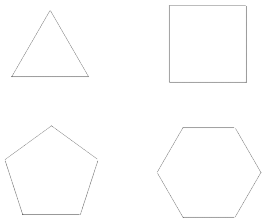
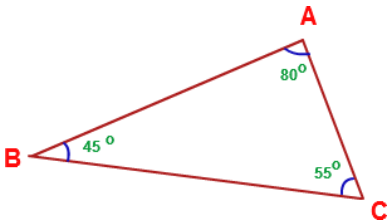
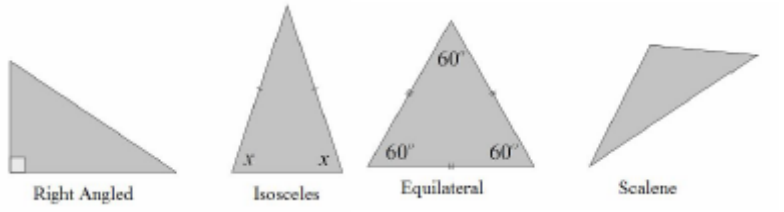
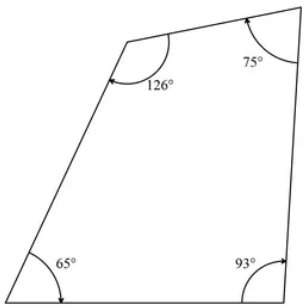
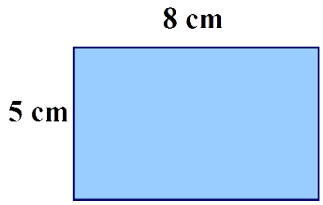
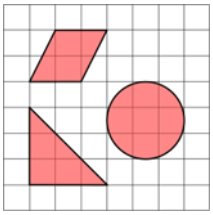
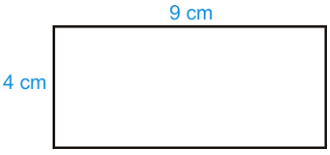
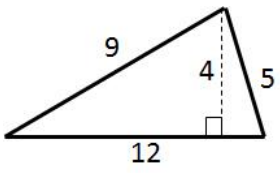
Kettering Science Academy Maths

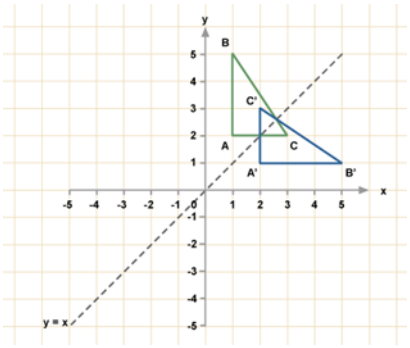
Year 7 Mathematics Developing HT 5

Angles and lines

1.	Polygon	**A 2D shape with only straight edges.** Rectangle, Hexagon, Decagon, Kite etc
2.	Regular	**A shape is regular if all the sides and all the angles are equal.** 
3.	Names of Polygons	3-sided = Triangle 4-sided = Quadrilateral 5-sided = Pentagon 6-sided = Hexagon 7-sided = Heptagon/Septagon 8-sided = Octagon 9-sided = Nonagon 10-sided = Decagon 
4.	Angles in a Triangle	**Angles in a triangle add up to 180°.** 

