Year 6 (2023-24)

Maths
The Year Ahead...

The following information booklet details the general plan for teaching and learning in the coming academic year at HHJS. We follow the White Rose Scheme of learning which is attached for your information. I have also included some extra resources you may find useful at home for pre-teaching or consolidation.

Carlisle & Hampton Hill Federation

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn term	Number — Place value — VIEW		Number — Addition, subtraction, multiplication and division — VIEW					Number — Fractions A — VIEW		Number — Fractions B — VIEW		Measurement Converting units — VIEW
Spring term	Number — Ratio — VIEW		Number — Algebra — VIEW		Number — Decimals — VIEW		Number — Fractions decimals and percentages — VIEW		Measurement — Area, perimeter and volume — VIEW		Statistics — VIEW	
Summer term	Geometry — Shape — VIEW		Geometry Position and direction — VIEW	Themed projects, consolidation and problem solving — VIEW								

*** These booklets are available on the website for all KS1 and 2 year groups across our federation.*
For more information speak to Miss Duffy (year 4 @HHJS)

Useful resources

White Rose's **free workbooks** align with the topics we will cover.
- Available for **all topics** across the year.

https://whiterosemaths.com/parent-resources

Get the free workbooks

| Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 |

Autumn Block 1 — **Place value**
Autumn Block 2a — **Four operations (a)**
Autumn Block 2b — **Four operations (b)**
Autumn Block 3a — **Fractions (a)**
Autumn Block 3b — **Fractions (b)**

Free digital tools - these match the representations used in class and align with our mastery approach, by *bringing the maths to life*.

https://whiterosemaths.com/resources/digital-tools

Free digital tools

Place value chart | Algebra tiles | Rekenrek | Bar model | Double-sided counters

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

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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
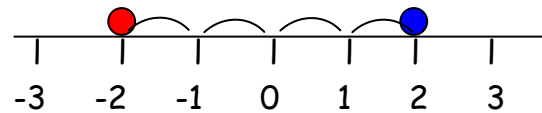   - Replace following digits with zeros

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**

<u>5 or more</u>? 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
$\approx$150 x 30
$\approx$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) 4 ⁴3 ¹³2
     -3 0↓
      1 3 2
     -1 2 0
        1 2
```

ANSWER - 432 ÷ 15 = **28 r 12**

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

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:

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

- **PRIME NUMBERS** have only TWO factors

e.g. Factors of 7 are:

1	7

Factors of 13 are

1	13

So 7 and 13 are both prime numbers

- **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**

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 + $\boxed{4 \times 6}$ – 5 = 22
↑first

$\boxed{(2 + 1)} \times 3 = 9$
↑
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  ³4̸ ¹5
4  2  7  -
2  1  8
```

6/7 Equivalent fractions

o To simplify a fraction

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

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

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

o 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:

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

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

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

$= \dfrac{3}{10}$

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

$$5 \overline{)6.^12^28^30}$$

$$1 . 2\ 5\ 6$$

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**

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

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

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

- **Decimal to percentage to fraction**

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

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

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

- **Fraction to decimal to percentage**

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

Change to 100

$$\frac{3}{8} = 3 \div 8 = 8)\overline{3.^30^60^40} = 0.375 = 37.5\%$$
(quotient: 0. 3 7 5)

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

Cancel by 3

6/13 Fraction of quantity

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

e.g. To find $\frac{4}{5}$ of £40

£40 ÷ 5 × 4 = £40

6/13 Percentage of quantity
Use only

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

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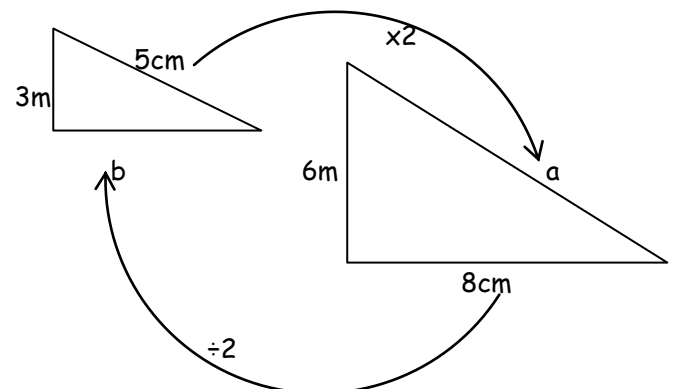
Scale factor = 6 ÷ 3 = 2
Length a = 5 × 2 = 10cm
Length b = 8 ÷ 2 = 4cm

