Scheme of Learning: Year 8 Spring Term

Topic Sequence: Algebraic Techniques

7	8	9
Brackets, Equations and Inequalities	**Sequences**	**Indices**

Topic Overview:

Before exploring the ideas behind the addition and subtraction laws of indices (which will be revisited when standard form is studied next term), the groundwork is laid by making sure students are comfortable with expressions involving powers, simplifying, for example $3x^2y \times 5xy^3$. The higher strand also looks at finding powers of powers.

Learning Sequence:

Adding and subtracting expressions with indices
Students sometimes mix up adding and subtracting when dealing with expressions involving indices; this step is to clarify the need for like terms in order to be able to add and subtract terms. Students may need reminding of the word "coefficient" and the convention that we don't usually use 1 as a coefficient. Using manipulatives helps to explain why, for example $2x^2 + 3x^2 \equiv 5x^2$ rather than $5x^4$.

Simplifying algebraic expressions by multiplying indices
Students should already be aware of the conventions for simplifying expressions like $3 \times a$, $b \times 4$ and $c \times c$ from their work in Year 7; this step builds on this to include terms with more than one letter and several letters/numbers by considering the factors of each term. The formal rules of indices are dealt with later in this block, but within this step students should deal with squares, cubes and their products.

Simplifying algebraic expressions by dividing indices
This step will reinforce students' understanding of algebraic notation, particularly the use of fractional form to represent division. This is helpful here as the fractional form can help students identify the common factors more easily, and links to writing fractions in simplest form. Students may need to be reminded that it is expected to give answers in the form, for example $\frac{y}{2}$ rather than involving decimals such as $0.5y$.

Using the addition law for indices
Through experimentation, students usually quickly see that multiplying terms of the form a^m and a^n gives the result a^{m+n}. Nonetheless, the sight of a multiplication sign often results in errors like $2^6 \times 2^2 = 2^{12}$ and it is helpful to include and discuss examples like this, and also noting the rule does not apply to different bases, for example $2^3 \times 3^4 \neq 6^7$. Likewise, the convention of writing x rather than x^1 can result in errors.

Using the addition and subtraction law for indices
This step develops from the last, illustrating that dividing expressions of the form a^m and a^n gives the result a^{m-n}. Common errors include not realising that a is the same as a^1 and mistakenly treating the exponent as a 0. It is worth noting the difference between writing, for example $6^5 \div 6^3$ as a single power and evaluating the result of $6^5 \div 6^3$. It is useful to mix up questions to include ×, ÷ and both operations.

Sequence of Learning:

1	Adding and subtracting expressions with indices
2	Simplifying algebraic expressions by multiplying indices
3	Simplifying algebraic expressions by dividing indices
4	Using the addition law for indices
5	Using the addition and subtraction law for indices

Topic Resources:

Knowledge Maps:	Index numbers Surds Algebraic Notation and manipulation

Assessment:

Knowledge:	End of Topic test
Application of Knowledge:	Termly mixed topic assessment

Supportive Reading:

Any supported reading listed here	Sparx Maths www.sparxmaths.co.uk
	Corbett Maths : www.corbettmaths.com
	AQA Revision Guide