St Mary's CE School
Maths Support Resources

Parents often ask us, how can I help my child in maths? Firstly, we provide parents with the expectations for each year to enable them to appreciate the standard required by the end of a school year. The next step is to share with parents, what this really looks like in practice. 'Reach for the Sky' is our initiative to support parents by providing them with information about how to do the calculations required in each class. Each year group is provided with information about what this looks like with visual reminders if you are not sure. These are available on our school website and handed out to all families at the beginning of the year.

We are always happy to discuss this with you; the resources hopefully provide a starting point to supporting your child.

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	ones
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   300 000
The value of the digit '4' is   40 000

- -

1 Round whole numbers

Example 1– Round 342 679 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
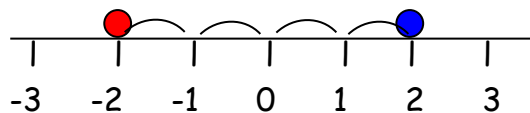   - Replace following digits with zeros

ANSWER – 340 000

Example 2– Round 345 679 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 – 350 000

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

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'

- -

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**

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

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

$432 \div 15$

$\approx 450 \div 15$

≈ 30

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**

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

e.g.   645 - 427

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

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

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

- 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:

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

8 Add & subtract fractions

- Make the denominators the same

e.g. $\dfrac{1}{5} + \dfrac{7}{10}$	e.g. $\dfrac{4}{5} - \dfrac{2}{3}$
$= \dfrac{2}{10} + \dfrac{7}{10}$	$= \dfrac{12}{15} - \dfrac{10}{15}$
$= \dfrac{9}{10}$	$= \dfrac{2}{15}$

Do not add denominators

9 Multiply fractions

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

e.g. $5 \times \dfrac{2}{3}$	e.g. $\dfrac{4}{5} \times \dfrac{2}{3}$
$= \dfrac{5}{1} \times \dfrac{2}{3}$	$= \dfrac{8}{15}$
$= \dfrac{10}{3} = 3\dfrac{1}{3}$	

9 Divide fractions

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

e.g. $\dfrac{2}{3} \div 5$	e.g. $\dfrac{4}{5} \div \dfrac{2}{3}$
$= \dfrac{3}{2} \times \dfrac{1}{5}$	$= \dfrac{4}{5} \times \dfrac{3}{2}$
$= \dfrac{3}{10}$	$= \dfrac{12}{10} = 1\dfrac{2}{10} = 1\dfrac{1}{5}$

6/10 Multiply/divide decimals by 10, 100

thousands	hundreds	tens	ones	•	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

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: $6.28 \div 5$

$$\begin{array}{r} 1\,.\,2\ 5\ 6 \\ 5\,\overline{)6\,.\,{}^12{}^28{}^30} \end{array}$$

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

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

with quotient $0.\,3\,7\,5$

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

Cancel by 3

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

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

14 Similar shapes

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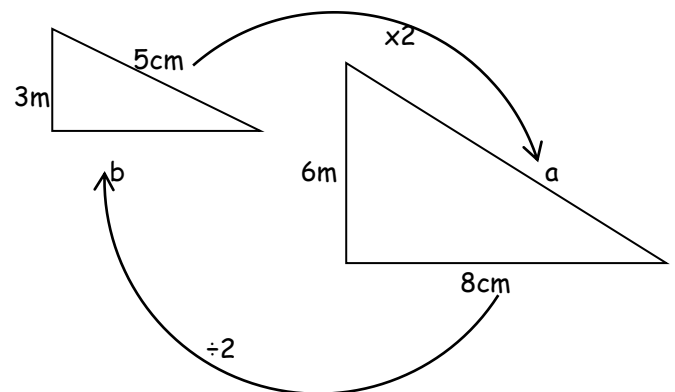
Scale factor = 6 ÷ 3 = 2
Length a = 5 × 2 = 10cm
Length b = 8 ÷ 2 = 4cm

14 Unequal sharing

Example- unequal sharing of sweets

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

15 Express missing numbers algebraically

An unknown number is given a letter

Examples

$2a - 4 = 8$

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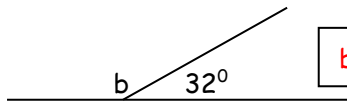
> $b + 32 = 180$ so $b = 148^0$
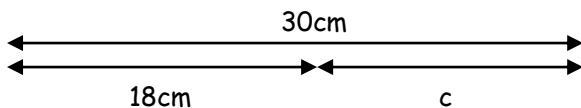
> $18 + c = 30$ so $c = 12$
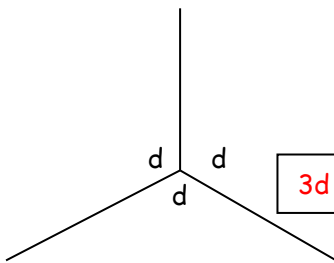
> $3d = 360^0$ so $d = 120^0$