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 $a = 6$

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

b 32^0

30cm

18cm

c

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

d d

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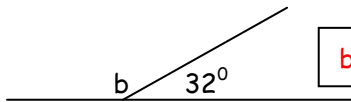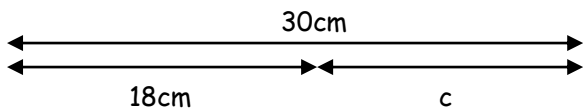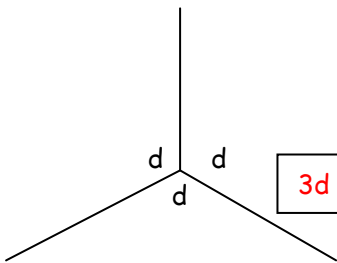
$3d = 360^0$ so $d = 120^0$

- -

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

$45min \times 6 + 45min$

$=270min + 45min$

$=315min$

= <u>5h 15min</u>

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

Position	1	2	3	4
Term	3	7	11	15

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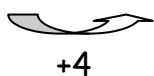
Term to term rule = **+4**

Position to term rule is × **4** - 1

(because position 1 x 4 – 1 = 3)

nth term = n × 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

x = 1 and y = 4

x = 2 and y = 3

x = 3 and y = 2

x = 4 and y = 1

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** (×)

• 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: 5 miles = 8km

Miles ⟶ ÷ 5 ⟶ x8 ⟶ kilometres

Miles ⟵ x 5 ⟵ ÷8 ⟵ kilometres
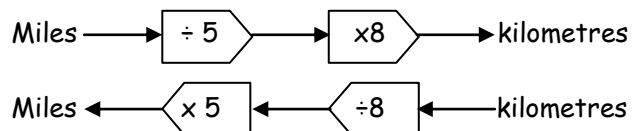
6/20 Perimeter and area of shapes

Shapes can have the SAME area but different perimeters

The area of each shape is 9 squares
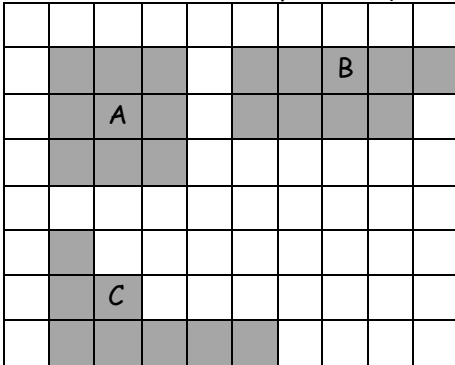
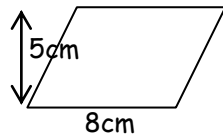Perimeter of each shape is different
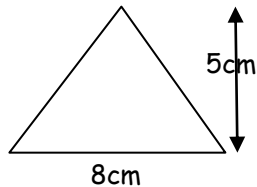A – 12; B – 14; C -16

6/21 Area of parallelogram & triangle

- **Area of parallelogram**

Area of parallelogram = b x h
$$= 8 \times 5$$
$$= \underline{40cm^2}$$

5cm
8cm

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

Area of triangle = $\dfrac{b \times h}{2}$
$$= \dfrac{8 \times 5}{2}$$
$$\underline{20cm^2}$$

5cm
8cm

6/22 Volume

- **Volume of cuboid**

Volume = l x w x h
$$= 5 \times 3 \times 2$$
$$= 30cm^3$$

3cm
2cm
5cm

- **Volume of cube**

Volume = l x w x h
$$= 3 \times 3 \times 3$$
$$= 27m^3$$

3m
3m
3m
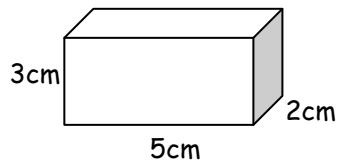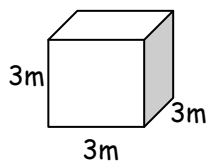
6/23 Construct 2D shapes

