6/1 Place value in numbers to 10million

The position of the digit gives its size

Ten millions	Millions	Hundred thousands	Ten thousands	thousands	hundreds	tens	units
1	2	3	4	5	6	7	8

Example
The value of the digit '**1**' is **10** 000 000
The value of the digit '**2**' is **2** 000 000
The value of the digit '**3**' is **3**00 000
The value of the digit '**4**' is **4**0 000

- -

6/1 Round whole numbers

Example 1– Round 3**42** 679 to the nearest 10 000
- o Step 1 – Find the 'round-off digit' - **4**
- o Step 2 – Move one digit to the right - **2**

4 or less? YES – leave 'round off digit' unchanged
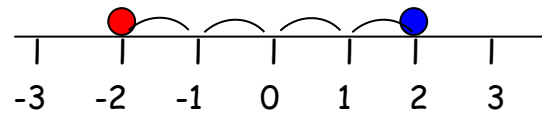   - Replace following digits with zeros

ANSWER – 3**4**0 000

Example 2– Round 3**45** 679 to the nearest 10 000
- o Step 1 – Find the 'round-off digit' - **4**
- o Step 2 – Move one digit to the right - **5**

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

ANSWER – 3**5**0 000

6/2 Negative numbers

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

$-2 < 2 \longrightarrow$ We say -2 is less than 2

The difference between 2 and -2 = 4 (see line)

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

6/3 Multiply numbers & estimate to check

e.g. 152 x 34   COLUMN METHOD
```
        152
       34x
       608   (x4)
      4560   (x30)
      5168
```

6/3 Use estimates to check calculations

152 x 34
≈150 x 30
≈4500

≈ is the symbol for 'roughly equals'

- -

6/3 Divide numbers & estimate to check

With a remainder also expressed as a fraction

e.g. 4928 ÷ 32   BUS SHELTER METHOD
```
       0 2 8                   0 2 8  r 12
   15)4 3 2               15)4⁴3¹³2
     -3 0↓
      1 3 2
     -1 2 0
        1 2
```
ANSWER - 432 ÷ 15 = **28 r 12**

$$= 28\frac{12}{15}$$

6/3 continued
With a remainder expressed as a decimal

```
      0 2 8 . 8              0 2 8 . 8
  15) 4 3 2 . 0          15) 4⁴3¹³2 .¹²0
     -3 0↓
      1 3 2
     -1 2 0
        1 2
```

ANSWER - 432 ÷ 15 = **28 . 8**

6/3 Use estimates to check calculations
432 ÷ 15

≈ 450 ÷ 15

≈ 30

6/4 Factors, multiples & primes

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

e.g. Factors of 12 are: Factors of 18 are:

1	12
2	6
3	4

1	18
2	9
3	6

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

- **PRIME NUMBERS** have only TWO factors

e.g. Factors of 7 are: Factors of 13 are

1	7

1	13

So 7 and 13 are both prime numbers

- **MULTIPLES** are the times table answers

e.g. Multiples of 5 are: Multiples of 4 are:

5   10   15   **20**   25 …….   4 8 12 16 **20** …….

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

6/5 Order of operations
Bracket
Indices
Divide
Multiply } Do these in the order they appear
Add
Subtract } Do these in the order they appear

---

e.g. 3 + 4 x 6 – 5 = 22
         ↑first
(2 + 1) x 3 = 9
      ↑
   first

6/6 Addition
- **Line up the digits in the correct columns**

e.g.   48p + £2.84 + £9

```
   0 . 4 8
   2 . 8 4
   9 . 0 0+
£1 2 . 3 2
  1 1    1
```

