



**Topic: Operations and Equations
with Directed Numbers**

Year: 7

NC Strand: Number

What should I already know?

- How to use negative numbers in context, and calculate intervals across zero
- How to solve number and practical problems that involve negative numbers in context, and calculate intervals across zero

What will I know by the end of the unit?

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| <ul style="list-style-type: none"> • How to understand and use interpretations of directed numbers • How to order directed numbers using number lines and symbols • How to perform calculations that cross zero • How to add directed numbers • How to subtract directed numbers • How to multiply directed numbers • How to divide directed numbers | <ul style="list-style-type: none"> • How to use a calculator for directed numbers • How to evaluate algebraic expressions with directed numbers • How to solve two step equations • How to use order of operations with directed numbers • Understand that positive numbers have more than one square root • How to work with higher powers and roots |
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Vocabulary

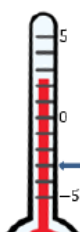
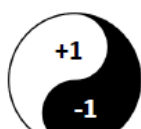
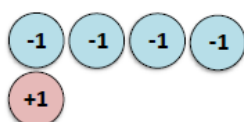
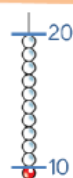
Positive	Smaller/Bigger than	Zero pair	Expression
Negative	Greater/Less than	Product	Order of operations
Reflections	Increase	Multiply	Solve
Symmetric	Decrease	Inverse	Solution
Sea Level	Difference	Multiplicative	Equation
Ascending	Add	Calculator	Function Machine
Descending	Subtract	Sign Change	Balance
Positive	Partition	Fraction button	Zero pair
Negative	Minus	Substitute	

Investigate/Homework tasks

- Homework will be set by your teacher using google classroom
- You should complete at least 30 minutes of maths tasks using the website and log in provided by your teacher. Please attend help sessions if you do not have access to the internet at home
- Additional work you could complete:
 - Find out more about the meaning of the vocabulary list using <http://www.amathsdictionaryforkids.com/>
- To challenge yourself: Answer the key questions to deepen your knowledge

Key Information/Diagrams

Key Representations



When dealing with directed numbers, it is important to use both horizontal and vertical number lines. The vertical will be



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Key Questions

<p>How far is -3 from zero? How far is 3 from 0? How are they different?</p> <p>What does this tell us about positive and negative numbers? (If using bead strings, they can be moved to emphasise the reflection about 0)</p>	<p>Is ordering temperatures from hottest to coldest, putting them in ascending or descending order?</p> <p>Where would $+\frac{1}{4}$ be on the number line? Is it closer to 0 or 1? How does this help us to put $-\frac{1}{4}$ on the number line?</p> <p>Between which two consecutive integers does -1.5 lie?</p>	<p>How could you use the number line to help perform this calculation?</p> <p>What is $4 - 4$? What is $-4 + 4$? What do you notice?</p> <p>How is $-3m + 5m$ different from $-3 + 5$? How are they the same?</p>
<p>Why is adding a negative the same as subtracting?</p> <p>Why is $100 + -102$ an easy calculation despite the large numbers? How does partitioning help?</p> <p>Give an example to show the statement "Two negatives make a positive" is wrong.</p>	<p>Using the manipulatives, what happens to the total when I take away 2 negatives?</p> <p>What happens when the lowest score is removed? Does the total increase or decrease?</p> <p>What happens when you subtract a negative number from a positive total? How can you represent this visually?</p>	<p>How could we use the number line to answer this question?</p> <p>If $3 \times -2 = -6$, what is -3×-2? How do you know?</p> <p>Why is $-3 \times 5a$ equal to $3 \times -5a$? What other calculations give the same answer?</p>
<p>Explain how to use the \pm on a calculator. How is it different from the $-$ button?</p> <p>What is the difference between -2.3^2 and $(-2.3)^2$?</p> <p>If there is no sign written in front of a number, is it positive or negative?</p>	<p>How do we substitute values into an expression?</p> <p>What is the correct order of operations?</p> <p>Why is it useful to put negative numbers in brackets when substituting?</p>	<p>How do you know if an equation can be solved in one step or more than one step?</p> <p>Can the solution to an equation be a negative number?</p> <p>How does a bar model help you to decide what step to take first when solving a multi-step equation?</p>
<p>What is the same and what is different about these questions and answers?</p> <p>When is it most useful to use a bar model for a two-step equation?</p> <p>How do you know the order of steps to take to solve an equation?</p>	<p>What does it mean when there is a number directly in front of a bracket e.g. $3(6 + 4)$?</p> <p>What's the difference between $(-6)^2$ and -6^2?</p> <p>Does a negative number change the order of operations?</p>	<p>What is a square number?</p> <p>What is the inverse of multiplication/squaring a number?</p> <p>What is the difference between $(-5)^2$ and -5^2?</p> <p>Does 5 have a square root?</p>
<p>What does cube mean?</p> <p>How do you raise a number to the fourth power?</p> <p>How do you find roots and powers on your calculator?</p> <p>If a number has two square roots, does it have three cube roots?</p>		