Example : Triangle with side and angles given
- Draw line AB = 7cm
- Draw angle 34^0 at point A from line AB
- Draw angle 47^0 at point B from line AB
- Extend to intersect the lines at C
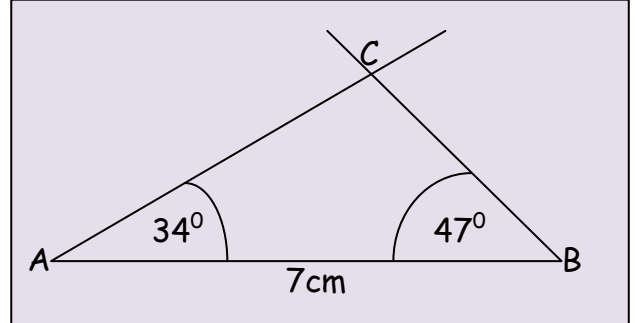
6/23 Construct 3D shapes

CUBE & its net
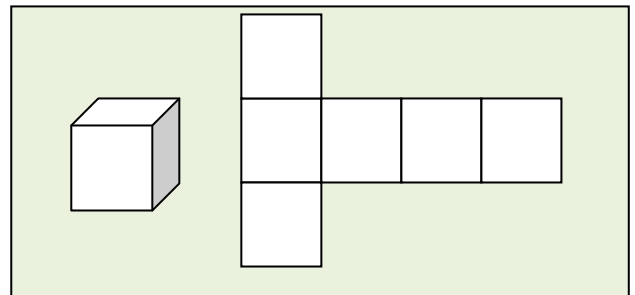
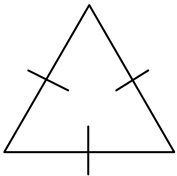### CUBOID & its net
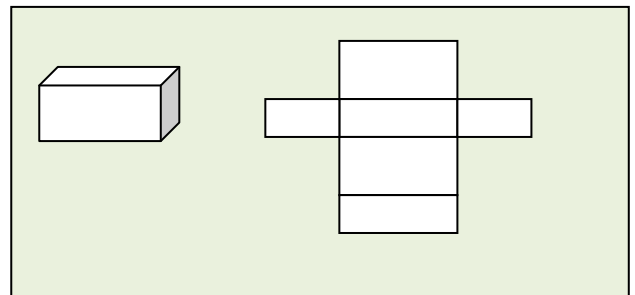
TRIANGULAR PRISM & its net
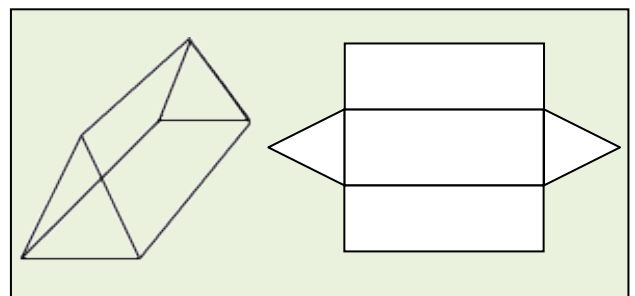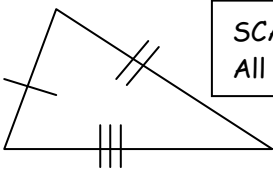
6/24 Properties of shapes
TRIANGLES – sum of angles = 180^0

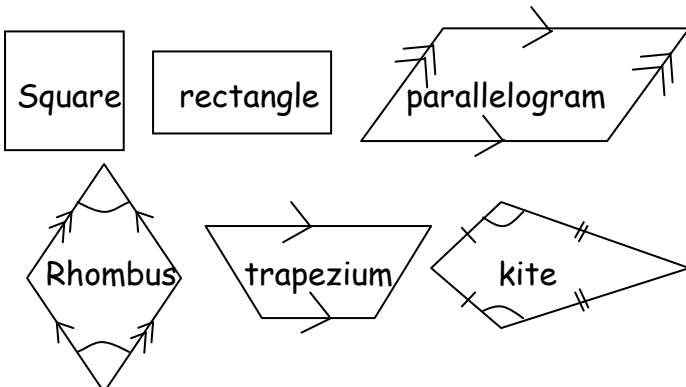ISOSCELES triangle
2 equal sides & 2 equal angles

