



# Kinross High School Mathematics Department

## Prerequisite Knowledge Required for the National 5 Course

### Introduction

Below is a list of the prerequisite skills that a pupil will need in order to be able to successfully access the National 5 course. Pupils will be expected to have a high level of confidence with the skills denoted with the symbol (●). For Skills denoted with the symbol (☒) a reasonable level of confidence is expected but these topics are usually partially revisited (albeit in a more challenging way) in the National 5 course. If you click on those symbols it should take you to a webpage where your child can revise the subskill. Please note, unless otherwise stated, these skills are expected to be able to be completed without a calculator.

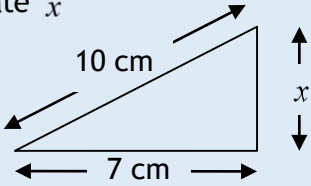
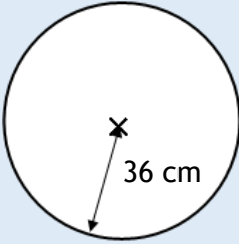
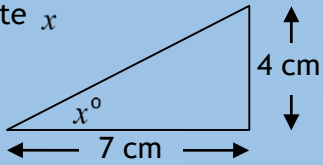
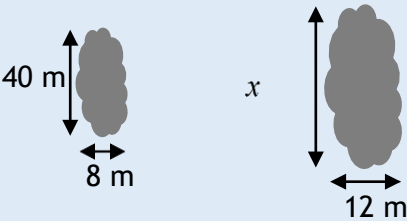
### Algebraic Skills

	SUBSKILL	EXAMPLE QUESTION
●	Expand and simplify algebraic expressions involving brackets	Expand and simplify $4(2x - 3) - 3(5 - x) + 2$
●	Solve linear equations and in-equations in the form $a(bx + c) = dx + e$ where $a \in \mathbb{Q}$ and $a, b, c, d, e \in \mathbb{Z}$	Solve $4(3 - x) > 6x - 3$
☒	Solve linear equations and in-equations with fractional terms	Solve $\frac{6x}{5} = x - 3$
●	Evaluate expressions and formulae by substitution	Evaluate $T$ when $a = -2$ and $b = 3$ in the formula $T = 3b - 2a^2$
☒	Find the missing variable in a formula through substitution and rearrangement	Evaluate $b$ when $a = -2$ and $T = 12$ in the formula $T = 3b - 2a^2$
●	Be able to factorise an expression using a common factor	Factorise $12x + 16y - 20$

## Numerical Skills

SUBSKILL	EXAMPLE QUESTION
• Understand the terms prime, factor and multiple and be able to find the highest common factor and the lowest common multiple.	What is the highest common factor of 16 and 40?
• Know all times tables up to 12, be able to multiply and divide whole numbers and decimals by multiples of 10	Evaluate $12 \times 7 \times 8000$
• Know all squares and square roots up to $12^2$	(a) Evaluate $8^2$ (b) Evaluate $\sqrt{49}$
• Be able to perform multiple operations on positive and negative numbers, following the order of priority (BIDMAS).	Evaluate $4 - 6^2 \div 7(-4) + (-3)$
• Be able to simplify fractions	Simplify $\frac{20}{36}$
• Convert between mixed numbers and improper fractions	Change $2\frac{4}{5}$ into an improper fraction
• Add, subtract, multiply and divide fractions where the numerator is smaller than the denominator	(a) Evaluate $3\frac{3}{4} - 2\frac{2}{3}$ (b) Evaluate $4\frac{4}{7} \times 7\frac{2}{5}$
• Add, subtract, multiply and divide fractions including mixed numbers	(a) Evaluate $5\frac{1}{4} - 2\frac{2}{3}$ (b) Evaluate $2\frac{4}{7} \div 1\frac{2}{5}$
• Evaluate common percentages of quantities without a calculator, sometimes in context	Find 30% of £52
• Evaluate common percentages of quantities with a calculator, sometimes in context	Jane's salary this year is £32 456. It is to increase next year by 2 – 7%. What is her salary next year?
• Be able to round numbers to various degrees of accuracy including significant figures.	Round $45\,237 - 8$ to 2 significant figures
• Be able to convert between metric units of weight, time, distance, area, volume and capacity.	Convert $57\,230 \text{ cm}^3$ to litres.
• Use appropriate formulae to calculate the speed, distance or time in given situations.	Calculate the speed of a car in kilometres per hour which travels three and a half kilometres in 40 minutes.