- -

6/6 Subtraction
- **Line up the digits in the correct columns**

e.g.   645 - 427

```
H  T  U
6  ³4̶ ¹5
4  2  7  -
2  1  8
```

6/7 Equivalent fractions

- To simplify a fraction

Example: $\dfrac{27}{36}$

First find the highest common factor of the numerator and denominator – which is 9, then divide

$$\dfrac{27}{36}\,{}^{÷9}_{÷9} \;=\; \dfrac{3}{4}$$

- To change fractions to the same denominator

Example: $\dfrac{3}{4}$ and $\dfrac{2}{3}$

Find the highest common multiple of the denominators – which is 12, then multiply:

$$\dfrac{3}{4}\,{}^{x3}_{x3} = \dfrac{9}{12} \text{ and } \dfrac{2}{3}\,{}^{x4}_{x4} = \dfrac{8}{12}$$

6/8 Add & subtract fractions

- Make the denominators the same

e.g. $\dfrac{1}{5} + \dfrac{7}{10}$

$= \dfrac{2}{10} + \dfrac{7}{10}$

$= \dfrac{9}{10}$

e.g. $\dfrac{4}{5} - \dfrac{2}{3}$

$= \dfrac{12}{15} - \dfrac{10}{15}$

$= \dfrac{2}{15}$

Do **not** add denominators

6/9 Multiply fractions

- Write 5 as $\dfrac{5}{1}$
- Multiply numerators & denominators

e.g. $5 \times \dfrac{2}{3}$

$= \dfrac{5}{1} \times \dfrac{2}{3}$

$= \dfrac{10}{3} = 3\dfrac{1}{3}$

e.g. $\dfrac{4}{5} \times \dfrac{2}{3}$

$= \dfrac{8}{15}$

6/9 Divide fractions

- Write 5 as $\dfrac{5}{1}$
- Invert the fraction after ÷ sign
- Multiply numerators & denominators

e.g. $\dfrac{2}{3} \div 5$

$= \dfrac{3}{2} \times \dfrac{1}{5}$ (crossed as $\dfrac{2}{3} \times \dfrac{1}{5}$)

$= \dfrac{3}{10}$

e.g. $\dfrac{4}{5} \div \dfrac{2}{3}$

$= \dfrac{4}{5} \times \dfrac{3}{2}$

$= \dfrac{12}{10} = 1\dfrac{2}{10} = 1\dfrac{1}{5}$

6/10 Multiply/divide decimals by 10, 100

thousands	hundreds	tens	units	•	tenths	hundredths	thousandths
4	3	5	2	•	6	1	7

- **To multiply by 10,** move each digit one place to the **left**

e.g. $35.6 \times 10 = 356$

Hundreds	Tens	Units	●	tenths
	3	5	●	6
3	5	6	●	

- **To divide by 10,** move each digit one place to the **right**

e.g. $35.6 \div 10 = 356 = 3.56$

Tens	Units	●	tenths	hundredths
3	5	●	6	
	3	●	5	6

- **To multiply by 100,** move each digit 2 places to the **left**

- **To divide by 100,** move each digit 2 places to the **right**

AN ALTERNATE METHOD
Instead of moving the **digits**
Move the **decimal point the opposite way**

6/11 Multiply decimals

Step 1 – remove the decimal point
Step 2 – multiply the two numbers
Step 3 – Put the decimal back in

Example: 0.06×8
=> 6×8
=> 48
=> 0.48

6/11 Divide decimals
Use the bus shelter method
Keep the decimal point in the same place
Add zeros for remainders

Example: $6.28 \div 5$

$$5 \overline{) 6 . {}^1 2 {}^2 8 {}^3 0} \qquad 1 . 2\ 5\ 6$$

6/12 Fraction, decimal, percentage equivalents

LEARN THESE:

$$\frac{1}{4} = 0.25 = 25\%$$

$$\frac{1}{2} = 0.5 \ = 50\%$$

$$\frac{3}{4} = 0.75 = 75\%$$

$$\frac{1}{10} = 0.1 \ = 10\%$$

- **Percentage to decimal to fraction**

$27\% = 0.27 = \dfrac{27}{100}$

$7\% \ = 0.07 = \dfrac{7}{100}$

$70\% = 0.7 \ = \dfrac{70}{100} = \dfrac{7}{10}$

- **Decimal to percentage to fraction**

$0.3 \ = 30\% = \dfrac{3}{10}$

$0.03 = 3\% \ = \dfrac{3}{100}$

$0.39 = 39\% = \dfrac{39}{100}$

- **Fraction to decimal to percentage**

$\dfrac{4}{5} = \dfrac{80}{100} = 80\% = 0.8$

Change to 100

$\dfrac{3}{8} = 3 \div 8 = 8\overline{)3.^30^60^40} = 0.375 = 37.5\%$

$\dfrac{9}{12} = \dfrac{3}{4} = 0.75 = 75\%$

Cancel by 3

6/13 Fraction of quantity

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

e.g. To find $\dfrac{4}{5}$ of £40

£40 ÷ 5 × 4 = £40

6/13 Percentage of quantity

Use only

- 50% - $\dfrac{1}{2}$
- 10% - $\dfrac{1}{10}$
- 1% - $\dfrac{1}{100}$

Example : To find 35% of £400
10% = £40
20% = £80
5% = £20
35% = £140

6/14 Similar shapes

When a shape is enlarged by a scale factor the two shapes are called SIMILAR shapes
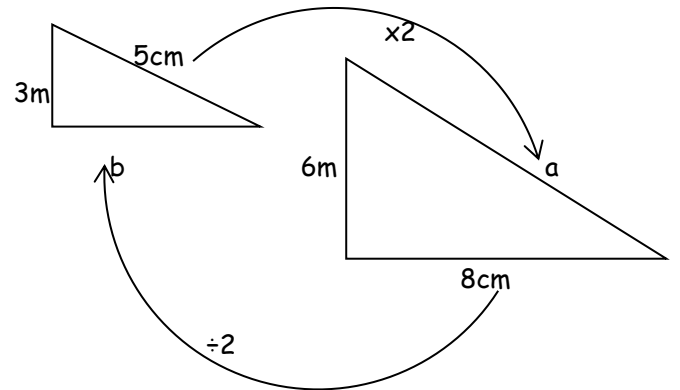
Scale factor = 6 ÷ 3 = 2
Length a = 5 × 2 = 10cm
Length b = 8 ÷ 2 = 4cm

6/14 Unequal sharing

Example- unequal sharing of sweets

A gets	B gets
3 shares	4 shares
=> 3 sweets	4 sweets
=> 12 sweets	16 sweets

×4 ... ×4

6/15 Express missing numbers

algebraically

An unknown number is given a letter

Examples
$2a - 4 = 8$

$2a = 12$ so $a = 6$

b $\quad 32^0$

$b + 32 = 180$ so $b = 148^0$

30cm

18cm $\quad$ c

$18 + c = 30$ so $c = 12$

d $\quad$ d

d
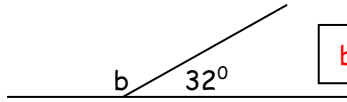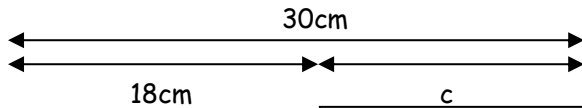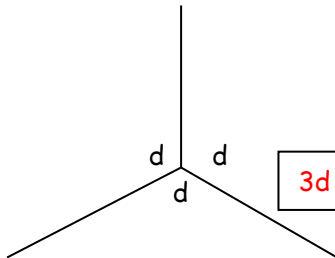
$3d = 360^0$ so $d = 120^0$

- -

6/15 Use a word formula

Example: -Time to cook a turkey
Cook for 45min per kg weight
Then a further 45min

For a 6kg turkey, follow the formula:
45min x 6 + 45min
=270min + 45min
=315min
= 5h 15min

6/16 Number sequences
- **Understand position and term**

Position	1	2	3	4
Term	3	7	11	15

+4

Term to term rule = **+4**
Position to term rule is x **4** - 1
(because position 1 x 4 – 1 = 3)
nth term = n x 4 -1 = 4n - 1
- **Generate terms of a sequence**

