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**

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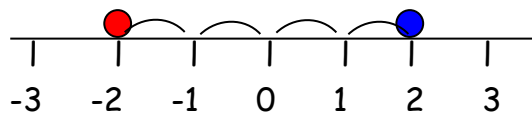- Replace following digits with zeros

<u>ANSWER – 3**4**0 000</u>

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**

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

<u>ANSWER – 3**5**0 000</u>

6/2 Negative numbers

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

$-2 < 2 \rightarrow$ 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

<u>With a remainder also expressed as a fraction</u>

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

$$\frac{27^{\div 9}}{36_{\div 9}} = \frac{3}{4}$$

- 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:

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

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

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

$= \dfrac{3}{10}$

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 x 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 ÷ 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 x 8
=> 6 x 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 ÷ 5

$5\overline{)6.{}^{1}2{}^{2}8{}^{3}0}$ = 1.256

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

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

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

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
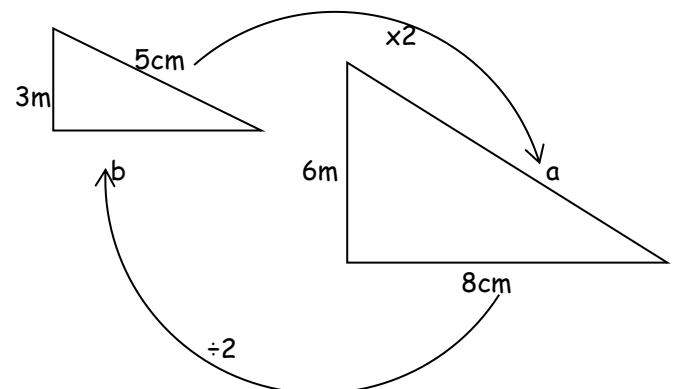
Scale factor = 6 ÷ 3 = 2
Length a = 5 × 2 = 10cm
Length b = 8 ÷ 2 = 4cm

6/14 Unequal sharing
Example- unequal sharing of sweets

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

6/15 Express missing numbers algebraically

An unknown number is given a letter

<u>Examples</u>

$2a - 4 = 8$

$2a = 12$ so $a = 6$
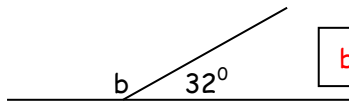
$b + 32 = 180$ so $b = 148^0$
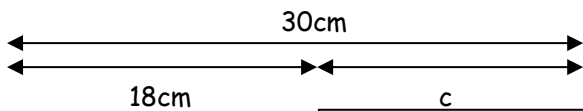
$18 + c = 30$ so $c = 12$
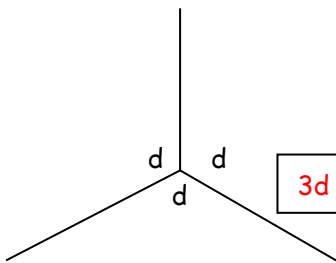
$3d = 360^0$ so $d = 120^0$

- -

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, <u>follow the formula</u>:

$45min \times 6 + 45min$

$= 270min + 45min$

$= 315min$

$= \underline{5h\ 15min}$

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

Position	1	2	3	4
Term	3	7	11	15

+4
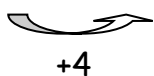
Term to term rule = +**4**

Position to term rule is $\times$ **4** - 1

(because position 1 x 4 – 1 = 3)

nth term $= n \times 4 - 1 = 4n - 1$

- **Generate terms of a sequence**

If the nth term is $5n + 1$

1st term *(n=1)* $= 5 \times 1 + 1 = 6$

2nd term *(n=2)* $= 5 \times 2 + 1 = 11$

3rd term *(n=3)* $= 5 \times 3 + 1 = 16$

6/17 Possible solutions of a number sentence

Example: x and y are numbers

Rule: $x + y = 5$

Possible solutions: $x = 0$ and $y = 5$

$\qquad x = 1$ and $y = 4$

$\qquad x = 2$ and $y = 3$

$\qquad x = 3$ and $y = 2$

$\qquad x = 4$ and $y = 1$

$\qquad x = 5$ 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** ($\times$)
- When converting from a **smaller unit to a larger** unit we **divide** ($\div$)

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: 5 miles = 8km
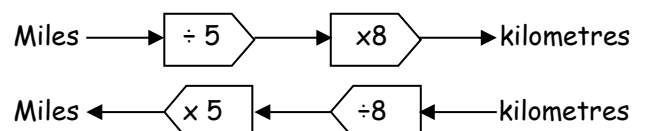
6/20 Perimeter and area of shapes