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
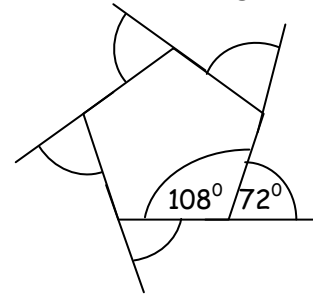
- o interior & exterior angle add up to 180^0

- o the interior angles add up to:

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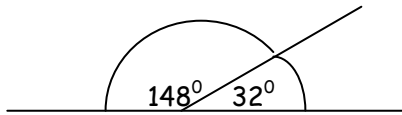Hexagon $=4 \times 180^0 = 720^0$ etc

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
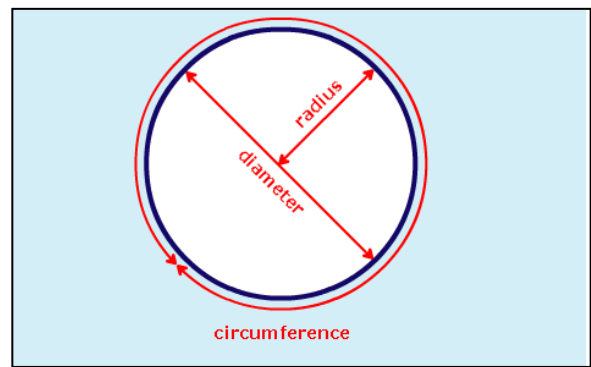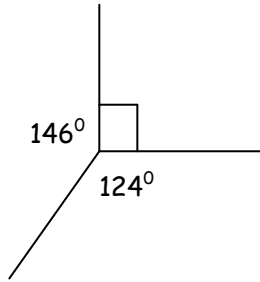
6/26 Angles and straight lines

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

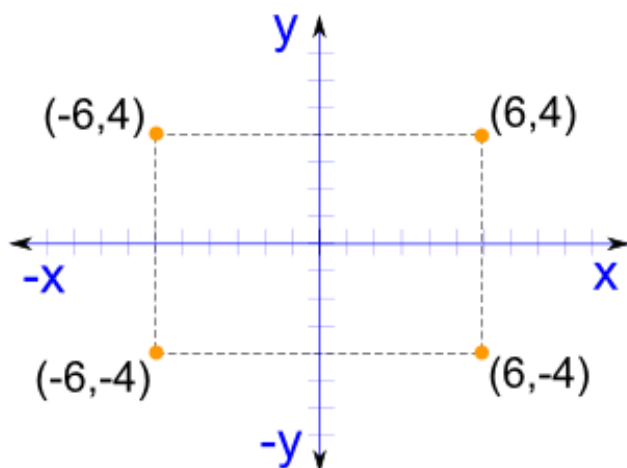$$148^0 + 32^0 = 180^0$$

- 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
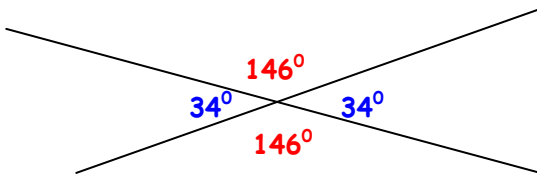
6/27 Position on a co-ordinate grid

(-6,4)   (6,4)

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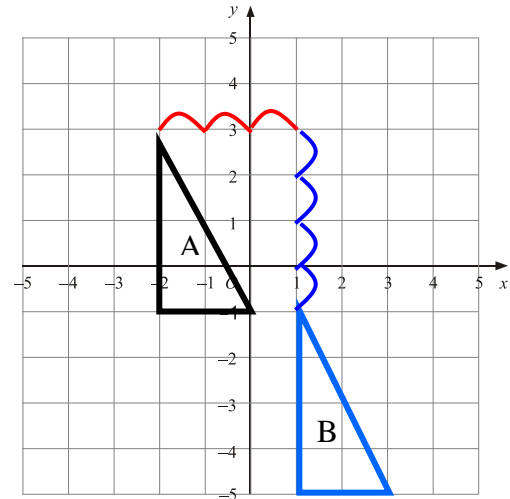
(-6,-4)   (6,-4)

