National 5 Maths - Expressions and Formulae Unit

Topics Covered:

- Volumes of Solids
- Gradients
- Algebra – Expanding Brackets and Factorising
- Algebraic Fractions
- Surds and Indices
- Rounding
- Scientific Notation

Assessment Standard	**Comments**
1.1 Applying numerical skills to simplify surds/expressions using the laws of indices	
1.2 Applying algebraic skills to manipulate expressions	
1.3 Applying algebraic skills to algebraic fractions	
1.4 Applying geometric skills linked to the use of formulae	
2.1 Interpreting a situation where mathematics can be used and identifying a valid strategy	
2.2 Explaining a solution and/or relating it to context	

Topic	I can…	Red/ Amber/ Green	Comments
Volume of Solids	use the formula $V = lbh$ to work out the volume of a cuboid (cube).		
	use the formula $V = Ah$ and area formulas to work out the volume of a prism.		
	use the formula $V = \pi r^2 h$ to calculate the volume of a cylinder.		
	use the formula $V = \frac{4}{3}\pi r^3$ to calculate the volume of a sphere.		
	use the formula $V = \frac{1}{3}\pi r^2 h$ to calculate the volume of a cone.		
	use the formula $V = \frac{1}{3}lbh$ to work out the volume of a pyramid.		
	work out the volume of composite shapes.		

Gradients	use the gradient formula $m = \frac{y_2 - y_1}{x_2 - x_1}$ given two coordinates		

Topic	I can…	Red/ Amber/ Green	Comments
Algebraic Fractions	I can simplify an algebraic fraction to its simplest form, knowing that I can cancel top and bottom if the terms are multiplying each other, eg, $\frac{(x+2)^2}{(x+2)(x+3)}=\frac{x+2}{x+3}$		
	I can add algebraic fractions by making sure they both have the same denominator (use the kiss and smile method)		
	I can subtract algebraic fractions by making sure they both have the same denominator (use the kiss and smile method)		
	I can multiply algebraic fractions together and simplify where possible. (by multiplying numerators together and multiplying denominators together).		
	I can divide algebraic fractions together by changing the ÷ to × and flipping the second fraction upside down. I can then simplify where possible.		

Topic	I can…	Red/ Amber/ Green	Comments
Indices and Surds	I can simplify a surd using factors and the formula $\sqrt{ab} = \sqrt{a}\sqrt{b}$.		
	I can gather like terms using multiples of different surds eg $3\sqrt{2} + 5\sqrt{8} + 4\sqrt{2}$		
	I can simplify a surd by using factors and the formula $\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}.}$		
	I know that $\sqrt{a}\sqrt{a} = a$.		
	rationalise the denominator of a fraction containing a single surd on the bottom line I multiply top and bottom by that surd, e.g. $\frac{2}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$		
	I know to rationalise the denominator of a fraction containing any surd I multiply by the top and bottom by the conjugate surd expression with opposite sign in between, e.g. $\frac{2}{\sqrt{3}+1} \times \frac{\sqrt{3}-1}{\sqrt{3}-1}$.		
	I can multiply and divide using the rules of indices including fractional indices using the rules: $x^a x^b = x^{a+b}$ and $\frac{x^a}{x^b} = x^{a-b}$.		
	I know the rule: $\sqrt[b]{x^a} = x^{\frac{a}{b}}$		
	I know the rule: $x^{-n} = \frac{1}{x^n}$		
	I know that $x^1 = x$ and $x^0 = 1$		
	I know and can use the rule $(x^a)^b = x^{ab}$		

Topic	I can…	Red/ Amber/ Green	Comments
Algebra	I can add, subtract and multiply more complicated algebraic expressions.		
	I can multiply out a simple, single set of brackets.		
	I can multiply out brackets and then gather like terms when necessary.		
	I can multiply out double brackets and then gather like terms when necessary.		
	I can multiply out two sets of brackets with one of the brackets containing a trinomial.		
Factorising	I can factorise an expression by taking out a common factor.		
	I can factorise an expression by using the difference of two squares.		
	I can factorise a quadratic expression of the form: $x^2 + bx + c$.		
	I can factorise a quadratic expression of the form: $ax^2 + bx + c$.		
	I can use my knowledge of factorising to factorise an expression using the methods in the correct order.		
Rounding	I can round to certain accuracy after completing a calculation.		
	I can round to 1, 2, 3, . . . decimal places.		
	I can round to 1, 2, 3, . . . significant figures.		
	I can estimates and then calculate the correct answer.		

Revision from B.G.E.

Topic	I can…	Red/ Amber/ Green	Comments
Fractions	I can change a mixed number to a top heavy fraction.		
	I can change a top heavy fraction to a mixed number.		
	I can add and subtract fractions including mixed numbers.		
	I can multiply fractions including mixed numbers.		
	I can divide fractions including mixed numbers.		
	I can use my knowledge of fraction calculations to solve real life problems.		

Scientific Notation	Convert numbers from traditional forms to scientific notation of the form $a \times 10^b$ where a is a number between 1 and 10. Eg 4520 = 4.52×10^3		
	Convert numbers from scientific notation back into traditional number form, eg $3.5 \times 10^4 = 35000$		
	Use scientific notation for small numbers using negative powers, eg. $2.4 \times 10^{-3} = 0.0024$		
	Carry out calculations involving scientific notation with and without a calculator eg, $3 \times 10^6 \times 5 \times 10^7 = 15 \times 10^{13} = 1.5 \times 10^{14}$		