Shapes can have the SAME area but different perimeters
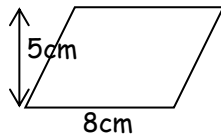
The area of each shape is 9 squares
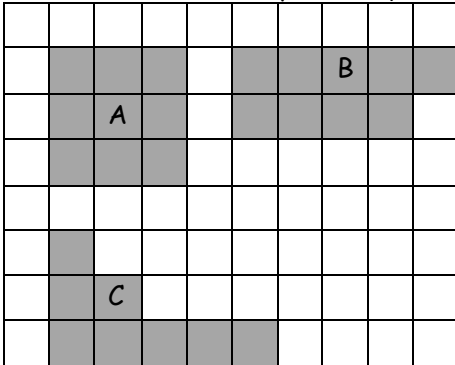
Perimeter of each shape is different
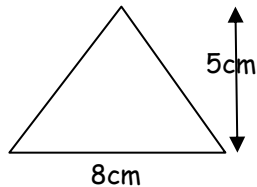A – 12; B – 14; C -16

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
= $27m^3$
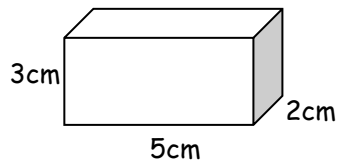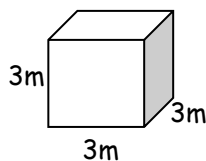
6/23 Construct 2D shapes

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
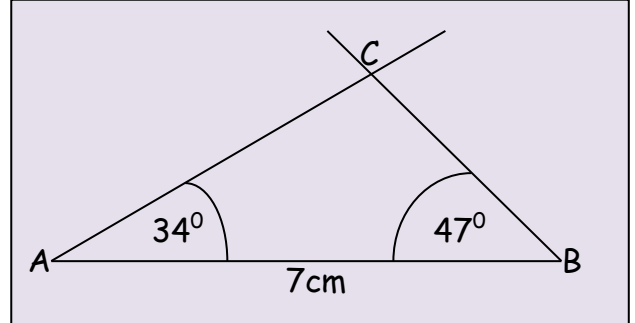
6/23 Construct 3D shapes

CUBE & its net
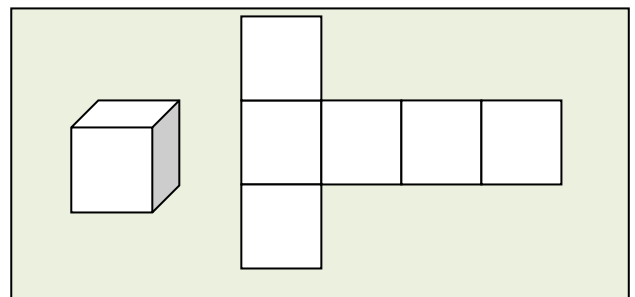
CUBOID & its net
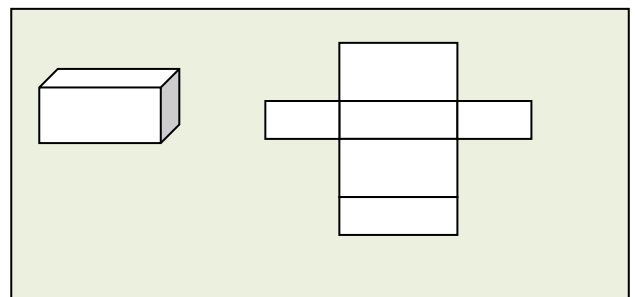
TRIANGULAR PRISM & its net
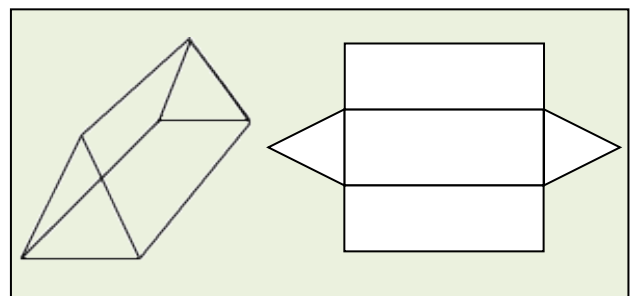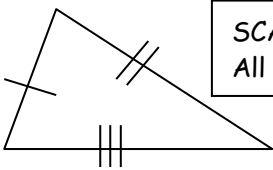
6/24 Properties of shapes
TRIANGLES – sum of angles = 180^0
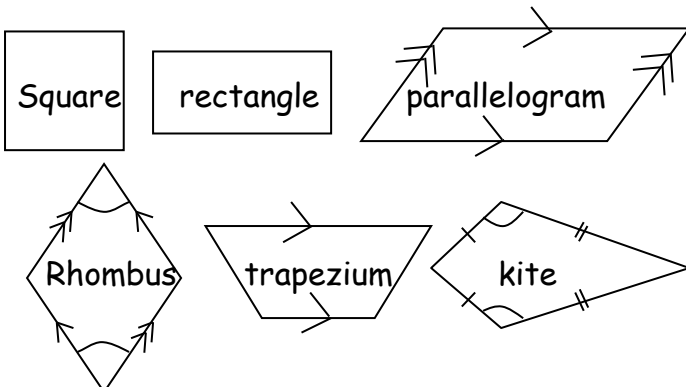
ISOSCELES triangle
2 equal sides & 2 equal angles
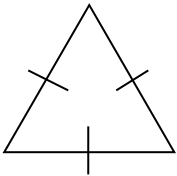
EQUILATERAL triangle
3 equal sides & ALL angles 60^0