- - - - - - - - - - - - - - - - - - - -

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:
$45min \times 6 + 45min$
$=270min + 45min$
$=315min$
$= \underline{5h\ 15min}$

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

- **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)* = $5 \times 3 + 1 = 16$

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

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: 5 miles = 8km

20 Perimeter and area of shapes

Shapes can have the SAME area but different perimeters

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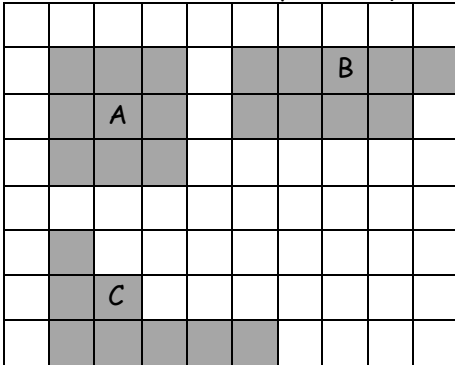
Perimeter of each shape is different
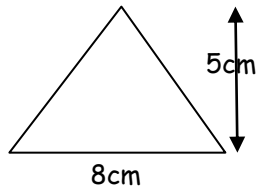A – 12; B – 14; C -16

21 Area of parallelogram & triangle

o **Area of parallelogram**

Area of parallelogram = b x h
= 8 x 5
= 40cm^2

5cm
8cm
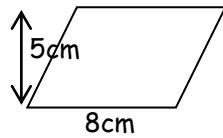
o **Area of triangle (½ a parallelogram)**

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

5cm
8cm

22 Volume

o **Volume of cuboid**

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

3cm
5cm
2cm

o **Volume of cube**

Volume = l x w x h
= 3 x 3 x 3
= 27m^3

3m
3m
3m
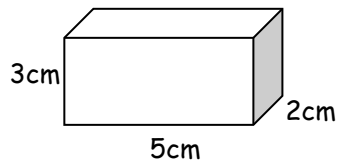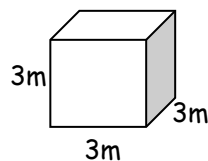
23 Construct 2D shapes

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

C
34^0
47^0
A
7cm
B
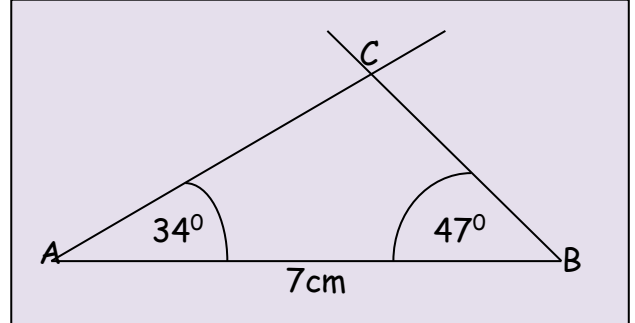
23 Construct 3D shapes
CUBE & its net
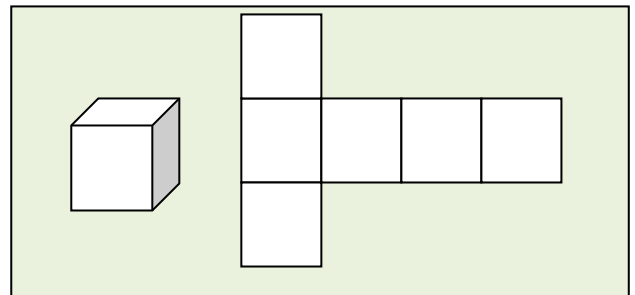
CUBOID & its net
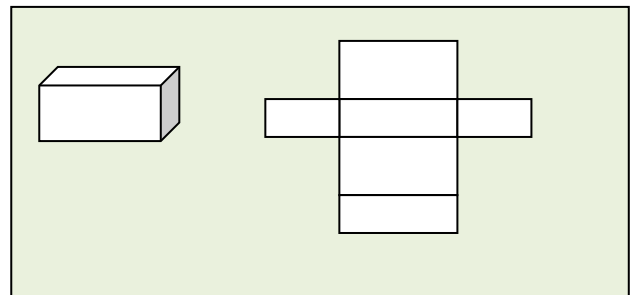
TRIANGULAR PRISM & its net
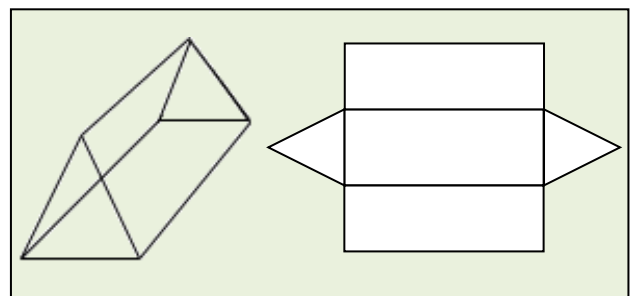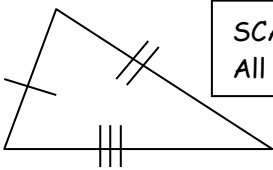
24 Properties of shapes
TRIANGLES – sum of angles = 180^0
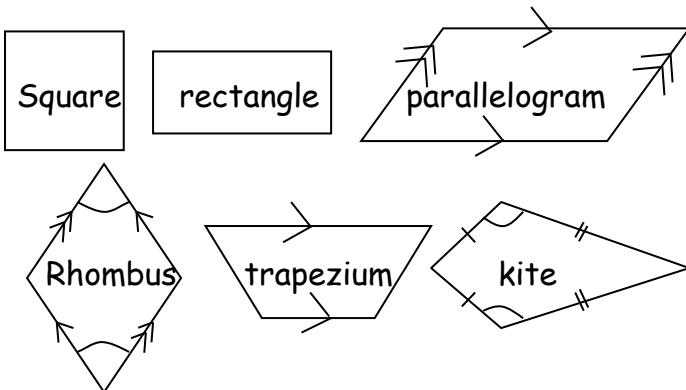
ISOSCELES triangle
2 equal sides & 2 equal angles
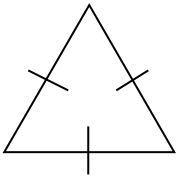
EQUILATERAL triangle
3 equal sides & ALL angles 60^0