If the nth term is 5n + 1
1st term *(n=1)* = 5x1 + 1 = 6
2nd term *(n=2)* = 5x2 + 1= 11
3rd term *(n=3)* = 5x3 + 1 = 16

6/17 Possible solutions of a number sentence

Example: x and y are numbers
Rule: $x + y = 5$
Possible solutions: x = 0 and y = 5
$\quad$ x = 1 and y = 4
$\quad$ x = 2 and y = 3
$\quad$ x = 3 and y = 2
$\quad$ x = 4 and y = 1
$\quad$ x = 5 and y = 0

6/18 Convert units of measure
METRIC

When converting measurements follow these rules:

• When converting from a **larger unit to a smaller** unit we **multiply** (x)
• When converting from a **smaller unit to a larger** unit we **divide** (÷)

UNITS of LENGTH
10mm = 1cm
100cm = 1m
1000m = 1km

UNITS of MASS
1000g = 1kg
1000kg = 1tonne

UNITS of VOLUME
1000ml = 1 litre
100cl = 1litre

UNITS of TIME
60sec = 1 min
60min = 1 hour
24h = 1 day
365days = 1 year

6/19 Convert units of measure
METRIC/IMPERIAL

LEARN: $\quad$ 5 miles = 8km

Miles $\longrightarrow$ ÷ 5 $\longrightarrow$ x8 $\longrightarrow$ kilometres

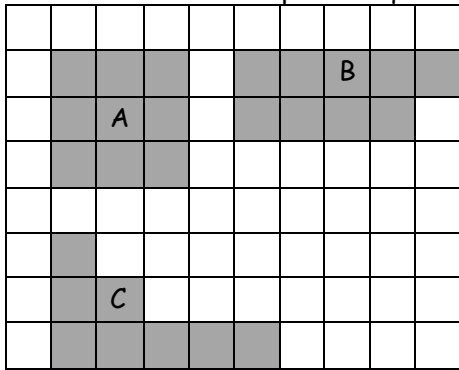Miles $\longleftarrow$ x 5 $\longleftarrow$ ÷8 $\longleftarrow$ kilometres
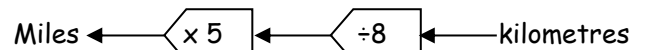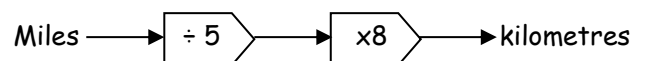
6/20 Perimeter and area of shapes

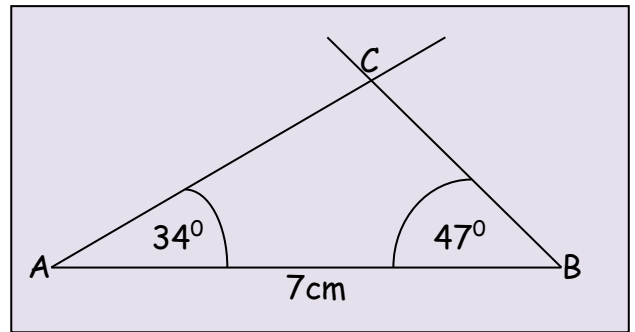Shapes can have the SAME area but different perimeters

The area of each shape is 9 squares

Perimeter of each shape is different
A – 12; B – 14; C -16

Example : Triangle with side and angles given
- o Draw line AB = 7cm
- o Draw angle 34^0 at point A from line AB
- o Draw angle 47^0 at point B from line AB
- o Extend to intersect the lines at C