SCALENE triangle
All sides & angles different

QUADRILATERALS – sum of angles = 360^0

Square | rectangle | parallelogram

Rhombus | trapezium | kite

REGULAR POLGONS – all sides the same
- o Polygons have straight sides
- o 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

o Sum of exterior angles is always 360^0

108^0 72^0
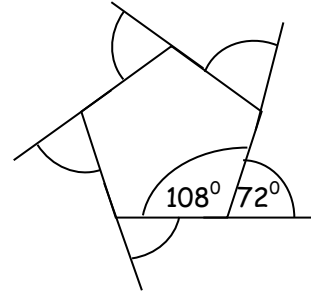
o interior & exterior angle add up to 180^0

o the interior angles add up to:
Triangle   = $1 \times 180^0 = 180^0$
Quadrilateral = $2 \times 180^0 = 360^0$
Pentagon   = $3 \times 180^0 = 540^0$
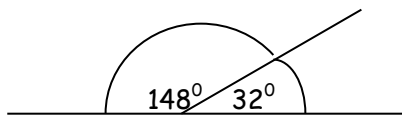Hexagon   = $4 \times 180^0 = 720^0$ etc

6/25 Parts of a circle
- o The circumference is the distance all the way around a circle.
- o The diameter is the distance right across the middle of the circle, passing through the centre.
- o The radius is the distance halfway across the circle.
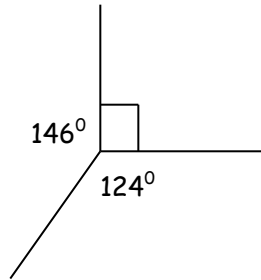- o The radius is always half the length of the diameter. (d = 2 x r) or (r = ½ x d)

radius
diameter
circumference
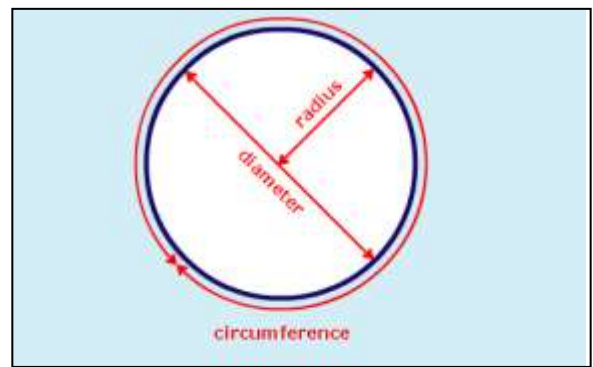
6/26 Angles and straight lines

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

148^0 32^0

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

○ 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
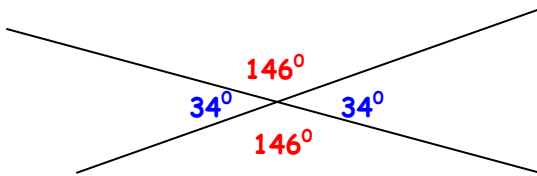
6/27 Position on a co-ordinate grid

y

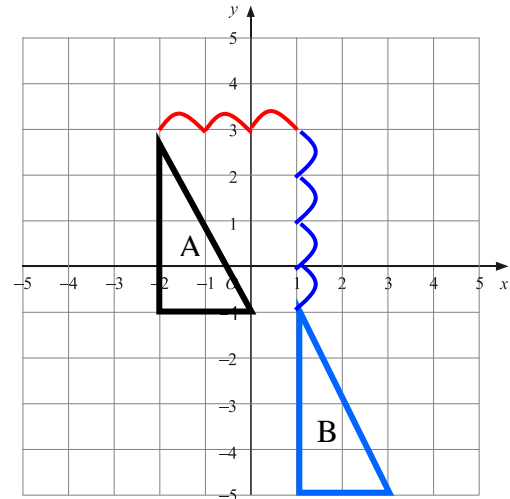(-6,4)   (6,4)

