Year 7
Knowledge Organiser

Year 7 - Sequences

Key Words

Sequence: A list which is in a particular order following a pattern.

**Term:** Each particular part of a sequence.

Arithmetic sequence: A sequence which is formed by adding or subtracting the same amount each time.

Geometric sequence: A geometric sequence has a **term-to-term rule** of "multiply or divide by a number

Key Concept
Types of Sequence

Sequence as pictures:


Arithmetic sequence:

4, 7, 10, 13, 16, ...

+3 +3 +3 +3

Fibonacci sequence:
(add the previous two terms)

1, 1, 2, 3, 5, 8, ...

An arithmetic sequence has a common/constant **difference**

Examples

Next pattern is:

Sequence = 4, 7, 10, 13, ...
Term to term rule = + 3
Nth term   4, 7, 10, 13, 16, ... **= 3n + 1**

+1   +3 +3 +3 +3

Straight-line Graphs

$y = x$

Tip
If a sequence is decreasing, the 'n' term will be negative.
Eg, 15, 11, 7, 3, ...
Nth term = -4n + 19

Questions
1) Find the next two terms and the term to term rule
a) 9, 13, 17, 21, ...   b) 7, 12, 17, 22, ...   c) 9, 7, 5, 3, ...   d) 3, 4, 7, 11, 18
2) Find the nth term   a) 7, 9, 11, 13, ...   b) 8, 13, 18, 23, ...
                       c) 15, 12, 9, 6, ...   d) 1, -3, -7, -11, ...

ANSWERS: 1) a) 25, 29 Rule = +4 b) 27, 32, Rule = +5 c) 1, -1 , Rule = - 2 d) 29, 47, Rule = add previous 2 numbers   2) a) 2n + 5 b) 5n + 3   c) -3n + 18
d) -4n + 5

Year 7- Expressions, Functions and Formulae

Key Concepts

A **formula** involves two or more letters, where one letter equals an **expression** of other letters.

An **expression** is a sentence in algebra that does NOT have an equals sign.

An **identity** is where one side is the equivalent to the other side.

When **substituting** a number into an expression, replace the letter with the given value.

Examples

1) $5(y + 6) \equiv 5y + 30$ is an identity as when the brackets are expanded we get the answer on the right hand side
2) $5m - 7$ is an expression since there is no equals sign
3) $3x - 6 = 12$ is an equation as it can be solved to give a solution
4) $C = \dfrac{5(F - 32)}{9}$ is a formula (involves more than one letter and includes an equal sign)
5) Find the value of $3x + 2$ when $x = 5$ $(3 \times 5) + 2 = 17$

Simplifying: Like terms contain the same letter (or no letter!). For example, $5x$ and $7x$ are like terms but $4x$ and $3y$ are not like terms. You can simplify an expression by collecting like terms

Key Words
Substitute
Equation
Formula
Identity
Expression

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153, 154, 189, 287

45 → −37 → 8

INPUT   FUNCTION   OUTPUT
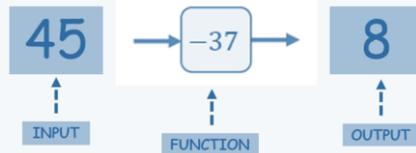
1) To find the output, you need to do the function to the input e.g. $45 - 37 = 8$.
2) To find the input, you need to do the INVERSE function to the output e.g. $8 + 37 = 45$.

Questions
1) **Identify the equation, expression, identity, formula from the list** (a) $v = u + a$ (b) $u^2 - 2as$ (c) $4x(x - 2) = x^2 - 8x$ (d) $5b - 2 = 13$
2) Find the value of $5x - 7$ when $x = 3$
3) Where $A = d^2 + e$, find A when $d = 5$ and $e = 2$

ANSWERS: 1) (a) formula (b) expression (c) identity (d) equation 2) 8 3) A = 27

Year 7 – Number Skills

Key Words

Factor: The numbers which fit into a number exactly.

Multiple: The numbers in the times table.

Prime: Numbers which have only two factors which are 1 and itself.

Highest Common Factor: The highest factor which is common for both numbers.

Lowest Common Multiple: The smallest multiple which is common to both numbers.