## Geometric Skills

SUBSKILL	EXAMPLE QUESTION
<p>□ Use Pythagoras' Theorem (<math>c^2 = a^2 + b^2</math>) in basic situations with a calculator (memorisation of formula is expected)</p>	<p>Calculate <math>x</math></p> 
<p>☒ Use Pythagoras' Theorem in more complex situations with a calculator</p>	<p>James wants to travel between three campsites. Campsite P is 4km due north of Q. Campsite R is due east of Q. How far will James travel if he starts at Q, visits the other two sites and returns to Q?</p>
<p>□ Solve problems involving the circumference (<math>C = \pi D</math>) and area (<math>A = \pi r^2</math>) of a circle with a calculator (memorisation of formulae is expected)</p>	<p>Calculate the area and circumference of this circle</p> 
<p>□ Calculate the area or a missing side of a rectangle, kite, rhombus, parallelogram, trapezium, triangle and composites of these shapes</p>	<p>The area of a kite with a diagonal of length 8 cm is <math>24\text{cm}^2</math>. Calculate the length of the other diagonal.</p>
<p>□ Be able to work out the volume of a cube and cuboid</p>	<p>Calculate the volume of a cube with edges measuring 50cm. Give your answer in litres.</p>
<p>☒ Find a missing side or angle in a right angled triangle using trigonometry (SOHCAHTOA)</p>	<p>Calculate <math>x</math></p> 
<p>□ Interpret mathematically similar shapes to find a missing side</p>	 <p>These shapes are mathematically similar. Calculate the values of</p>

	SUBSKILL	EXAMPLE QUESTION
•	Understand and use the Cartesian coordinate system	<p>(a) Plot the points A(4, 6), B(-2, 3) and C(-1, -3) on a coordinate diagram.</p> <p>(b) Plot a point D such that ABCD is a rhombus</p> <p>(c) Reflect rhombus ABCD about the <math>x</math> – axis.</p>
•	Work with bearings to find other angles and bearings	The bearing of C from A is $50^\circ$ . The bearing from C to B is $120^\circ$ . Calculate the angle ACB.

## Statistical Skills

	SUBSKILL	EXAMPLE QUESTION										
•	Understand and evaluate the mean, median and mode of a set of data	Calculate the mean, median and mode of the following data set: 4, 5, 7, 7, 5, 6, 2, 8										
•	Compare the mean or median of a data set with the mean or median of another data set	Explain why when considering the average salary of all adults in the UK, the median might be a better measure of average than the mean.										
•	Be able to plot and interpret scatter diagrams	<p>(a) Plot the following pairs of test scores on a scatter diagram:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tbody> <tr> <td>Maths</td> <td>31</td> <td>45</td> <td>21</td> <td>52</td> </tr> <tr> <td>Physics</td> <td>25</td> <td>35</td> <td>18</td> <td>40</td> </tr> </tbody> </table> <p>(b) Draw a best fitting line through the data</p> <p>(c) Use your best fitting line to predict a Physics score if a Maths score was 40.</p>	Maths	31	45	21	52	Physics	25	35	18	40
Maths	31	45	21	52								
Physics	25	35	18	40								
•	Draw and interpret the following statistical diagrams: <input type="checkbox"/> Pie chart <input type="checkbox"/> Bar chart <input type="checkbox"/> Line graph <input type="checkbox"/> Scatterplot <input type="checkbox"/> Stem & Leaf diagram <input type="checkbox"/> Histogram <input type="checkbox"/> Grouped frequency table	Construct a pie chart for the following data of favourite colours: <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Blue</th> <th>Green</th> <th>Red</th> <th>Yellow</th> </tr> </thead> <tbody> <tr> <td>44</td> <td>16</td> <td>22</td> <td>8</td> </tr> </tbody> </table>	Blue	Green	Red	Yellow	44	16	22	8		
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☒	Calculate the Mean from a grouped frequency table	Calculate the mean of the data in this grouped frequency table: <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Minutes of Maths homework per week</th> <th>frequency</th> </tr> </thead> <tbody> <tr> <td>0 - 10</td> <td>2</td> </tr> <tr> <td>11 - 20</td> <td>5</td> </tr> <tr> <td>21 - 30</td> <td>12</td> </tr> <tr> <td>31 - 40</td> <td>10</td> </tr> </tbody> </table>	Minutes of Maths homework per week	frequency	0 - 10	2	11 - 20	5	21 - 30	12	31 - 40	10
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