-y

6/28 Transformations

- **Translation –** A shape moved along a line
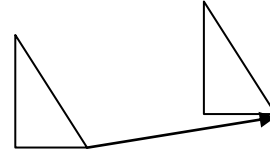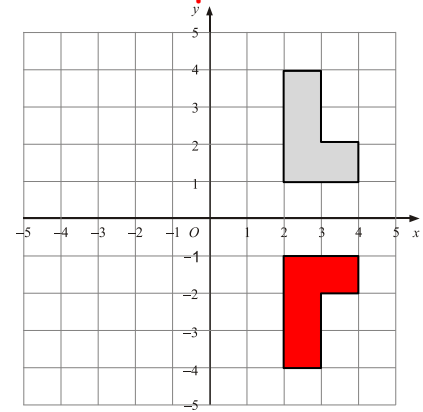

Example – Move shape A 3 right & 4 down
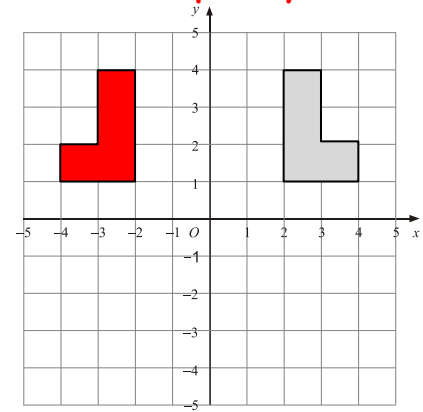Can also be written as a vector $\begin{pmatrix} 3 \\ -4 \end{pmatrix}$ Right Down

Notice:
- The new shape stays the same way up
- The new shape is the same size

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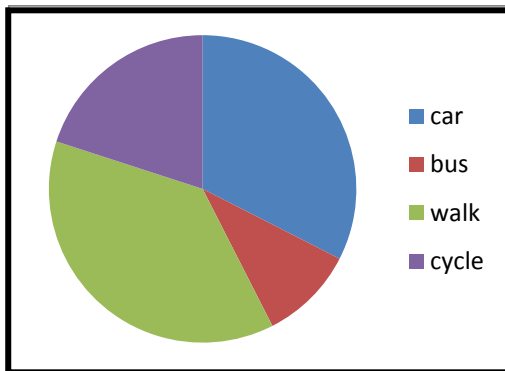

- **Reflect a shape in y-axis**

6/29 Graphs

- **Pie chart**

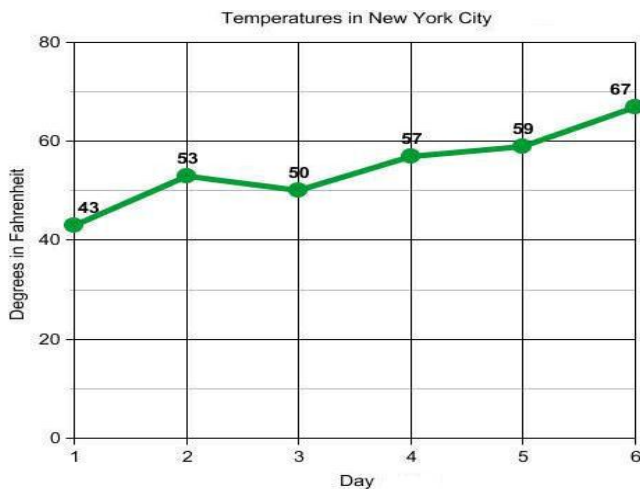| Transport	Frequency	Angle
Car	13	$13 \times 9 = 117^0$
Bus	4	$4 \times 9 = 36^0$
Walk	15	$15 \times 9 = 135$
Cycle	8	$8 \times 9 = 72$

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

$$\text{Mean} = \text{total of measures} \div \text{no. of measures}$$

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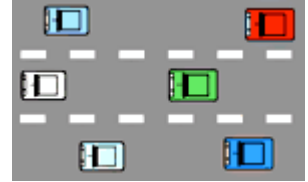
$$\text{Mean} = \frac{66+57+71+54+69+58}{6}$$

$$= \frac{375}{6}$$

$$= 62.5\text{mph}$$

Mean average speed was 62.5mph