5.	Types of Triangles	**Right Angle** Triangles have a **90°** angle in. **Isosceles** Triangles have **2 equal sides** and **2 equal base angles**. **Equilateral** Triangles have **3 equal sides** and **3 equal angles (60°)**. **Scalene** Triangles have **different sides** and **different angles**. **Base angles in an isosceles triangle are equal.** 
6.	Angles in a Quadrilateral	**Angles in a quadrilateral add up to 360°.** 
7.	Sum of Interior Angles	$$(\boldsymbol{n-2}) \times \mathbf{180}$$ - where n is the number of sides. Sum of Interior Angles in a Decagon = $(10-2) \times 180 = 1440°$
8.	Size of Interior Angle in a Regular Polygon	$$\frac{(\boldsymbol{n-2}) \times \mathbf{180}}{\boldsymbol{n}}$$ You can also use the formula: $$\mathbf{180} - \boldsymbol{Size\ of\ Exterior\ Angle}$$ Size of Interior Angle in a Regular Pentagon = $$\frac{(5-2) \times 180}{5} = 108°$$
9.	Size of Exterior Angle in a Regular Polygon	$$\frac{\mathbf{360}}{\boldsymbol{n}}$$ You can also use the formula: $$\mathbf{180} - \boldsymbol{Size\ of\ Interior\ Angle}$$

		Size of Exterior Angle in a Regular Octagon = $\frac{360}{8} = 45°$
10.	Perimeter	The **total distance** around the **outside** of a shape. Units include: mm, cm, m etc.  $P = 8 + 5 + 8 + 5 = 26cm$
11.	Area	The amount of **space inside** a shape. Units include: mm^2, cm^2, m^2 
12.	Area of a Rectangle	**Length x Width**  $A = 36cm^2$
13.	Area of a Triangle	**Base x Height ÷ 2**  $A = 24cm^2$
14.	Reflection	The size does not change, but the shape is '**flipped**' like in a **mirror**. Line $x = ?$ is a **vertical line**.

		Line $y =?$ is a **horizontal line**. Line $y = x$ is a **diagonal line**. Reflect shape C in the line $y = x$ 
Fractions, decimals and percentages		
1.	Fraction	A mathematical expression representing the **division** of one integer by another. Fractions are written as **two numbers separated by a horizontal line**. $\frac{2}{7}$ is a 'proper' fraction. $\frac{9}{4}$ is an 'improper' or 'top-heavy' fraction.
2.	Numerator	The **top** number of a fraction. In the fraction $\frac{3}{5}$, 3 is the numerator.
3.	Denominator	The **bottom** number of a fraction. In the fraction $\frac{3}{5}$, 5 is the denominator.
4.	Simplifying Fractions	**Divide the numerator and denominator by the highest common factor**. $$\frac{20}{45} = \frac{4}{9}$$
5.	Equivalent Fractions	Fractions which represent the **same value**. $$\frac{2}{5} = \frac{4}{10} = \frac{20}{50} = \frac{60}{150}\ etc.$$

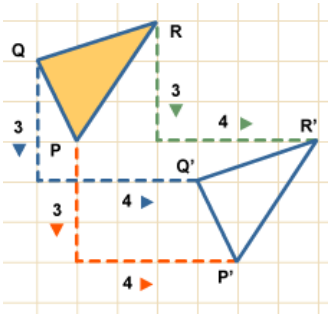
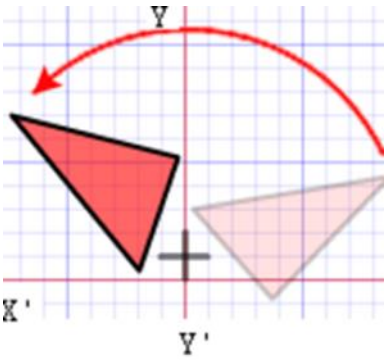
6.	Comparing Fractions	To compare fractions, they each need to be rewritten so that they have a **common denominator**. **Ascending** means **smallest to biggest**. **Descending** means **biggest to smallest**. Put in to ascending order : $\frac{3}{4}, \frac{2}{3}, \frac{5}{6}, \frac{1}{2}$. Equivalent: $\frac{9}{12}, \frac{8}{12}, \frac{10}{12}, \frac{6}{12}$ Correct order: $\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{5}{6}$
7.	Adding or Subtracting Fractions	Find the **LCM of the denominators** to find a common denominator. Use equivalent fractions to change each fraction to the **common denominator**. $$\frac{2}{3}+\frac{4}{5}$$ Multiples of 3: 3, 6, 9, 12, **15**.. Multiples of 5: 5, 10, **15**.. LCM of 3 and 5 = 15 Then just **add or subtract the numerators** and keep the **denominator the same**. $$\frac{2}{3}=\frac{10}{15}$$ $$\frac{4}{5}=\frac{12}{15}$$ $$\frac{10}{15}+\frac{12}{15}=\frac{22}{15}=1\frac{7}{15}$$
8.	Percentage	**Number of parts per 100.** 31% means $\frac{31}{100}$
9.	Finding 10%	To find **10%, divide by 10** 10% of £36 = 36÷10=£3.60
10.	Finding 1%	To find **1%, divide by 100**