6/21 Area of parallelogram & triangle

- o **Area of parallelogram**

Area of parallelogram = b x h

= 8 x 5

= 40cm^2

- o **Area of triangle (½ a parallelogram)**

Area of triangle = $\frac{b \times h}{2}$

= $\frac{8 \times 5}{2}$

20cm^2

6/22 Volume

- o **Volume of cuboid**

Volume = l x w x h

= 5 x 3 x 2

= 30cm^3

- o **Volume of cube**

Volume = l x w x h

= 3 x 3 x 3

= 27m^3

6/23 Construct 3D shapes

CUBE & its net
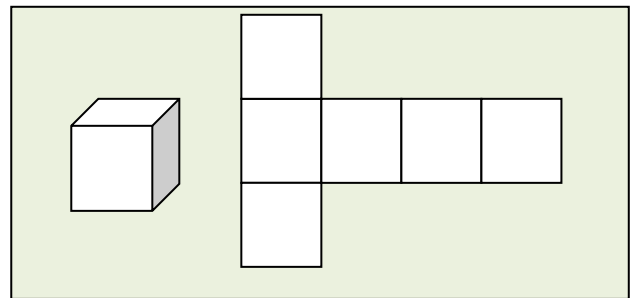
CUBOID & its net
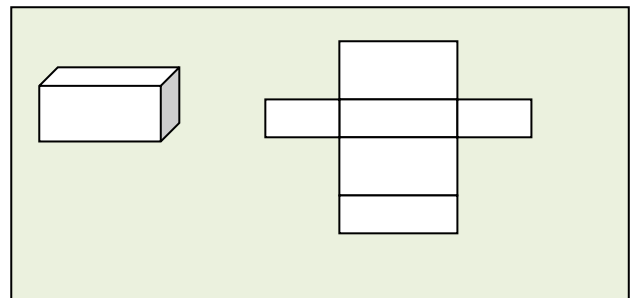
TRIANGULAR PRISM & its net
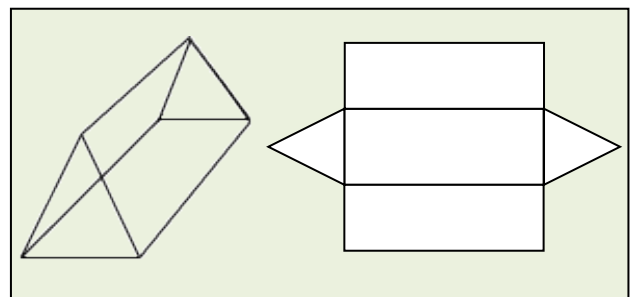
6/23 Construct 2D shapes

6/24 Properties of shapes

TRIANGLES – sum of angles = 180^0

ISOSCELES triangle
2 equal sides & 2 equal angles
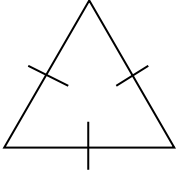
EQUILATERAL triangle
3 equal sides & ALL angles 60^0
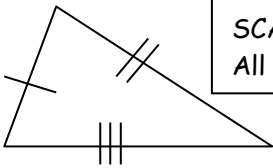
SCALENE triangle
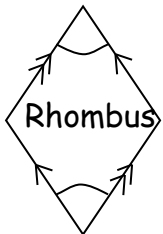All sides & angles different

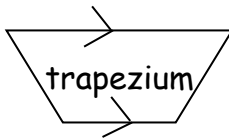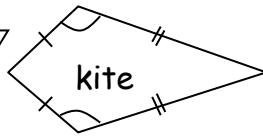## QUADRILATERALS – sum of angles = 360^0
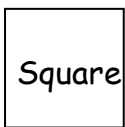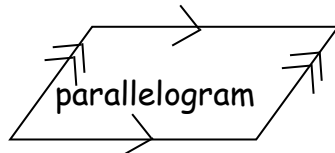
Square   rectangle   parallelogram

Rhombus   trapezium   kite

REGULAR POLGONS – all sides the same
- Polygons have straight sides
- Polygons are named by the number sides
    - 3 sides – triangle
    - 4 sides – quadrilateral
    - 5 sides – pentagon
    - 6 sides – hexagon
    - 7 sides – heptagon
    - 8 sides – octagon
    - 9 sides – nonagon
    - 10 sides – decagon

- Sum of exterior angles is always 360^0

108^0 72^0

- interior & exterior angle add up to 180^0

- the interior angles add up to:

Triangle $=1 \times 180^0 = 180^0$
Quadrilateral $=2 \times 180^0 = 360^0$
Pentagon $=3 \times 180^0 = 540^0$
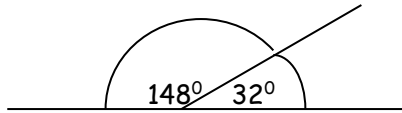Hexagon $=4 \times 180^0 = 720^0$ etc

6/25 Parts of a circle
- The circumference is the distance all the way around a circle.
- The diameter is the distance right across the middle of the circle, passing through the centre.
- The radius is the distance halfway across the circle.
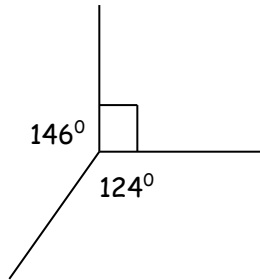- The radius is always half the length of the diameter. ($d = 2 \times r$) or ($r = \frac{1}{2} \times d$)

radius
diameter
circumference
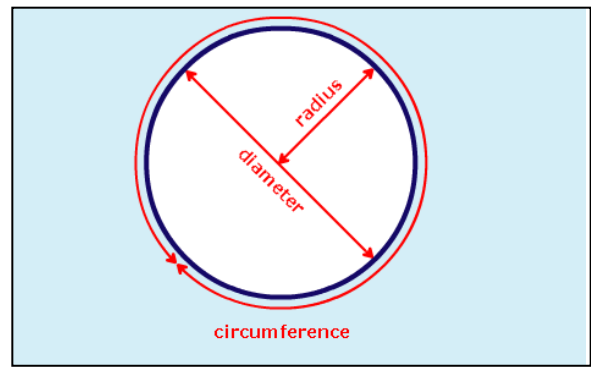
6/26 Angles and straight lines

- Angles on a straight line add up to 180^0

$$148^0 + 32^0 = 180^0$$

- Angles about a point add up to 360^0

146^0
124^0
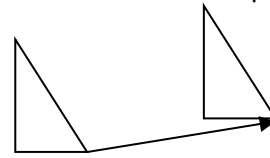
$$146^0 + 90^0 + 124^0 = 360^0$$

- Vertically opposite angles are equal

146^0
34^0 34^0
146^0

6/27 Position on a co-ordinate grid

y

(-6,4)   (6,4)

-x   x

(-6,-4)   (6,-4)

