same size and shape – CONGRUENT
- In reflection the shape is flipped over
- In translation the shape stays the same way up

29 Line graphs

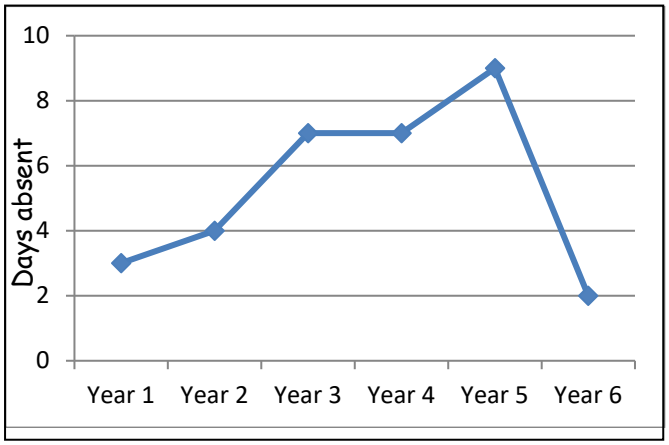
- **Find the difference**

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



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