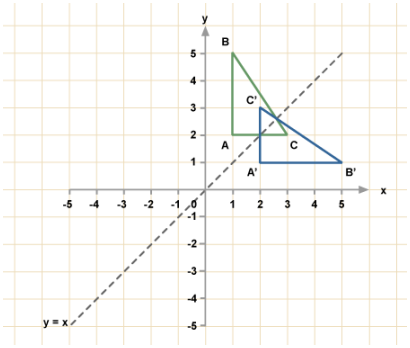
		1% of £8 = 8÷100 = £0.08

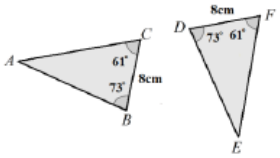
Kettering science Academy Maths

Year 7 Mathematics Developing HT 6

Transformations

1.	Translation	**Translate means to move a shape.** The shape does not change size or orientation. 
2.	Column Vector	In a column vector, the top number moves left (-) or right (+) and the bottom number moves up (+) or down (-) $\begin{pmatrix}2\\3\end{pmatrix}$ means '2 right, 3 up' $\begin{pmatrix}-1\\-5\end{pmatrix}$ means '1 left, 5 down'
3.	Rotation	The size does not change, but the **shape is turned around a point**. Use tracing paper. **Rotate Shape A 90° anti-clockwise about (0,1)** 
4.	Reflection	**The size does not change, but the shape is 'flipped' like in a mirror.**

		Line $x =?$ is a vertical line. **Line $y =?$ is a horizontal line.** **Line $y = x$ is a diagonal line.** Reflect shape C in the line $y = x$ 
5.	Enlargement	**The shape will get bigger or smaller. Multiply each side by the scale factor.** Scale Factor = 3 means '3 times larger = multiply by 3' Scale Factor = ½ means 'half the size = divide by 2'
6.	Describing Transformations	Give the following information when describing each transformation: Look at the number of marks in the question for a hint of how many pieces of information are needed. If you are asked to describe a 'transformation', you need to say the name of the type of transformation as well as the other details. **- Translation, Vector** **- Rotation, Direction, Angle, Centre** **- Reflection, Equation of mirror line** **- Enlargement, Scale factor, Centre of enlargement**
7.	Congruent Shapes	Shapes are congruent if they are **identical** - **same shape** and **same size**. Shapes can be rotated or reflected but still be congruent. 
8.	Congruent Triangles	4 ways of proving that two triangles are congruent:

		1. **$$$** (Side, Side, Side) 2. **RH$** (Right angle, Hypotenuse, Side) 3. **A** (Side, Angle, Side) 4. **A$A** (Angle, Side, Angle) or **AA$** <u>ASS does not prove congruency.</u>  $BC = DF$ $\angle ABC = \angle EDF$ $\angle ACB = \angle EFD$ $\therefore$ The two triangles are congruent by AAS.
9.	Similar Shapes	Shapes are similar if they are the **same shape but different sizes**. The proportion of the matching sides must be the same, meaning the ratios of corresponding sides are all equal. 
10.	Similar Triangles	To show that two triangles are similar, show that: 1. The three sides are in the same proportion 2. Two sides are in the same proportion, and their included angle is the same 3. The three angles are equal