-y

6/28 Transformations
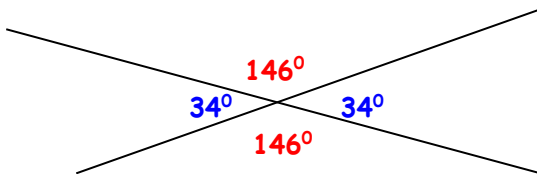
o **Translation** – A shape moved along a line
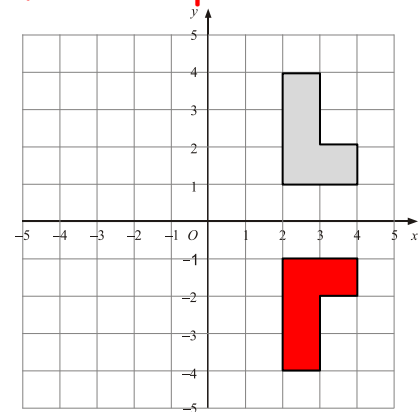
Example – Move shape A 3 right & 4 down
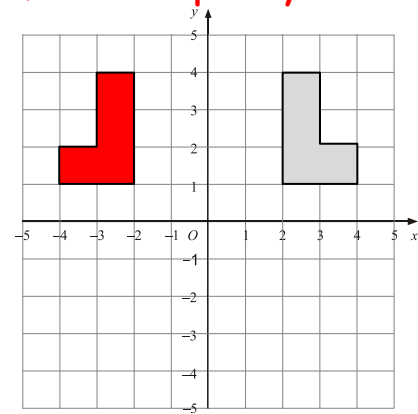Can also be written as a vector $\begin{pmatrix} 3 \\ -4 \end{pmatrix}$ Right Down
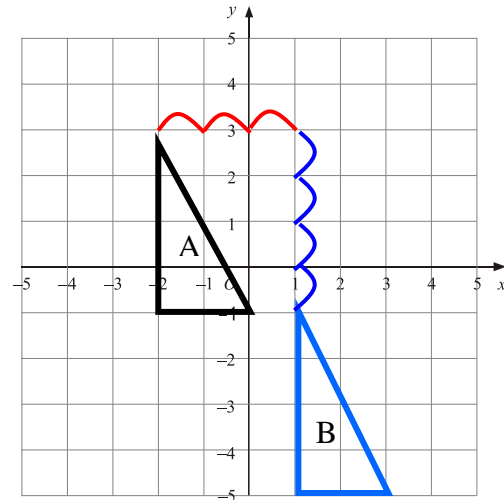
Notice:
- o The new shape stays the same way up
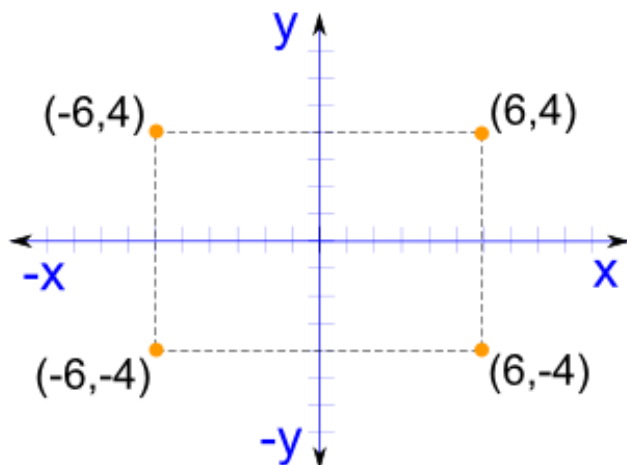- o The new shape is the same size

o **Reflect a shape in x-axis**

o **Reflect a shape in y-axis**

6/29 Graphs

o **Pie chart**

| Transport	Frequency	Angle
Car	13	$13 \times 9 = 117^0$
Bus	4	$4 \times 9 = 36^0$
Walk	15	$15 \times 9 = 135$
Cycle	8	$8 \times 9 = 72$

Total frequency = 40
$360^0 \div 40 = 9^0$ per person
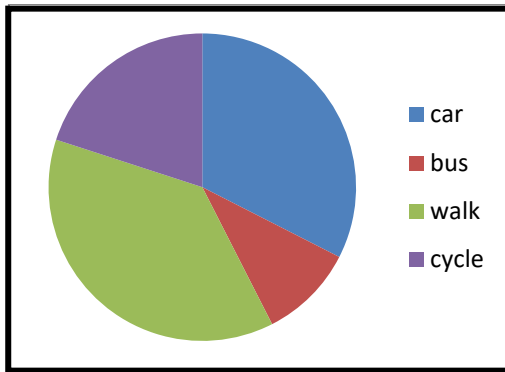
The mean is usually known as the average.
The mean is not a value from the original list.
It is a typical value of a set of data

Mean = total of measures ÷ no. of measures

e.g.- Find mean speed of 6 cars travelling on a road
Car 1 – 66mph
Car 2 – 57mph
Car 3 – 71mph
Car 4 – 54mph
Car 5 – 69mph
Car 6 – 58mph
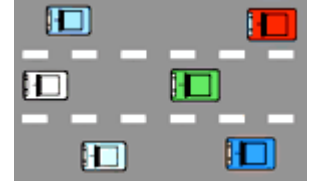
Mean = $\dfrac{66+57+71+54+69+58}{6}$

= $\dfrac{375}{6}$

= 62.5mph
Mean average speed was 62.5mph

o **Line graph**
Line graphs show changes in a single variable – in this graph changes in temperature can be observed.