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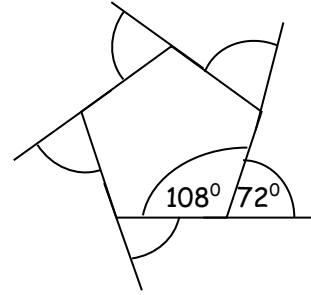
- o interior & exterior angle add up to 180^0

- 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

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. ($d = 2 \times r$) or ($r = \frac{1}{2} \times d$)

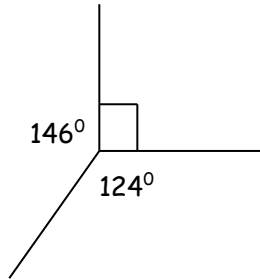radius
diameter
circumference
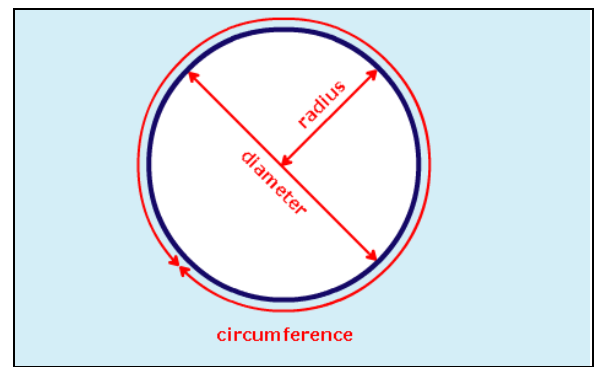
26 Angles and straight lines

- Angles on a straight line add up to 180^0
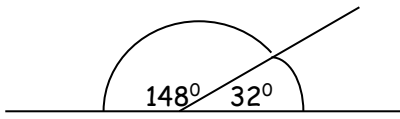
$$148^0 + 32^0 = 180^0$$