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Clip Numbers
196 - 198, 261

Key Concept

Commutative Property of multiplication:

The commutative property of multiplication states that you can multiply numbers in any order and still have same product. 2x5=5x2

Factors

Find factors of 18
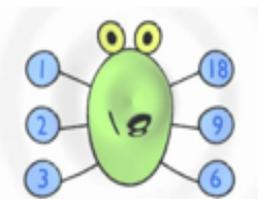
1,18,2, 9, 3 and 6 are factors of 18

Tip

There is only one even prime number which is the number 2. This can be used to help solve lots of problems.

Examples

Long Multiplication is a written method to multiply by numbers with two or more digits

Work out 34 x 29

```
    34
   x29
  ____
   306      First work out 34 x 9
 + 680      Now work out 34 x 20
  ____
   986
```

Add to give the final answer

Questions

1. Work out
a) 32 x 15 b) 46 x 54 c) 62 x 39

2. work out
a) £0.90 x 3 b) £1.25 x 6 c) £19.20 ÷ 6

3. List the factors of 12, 15 and 16

ANSWERS: 1) a) 480 b) 2484 c) 2418 d)
2) a) £2.70 b) £7.50   c) £3.20 3) a) 1, 2, 3, 4, 6, 12, b) 1, 3, 5, 15 c) 1, 2, 4, 8, 16

Year 7- Representing Data

Key Words

Data: A mathematical word that means information.

Correlation: The relationship between two sets of data.

Outliers: A piece of data that doesn't fit the correlation. **Line of best fit:** A line that <u>shows</u> the relationship between two sets of data.

Key Concept

Types of Data

Data can be classified in several different ways.

If you can't give something a number it is called Qualitative data.

Qualitative

Example: What's your favourite food? "curry"

If you can give something a number (counting or measuring) it is called Quantitative data.

Example: How many pets do you have? "4"

Quantitative

Continuous

Continuous data is measured.

Example: What do you weigh? "87kg"

Discrete

Discrete data is counted.

Example: How many DVDs do you have? "44"

Examples

Line of best fit
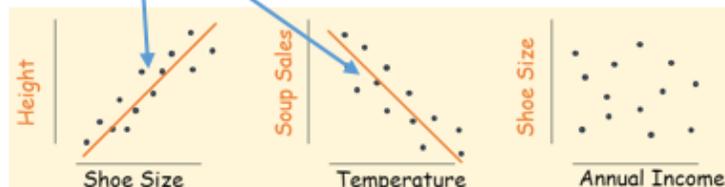
- Scatter graph 1 shows a positive correlation.
- Scatter graph 2 shows a negative correlation.
- Scatter graph 3 shows no correlation.

Frequency tables:

Number of Pets	Tally	Frequency
0		
1		
2		
3		
4		
5 +		

You would use a standard frequency table in cases where:
- The data is discrete
- The data has a small range

| Height of Pet (cm)	Tally	Frequency
0< x ≤ 10		
10 ≤ 20		
20 x ≤ 30		
30 x ≤ 40		
40 x ≤ 50		
50 +		

You would use a grouped frequency table in cases where:
- The data is continuous
- The data has a large range
- There are lots of different numbers

Questions

1) Are the following examples of discrete or continuous data:
A) Number of siblings   B) The length of a leaf
C) Distance ran in 1min   D) Scores in a test out of 100

2)
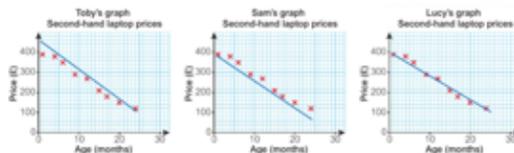
Whose drawn the most accurate line of best fit? Why?

Tip!
The line of best fit does not *have* to have crosses on the line!

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Clip Numbers

400 – 429

Year 7 – Fractions and Percentages

Key Words

Fraction: A fraction is made up of a numerator (top) and a denominator (bottom).

Percentage: Is a proportion that shows a number as parts per hundred.

Integer: Whole number.

Ascending Order: Place in order, smallest to largest.

Descending Order: Place in order, largest to smallest.

Key Concept
FDP equivalence

F	D	P
$\frac{1}{100}$	0.01	1%
$\frac{1}{10}$	0.1	10%
$\frac{1}{5}$	0.2	20%
$\frac{1}{4}$	0.25	25%
$\frac{1}{2}$	0.5	50%
$\frac{3}{4}$	0.75	75%

Examples

Make the denominators the same.

