Year 7 Spring 2

Unit Overview: Directed Numbers and Fractional Thinking								
Half- Term:	AUT 1	AUT 2	SPR 1	SPR 2	SUM 1	SUM 2	**No of Lessons:**	**24**

Key Focus for Unit:

Weeks 1 to 3: Directed number

Students will only have had limited experience of directed number at primary school, so this block is designed to extend and deepen their understanding of this. Multiple representations and contexts will be used to enable students to appreciate the meaning behind operations with negative integers rather than relying on a series of potentially confusing "rules". As well as exploring directed number in its own right, this block provides valuable opportunities for revising and extending earlier topics, notably algebraic areas such as substitution and the solution of equations; in particular students will be introduced to two-step equations for the first time in this block.

Weeks 4 to 6: Fractional thinking

This block builds on the Autumn term study of "key" fractions, decimals and percentages. It will provide more experience of equivalence of fractions with any denominators, and to introduce the addition and subtraction of fractions. Bar models and concrete representations will be used extensively to support this. Adding fractions with the same denominators will lead to further exploration of fractions greater than one, and for the Core strand adding and subtracting with different denominators will be restricted to cases where one is a multiple of the other.

Key:

MASTERY – The skills and knowledge we want all our students to master and recall quickly.

SECURE – The skills and knowledge that we will need to return to regularly and interleave in order for our middle and lower attaining students to secure mastery or for which they might struggle.

DEVELOPING – The skills and knowledge that we will use to stretch and challenge our most abled students.

Directed Number:

Understand and apply the rules for directed numbers formally and with calculator (Mastery) e.g. −− → + 5 - - 3 = 8

- Add directed numbers
- Subtract directed numbers
- Multiplication of directed numbers
- Multiplication and division of directed numbers

Evaluate expressions and solve two step equations using directed numbers (Secure) e.g. $5 = 3 - 2a$

- Evaluate algebraic expressions with directed number
- Solve two-step equations
- Use order of operations with directed numbers

Powers and Roots (Developing) e.g. $\sqrt{64}\ and\ 2^6$

- Roots of positive numbers
- Explore higher powers and roots

Fractional Thinking:

Add and subtract fractions $\frac{1}{3} + \frac{2}{3}$

- Convert between mixed numbers and fractions
- Understand and use equivalent fractions
- Add and subtract fractions with any denominator

Add and subtract with Mixed Numbers and Improper Fractions $\frac{5}{4} + 2\frac{1}{6}$

- Add and subtract improper fractions and mixed numbers
- Use equivalence to add and subtract decimals and fractions

Add and subtract with Algebraic Fractions $\frac{2x}{4} - \frac{3x}{8}$

- Use fractions in algebraic contexts
- Add and subtract simple algebraic fractions

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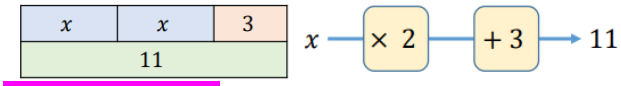
Scaffolded Guidance:

- All operations – correct modelling and use of brackets i.e. $2 - -3 \rightarrow 2 - (-3)$
- Add directed numbers – using zero pairs

- Subtract directed numbers – use of number line
- Multiplying and dividing – use of multiplication grid
- Two step Equations – use of bar models and function machines

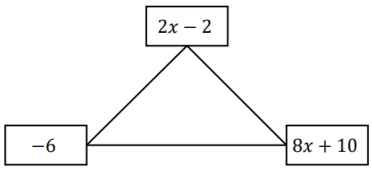
e.g. $2x + 3 = 11$



Stretch Guidance:

- Equation Triangle

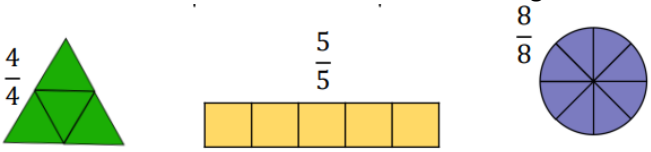
Form and solve three equations by equating the linked expressions on the vertices of the triangle.



- What do you notice about the values of x?
- Adapt the equations triangle so the solutions are all -3
- Investigate further by adding additional rows to the triangle.

Scaffolded Guidance:

- Understand representations of fractions
- Add and subtract fractions from integers



- Understand Equivalent fractions – Fraction wall

Stretch Guidance:

- Extend to more complex algebraic fractions - $e.g. \frac{1}{3b-1} + \frac{a^2}{3b}$

Always, sometimes and never true

$$\frac{a}{b} + \frac{c}{d} = \frac{ad + cb}{cd}$$

$$\frac{1}{a} - \frac{1}{b} = \frac{1}{ab}$$

- Get students to make Generalisations

Key Knowledge and Big Ideas:

*What **Powerful Knowledge** and **Big Ideas** are explored in this Unit?*
*How have these progressed from previous learning? What **gaps in knowledge** have you identified from **baselining** and how are the being closed?*

BIG IDEAS:

Number and Algebra

Powerful Knowledge:

- Understand and apply the rules for directed numbers formally and with calculator
- Evaluate expressions and solve two step equations using directed numbers
- Powers and Roots
- Add and subtract fractions
- Add and subtract with Mixed Numbers and Improper Fractions
- Add and subtract with Algebraic Fractions

Previous Learning:

- Function Machines
- Solving one step equations
- Substituting values
- Generate sequences
- Representing Fractions (number line and hundred square)
- Converting between FDP

Gaps in Knowledge and Misconceptions:

- $-5 - 2 = -3$ or 7 (because two negatives become positive)
- Adding or subtracting the denominators $\frac{2}{5} + \frac{1}{6} = \frac{3}{11}$

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Unit Assessment:

How will this unit be assessed?

What is the frequency of assessments – baselines etc?

- Baseline Testing with EOB A or similar at start
- Stretch & Exit Tickets that give same or similar questions not grasped from Baseline Testing (practice testing)
- End of Block Assessment with EOB B at end

Retrieval Practice:

- Recall starter
- Homework tasks
- Distraction tasks

Key Retrieval Topics (Interleaving):

- Problem solving with angles and perimeter
- Problem solving in real world contexts
- Sequences

Key Skills Explored	Vocabulary Selected for DVI	Links to Previous Unit
• Finding Lowest Common Multiples • Operations of Fractions • Solving equations using Inverse Operations (BIDMAS) • Converting between mixed and improper	• Improper Fractions • Lowest Common Multiple • Inverse • Numerator, Denominator • Product • Quotient, Divisor, Dividend • Equivalent, Greater than, less than • Powers, Roots • Equation, Expression	• Number work with all four operations • Fractions and Percentages of Amounts • Understand and use algebraic notations

Links to Careers/Employability	How does this unit prepare students for the next unit?
• Financial Services (Shop Keeper) • Problem solving and solutions • Engineering • Design (Textiles)	• Sets and Probability • Equations using angles facts to solve geometric problems • Constructions • Number sense (All four operations – decimals and fractions)