- Angles about a point add up to 360^0

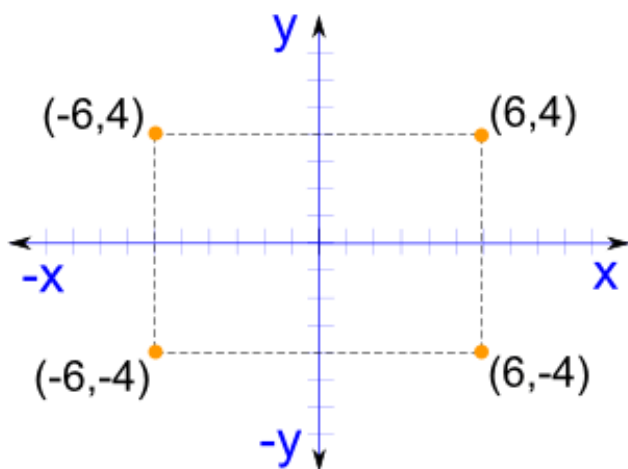
$$146^0 + 90^0 + 124^0 = 360^0$$
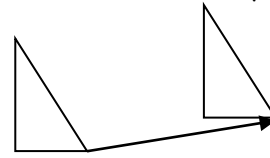
- Vertically opposite angles are equal
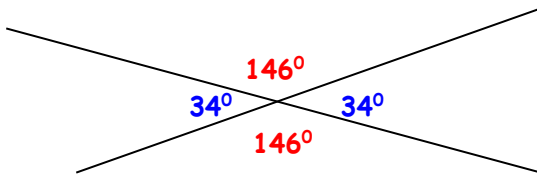
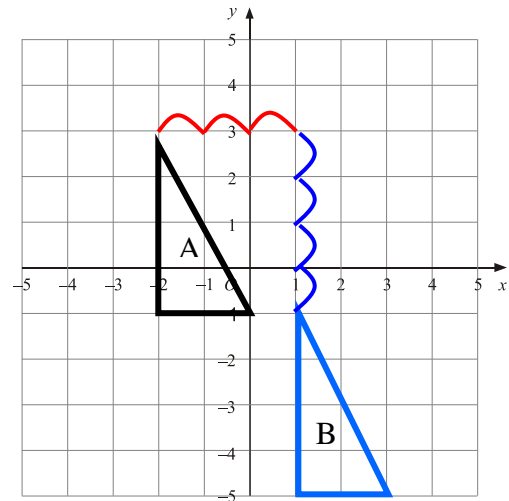## 27 Position on a co-ordinate grid

28 Transformations

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

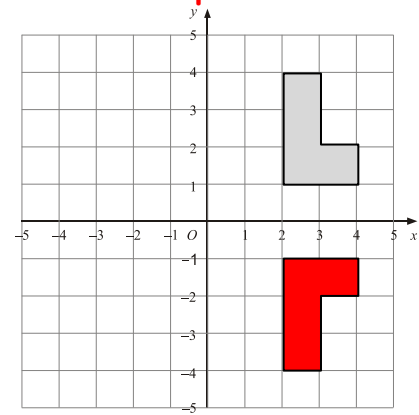Example – Move shape A 3 right & 4 down

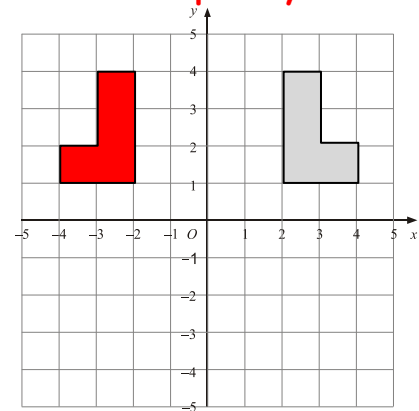Can also be written as a vector $\begin{pmatrix} 3 \\ -4 \end{pmatrix}$ Right Down

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

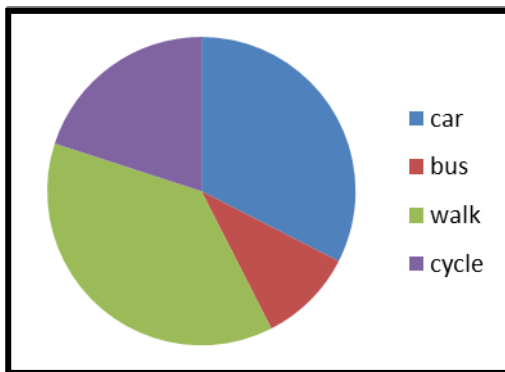- **Reflect a shape in x-axis**

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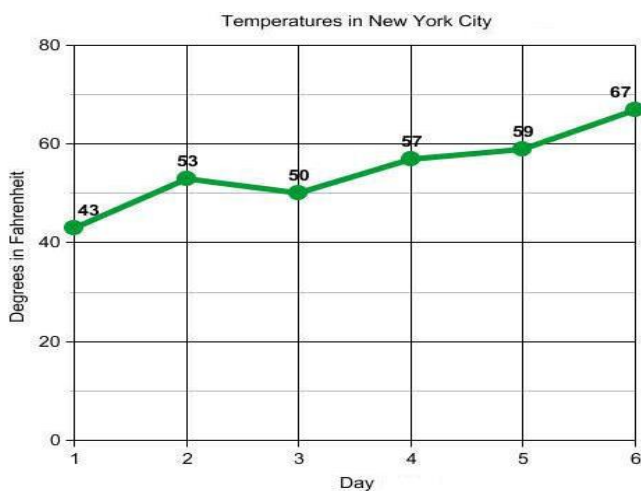
29 Graphs

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

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

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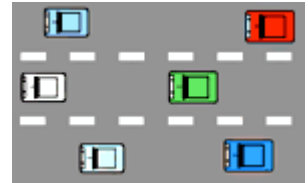
Mean = $\frac{66+57+71+54+69+58}{6}$

$= \frac{375}{6}$

= 62.5mph

Mean average speed was 62.5mph