$\frac{3}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{7}{8}$	$\frac{1}{4}$
↓	↓	↓	↓	↓
$\frac{6}{8}$ ④	$\frac{3}{8}$ ②	$\frac{4}{8}$ ③	$\frac{7}{8}$ ⑤	$\frac{2}{8}$ ①
↓	↓	↓	↓	↓
$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{7}{8}$

Convert them all to decimals.

56%	$\frac{3}{4}$	0.871	23%	$\frac{6}{7}$
0.56	0.75	0.871	0.23	0.857...
2	3	5	1	4
23%	56%	$\frac{3}{4}$	$\frac{6}{7}$	0.871

Tip

- A larger denominator does not mean a larger fraction.
- To find equivalent fractions multiply/divide the numerator and denominator by the same number.

Questions

1) Place these lists in ascending order.

a) $\frac{2}{3}, \frac{3}{4}, \frac{5}{6}, \frac{7}{12}$ b) $\frac{3}{7}, \frac{1}{2}, 0.49, 0.2$ c) $\frac{7}{32}, 25\%, 0.05, \frac{29}{100}$

ANSWERS: 1) $\frac{7}{12}, \frac{2}{3}, \frac{3}{4}, \frac{5}{6}$ 2) $0.2, \frac{3}{7}, 0.49, \frac{1}{2}$ 3) $0.05, \frac{7}{32}, 25\%, \frac{29}{100}$

Year 7 Knowledge Organiser
ANALYISNG AND DISPLAYING DATA

Key Concept
Pictogram

Year	Number of cars	🚗 = 1000 cars
2003	🚗 🚗 🚗	
2004	🚗 🚗 🚗	
2005	🚗 🚗 🚗	
2006	🚗 🚗 🚗 🚗	
2007	🚗 🚗	
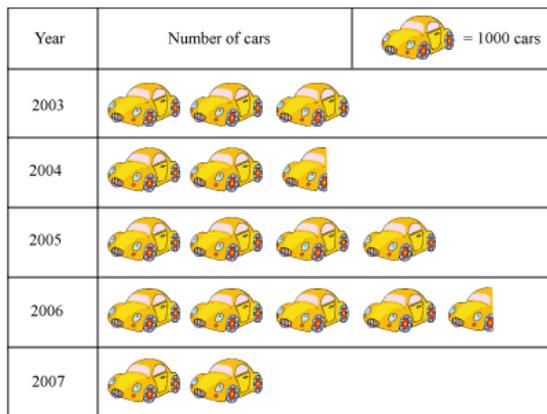
How many cars were sold in 2006?   4500 cars

Bar-chart

1. Frequency on vertical axes
2. Labels on axes
3. Right scales
4. Space between bars
5. Bars with equal widths
6. Title

Key Words

Frequency: Total.
Mean: Total of data divided by the number of pieces of data.
Mode: The value that occurs most frequently.
Median: Middle number when they are in order.
Range: Difference between the largest and smallest values.

Tips
- There can be more than one mode.
- Range is a measure of spread, not an average.
- Bar charts have gaps between the bars.

Examples

$$5, 9, 9, 9, 11, 12, 13, 15, 16$$

Averages

$$Mean = \frac{5 + 9 + 9 + 9 + 11 + 12 + 13 + 15 + 16}{9} = \frac{99}{9} = 11$$

Median = 11   (The middle number shown above)

Mode = 9   (This number occurs most often)

Measure of Spread

Range = 16 − 5 = 11
(A bigger range means the data is more spread out)

Questions

1) Find the mean, mode, median and range of:
   a) 3, 12, 4, 6, 8, 5, 4   b) 12, 1, 10, 1, 9, 3, 4, 9, 7, 9
2) For the table:
a) Draw a pie chart to show the data.
b) Draw a bar chart to show the data.
c) Work out the mean of the data.