-X   X

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

-y
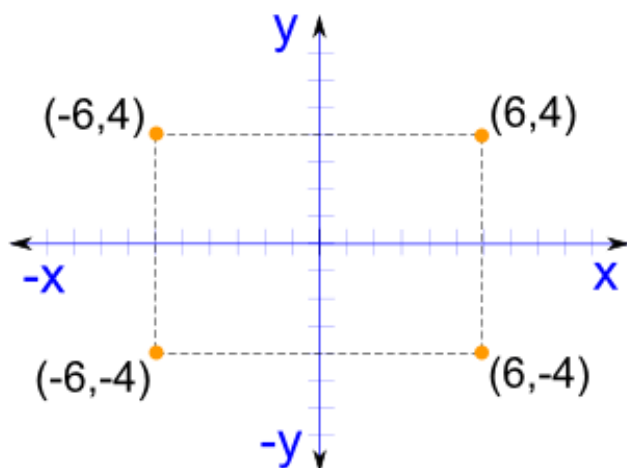
6/28 Transformations

○ **Translation –** A shape moved along a line
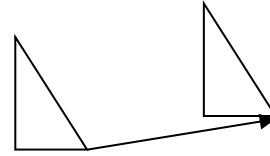
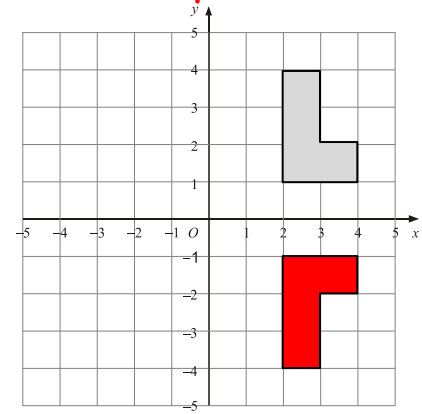Example – Move shape A 3 right & 4 down

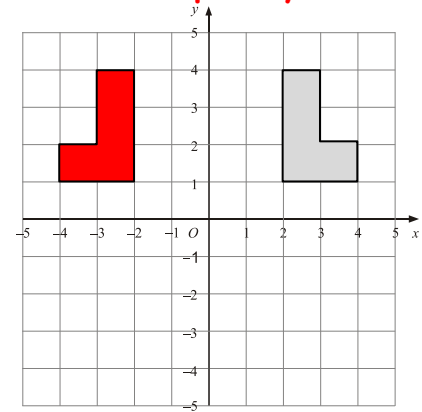Can also be written as a vector $\begin{pmatrix} 3 \\ -4 \end{pmatrix}$ Right Down

A

B

Notice:

○ The new shape stays the same way up
○ The new shape is the same size

○ **Reflect a shape in x-axis**

○ **Reflect a shape in y-axis**
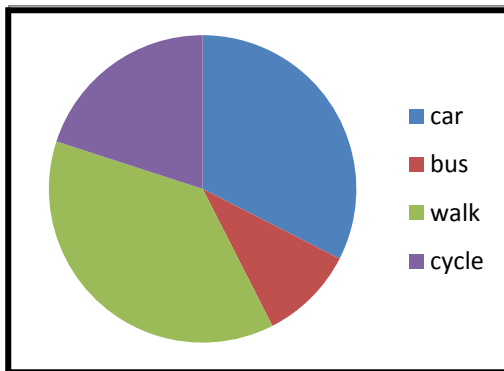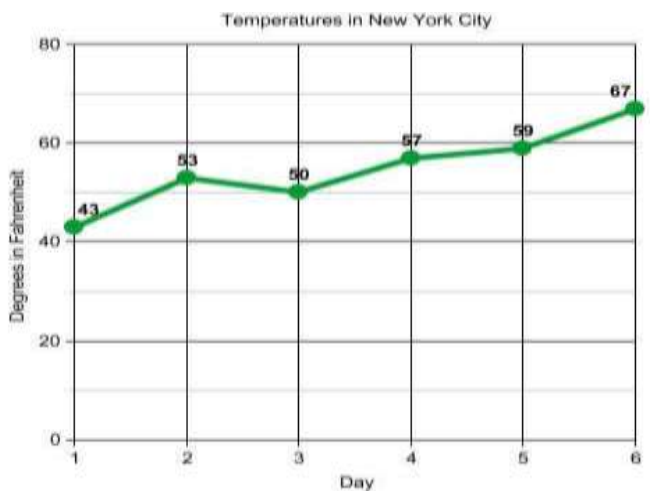
6/29 Graphs

- ### 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

- ### Line graph

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

6/30 The mean

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
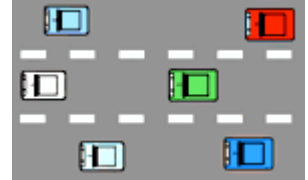
Mean = $\dfrac{66+57+71+54+69+58}{6}$

= $\dfrac{375}{6}$

= 62.5mph

Mean average speed was 62.5mph