Age	Frequency
11	17
12	11
13	8

ANSWERS: 1) a) Mean = 6, Mode = 4, Median = 5, Range = 9   b) Mean = 6.5, Mode = 9, Median = 8, Range = 11   2) a) Angles 170°, 110°, 80 °   c) 11.75

Year 7 Knowledge Organiser
DECIMALS AND MEASURES

Digits after decimal represents fraction

H	T	O	.	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$
		0	.	0	1	

$0.01 = \frac{1}{100}$ (one hundredth)

Mass includes the grams(g) and Kilo grams (kg) 1000g=1kg
Capacity includes the milliliter(ml) and litre.
1000ml=1litre

Key Concepts
Area

$A = l \times w$

$A = b \times h$

$A = \frac{1}{2} (b \times h)$

$A = \frac{1}{2} (a + b)h$
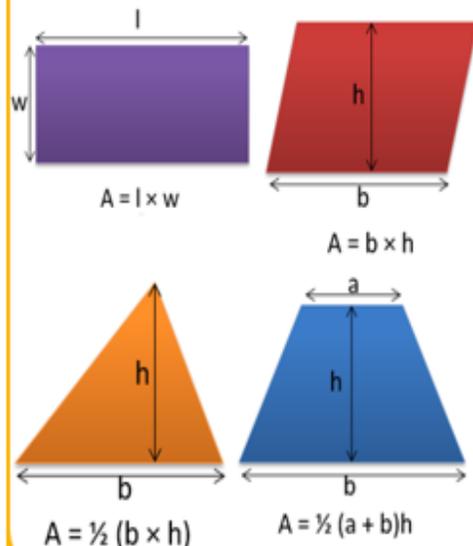
Key Words

Area: The amount of square units that fit inside the shape.
Perimeter: The distance around the outside of the shape.
Dimensions: The lengths which give the size of the shape.
Shapes: Rectangle, Triangle, Parallelogram, Trapezium, Kite.

Examples

4 m
2 m

$Area = 2 \times 4 = 8m^2$

$Area = \frac{1}{2}(10 \times 12)$

$= 60cm^2$

12 cm
10 cm

5 mm
14 mm

$Area = 5 \times 14$
$= 70mm^2$

8cm
2cm
5cm
5 cm
3cm

$Area = (5 \times 3) + (2 \times 5)$
$= 25cm^2$
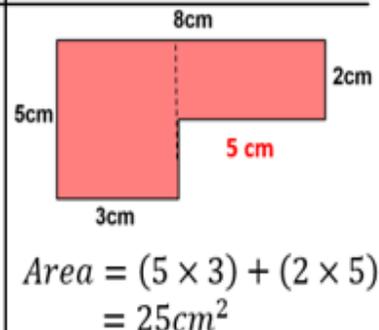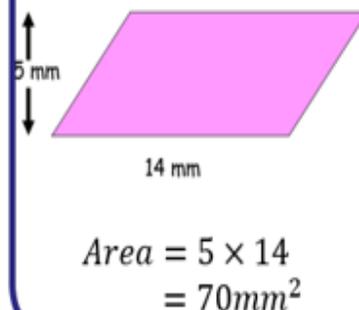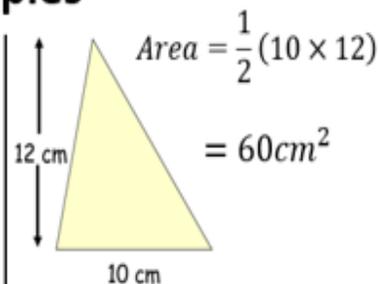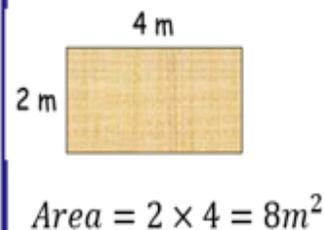
Jaylynn draws a hen with a scale of 2 units on her graph paper represents 6 cm. The hen is 16 units tall in the drawing.
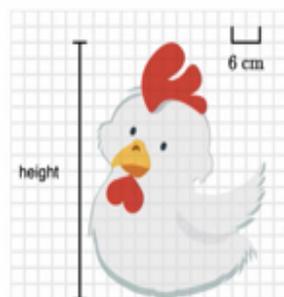
What is the height, in cm, of the actual hen?

6 cm

Drawing   Real World

Units   Cm

2   6

16   48

height

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Clip Numbers
554 – 559

Tip
Always remember units. These units are squared for area.
mm^2, cm^2, m^2, etc

Questions – Find the area.

1)
12 cm
8 cm

2)
16 cm
14 cm

3)
7cm
6cm
9cm
15cm
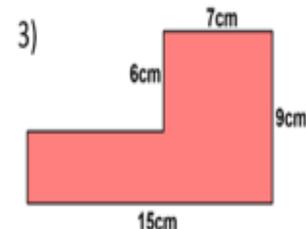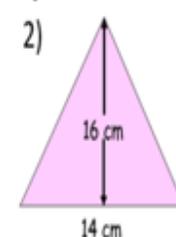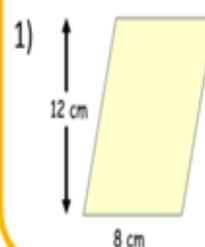
ANSWERS: 1) 96 cm²   2) 112 cm²   2) 87 cm²

Year 7 Knowledge Organiser
PROBABILITY

Key Concept

Chance

Impossible — Unlikely — Even Chance — Likely — Certain

Probability

0	0.25	0.5	0.75	1
0%	25%	50%	75%	100%
0	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1
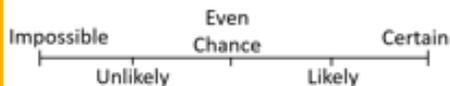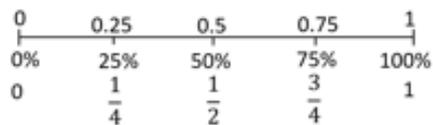
Probabilities can be written as:
- Fractions
- Decimals
- Percentages

Key Words

Probability: The chance of something happening as a numerical value.
Impossible: The outcome cannot happen.
Certain: The outcome will definitely happen.
Even chance: The are two different outcomes each with the same chance of happening.
Expectation: The amount of times you expect an outcome to happen based on probability.

Examples

1) What is the probability that a bead chosen will be **yellow**.
Show the answer on a number line.

$$Probability = \frac{Number\ of\ favourable\ outcomes}{Total\ number\ of\ outcomes}$$

$$P(Yellow) = \frac{2}{8} = \frac{1}{4}$$

0   $\frac{1}{8}$ $\frac{2}{8}$ $\frac{3}{8}$ $\frac{4}{8}$ $\frac{5}{8}$ $\frac{6}{8}$ $\frac{7}{8}$ 1
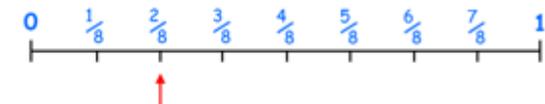
2) How many **yellow** beads would you **expect** if you pulled a bead out and replaced it 40 times?

$$\frac{1}{4} \times 40 = \frac{1}{4} of\ 40 = 10$$

Formula

$$Expectation = Probability \times no.\ of\ trials$$

Formula

Experimental probability

$$= \frac{Number\ of\ times\ that\ thing\ happened}{Total\ number\ of\ times\ experiment\ was\ done}$$

Tip
Probabilities always add up to 1.

Questions
In a bag of skittles there are 12 red, 9 yellow, 6 blue and 3 purple left.
Find: a) P(Red)   b) P(Yellow)   c) P(Red or purple)   d) P(Green)

ANSWERS: 1) a) $\frac{12}{30} = \frac{2}{5}$ b) $\frac{9}{30} = \frac{3}{10}$ c) $\frac{15}{30} = \frac{1}{2}$ d) 0

Year 7 Knowledge Organiser
RATIO and PROPORTION

Key Concept

2:6

2 parts = 6 parts

1:3

=

$= \dfrac{1}{4} = 25\%$

Key Concept

A ratio compares values. It says how much of one thing there is compared to another thing.

For example, if a cake recipe said use 1 cup of sugar and 3 cups of flower…

1 to 3

1 : 3
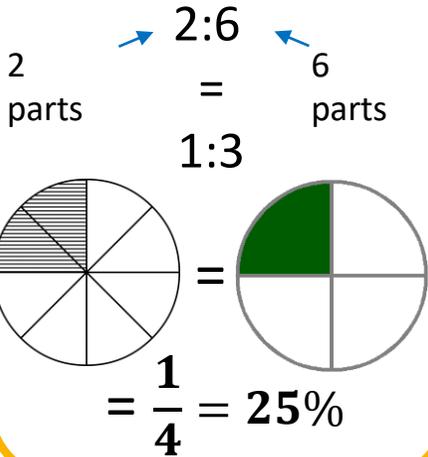
Key Words

Ratio: Relationship between two numbers.
Part: This is the numeric value '1' of, would be equivalent to.
Simplify: Divide both parts of a ratio by the same number.
Equivalent: Equal in value.
Convert: Change from one form to another.

Tip
It's often useful to write the letters above the ratio. This helps you keep the order the correct way round.

Examples

Simplify   60 : 40 : 100

÷ 10

This could have been done in one step by dividing by 20.

6 : 4 : 10

÷ 2

3 : 2 : 5

Write 2: 5 in the form 1 : n

2 : 5

÷ 2   ÷ 2

1 : 2.5

Share £45 in the ratio 2 : 7

$45 \div 9 = 5$

£10 : £35

2 : 7

5	5
5	5
=10	5
	5
	5
	5
	5

=35

3 memory sticks cost £24. How much do 7 memory sticks cost?

1 memory stick =
24/3 = £8
7 memory sticks =
£8 x 7 = £56

Questions
1)   Simplify   a) 45 : 63   b) 66 : 44   c) 320 : 440
2)   Write in the form 1 : n   a) 5 : 10   b) 4: 6   c) $x : x^2 + x$
3)   Share 64 in the ratio 3 : 5   4) Write the ratio 1 : 4 as a fraction.

Year 7
LINES AND ANGLES

Key Concepts

Angles in a **triangle equal 180º**.
Angles in a **quadrilateral equal 360º**.
Vertically opposite angles are equal in size.
Angles on a **straight line equal 180º**.
Angles **around a point equal 360º**
Base angles in an isosceles triangle are equal.

Types of angle
There are four types which need to be identified – acute, obtuse, reflex and right angled.

Types of triangles

| Equilateral Triangle | Isosceles Triangle | Scalene Triangle | Right Angle Triangle |

Examples

Acute is less than 90º

Obtuse is between 90º and 180º

Right angled is 90º

Reflex is between 180º and 360º

$x = 180 - (23 + 124)$
$x = 33^o$

23°   124°

$c = 180 - 129$
$x = 51^o$

129°

$\angle FGD = 360 - (65 + 110 + 87)$
$\angle FGD = 98^o$

F   65°   110°   E
87°   D
?   G

$f = 44^o$

44°

$e = 360 - (95 + 115 + 50)$
$e = 100^o$

95°   e
115°   50°

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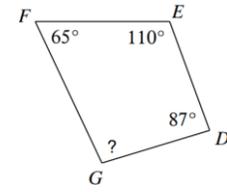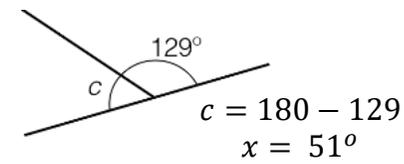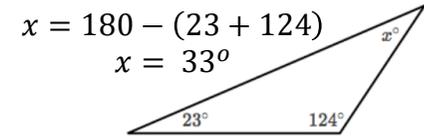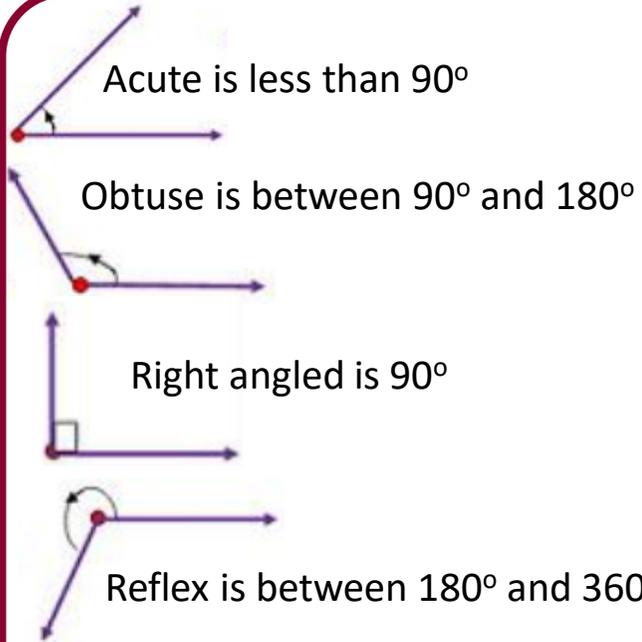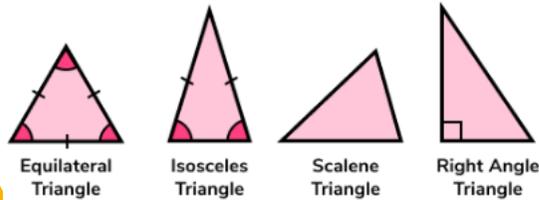
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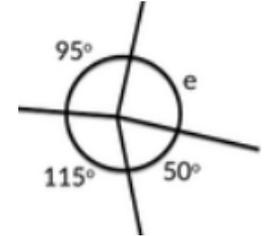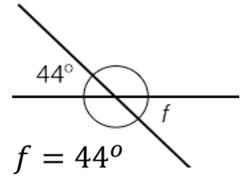
461, 477-479,
485-487, 560,
812-814, 823

Key Words
Angle
Vertically opposite
Straight line
Equilateral
Isosceles
scalene

Questions

Calculate the missing angle:

a)
a
70°   60°

b)
87°   c
94°   b   58°

c)
?°   25°
90°   105°

ANSWERS: 1) a=50º   2) b=122º   c=57º 3) 140
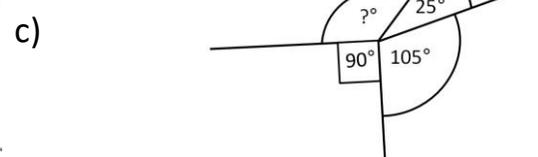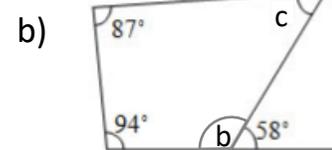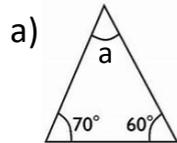
# Year 7 Knowledge Organiser
TRANSFORMATIONS

Key Concept

Reflection
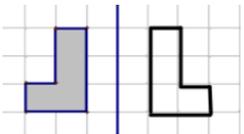
Rotation
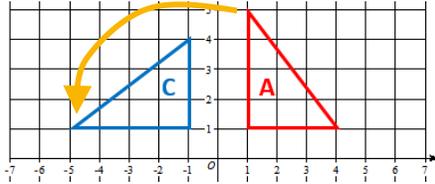
Translation
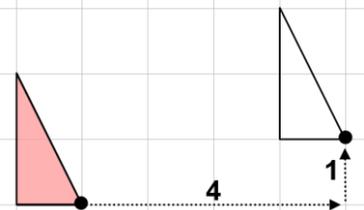
Key Words

Transformation: This means something about the shape has 'changed'.

Reflection: A shape has been flipped.

Rotation: A shape has been turned.

**Translation:** A movement of a shape.

Enlargement: A change in size, either bigger or smaller.

Congruent: These shapes are the same shape and same size but can be in any orientation.

Symmetry: A shape has symmetry if there is a line which forms two equal parts which are a mirror image of each other.

Examples

Lines of symmetry and reflection

Square
4 lines of symmetry

Rectangle
2 lines of symmetry

Rotational Symmetry

Order = 2   Order = 4

Questions

1) A triangle has lengths 3cm, 4cm and 5cm. What will they be if enlarged scale factor 3.

2) For the shapes below draw on their lines of symmetry and state their order of rotational symmetry
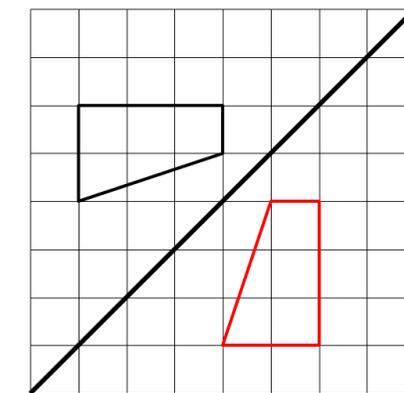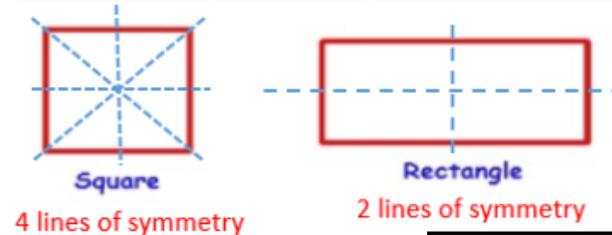
Tip

- The smallest the order of rotational symmetry can be, is 1.
- To see if a line of symmetry works fold along the line and see if the both halves lie exactly on top of each other.
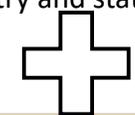
ANSWERS: 1) 9cm, 12cm and 15cm 2) 1) 2 lines of symmetry, order = 2 2) 1 line of symmetry, order = 1 3) 4 lines of symmetry, order = 4.