Directed Numbers

Year 11 General Maths
Units 1 and 2

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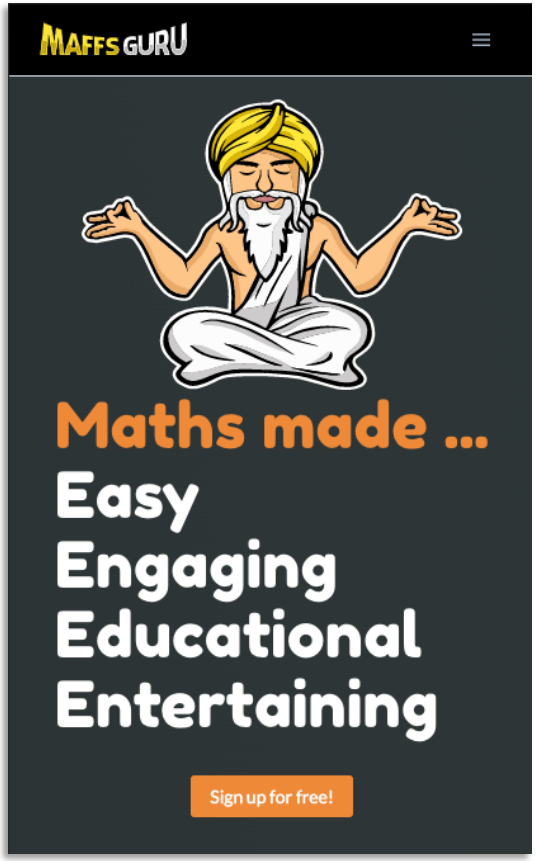

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Learning Objectives

By the end of the lesson I would hope that you have an understanding and be able to apply to questions the following concepts:

- Understand what a directed number is
- How to add and subtract directed numbers
- How to multiply and divide directed numbers

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Recap

In the previous lesson we looked at what BIDMAS (or BODMAS) was used for. We found that there was order to Mathematics and all was good with the world.

We only used positive numbers in all the examples we completed as, they are the ones we are the most familiar with.

However, there are such things as negative numbers and this adds a whole new level of excitement to BIDMAS!

Brackets

Indices

Division

Multiplication

Addition

Subtraction

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Isn’t there only One Direction?

The puns don’t get any better … I can promise you!

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What is a directed number?

Both positive and negative numbers are directed numbers.

Directed numbers are those which have a direction and a size.

Direction can be both positive and negative.

We can show directed numbers using a number line.

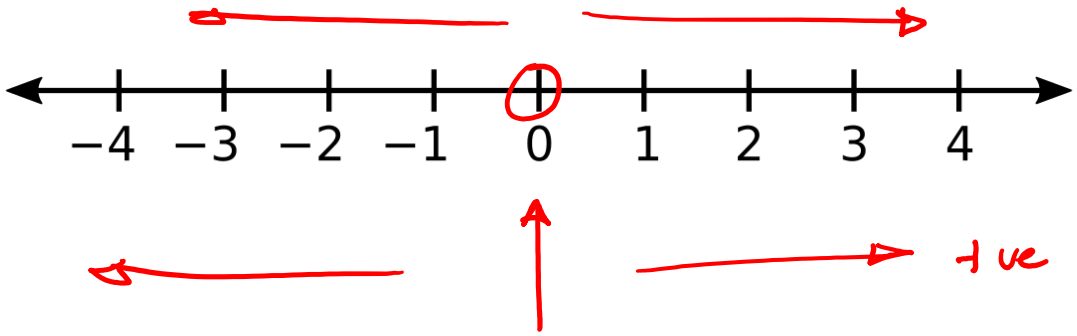

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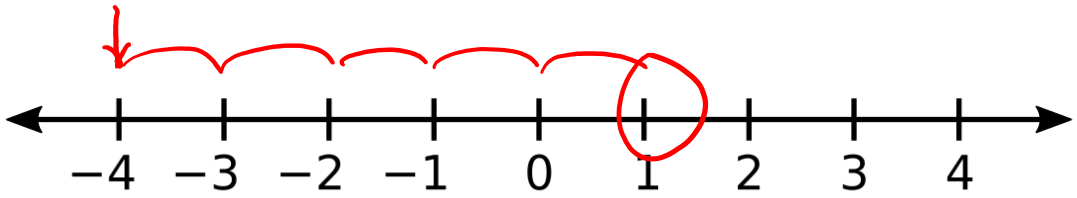
Image source: commons.wikipedia.org

Using a number line to add and subtract numbers.

When we add a number we move to the right along a number line.
When we subtract, we move to the left along the number line.
We can start with positive and negative numbers.

Example:

$-4 + 5 = 1$



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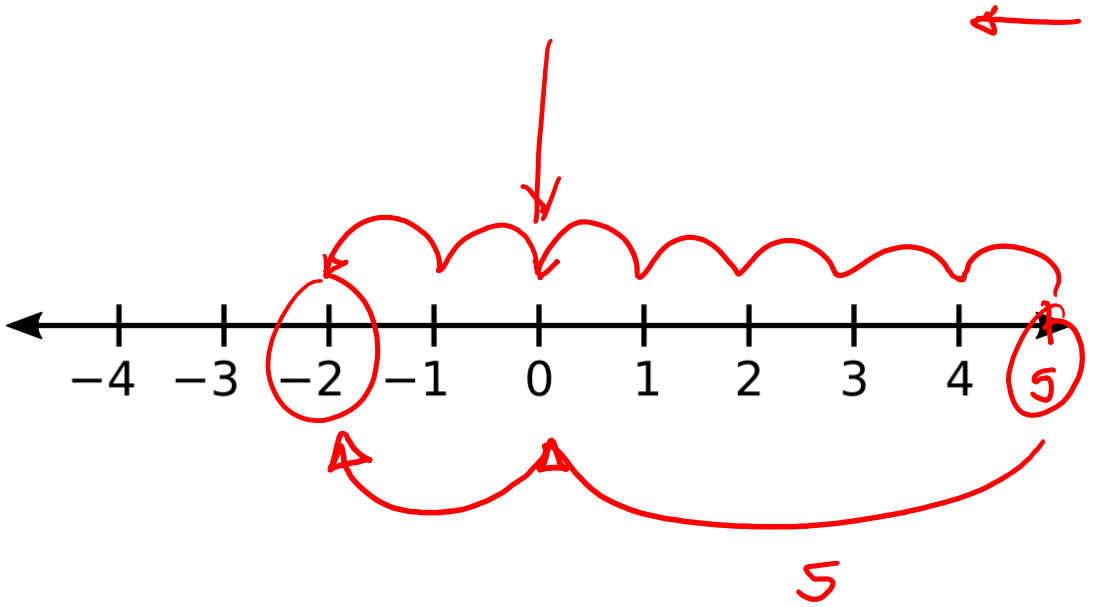
Using a number line to add and subtract numbers.

When we add a number we move to the right along a number line.
When we subtract, we move to the left along the number line.
We can start with positive and negative numbers.

Example:

$5 - 7 = -2$



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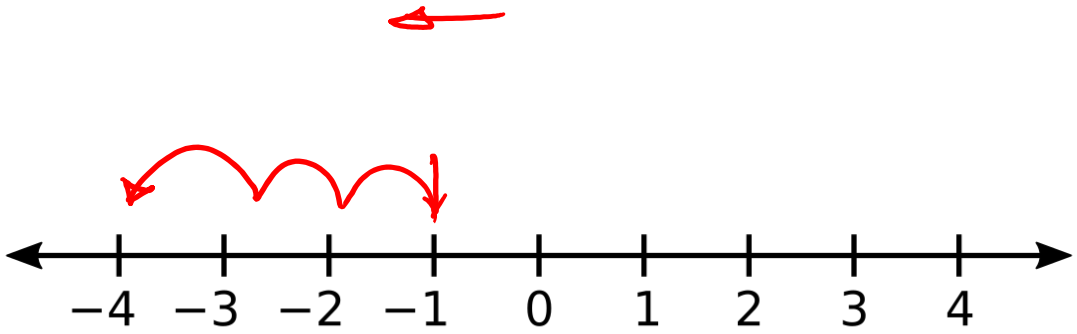
Using a number line to add and subtract numbers.

When we add a number we move to the right along a number line.
When we subtract, we move to the left along the number line.
We can start with positive and negative numbers.

Example:

$-1-3$ = -4



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Those pesky brackets … aren't they there to confuse us?

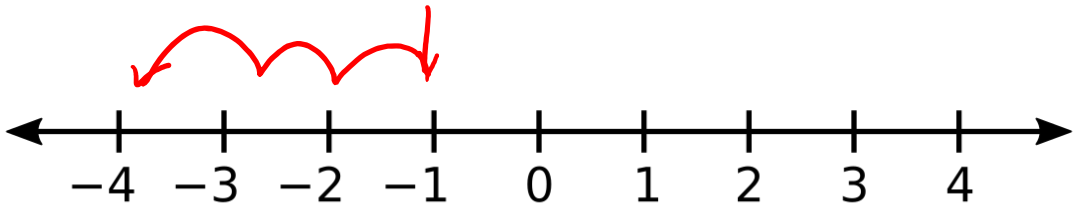
The brain is programmed to miss things. Odd huh?

For example, it doesn't like short horizontal lines. So, where it can, it tries to ignore them. We can stop the brain from doing that by using brackets.

So, a previous example could have been written the a different way, but mean the same thing.

Example:

$(-1) - 3 \quad = -4$



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Multiplying and dividing negative numbers

There are four rules we must use when multiplying and dividing negative numbers. They are a bit of a secret … so don't tell too many people!

$$+ \; and \; + = +$$

$$- \; and \; - = +$$

$$+ \; and \; - = -$$

$$- \; and \; + = -$$

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Image source: freesvg.org

Multiplying and dividing negative numbers

There is another way of thinking of this …

$+ \ and \ + = +$

$- \ and \ - = +$

$+ \ and \ - = -$

$- \ and \ + = -$

When they are the same, they become a plus

When they are different, they become a minus

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Image source: freesvg.org

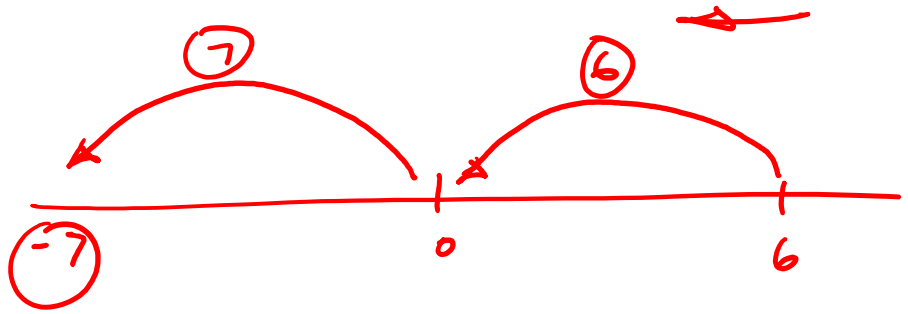
Examples using directed numbers

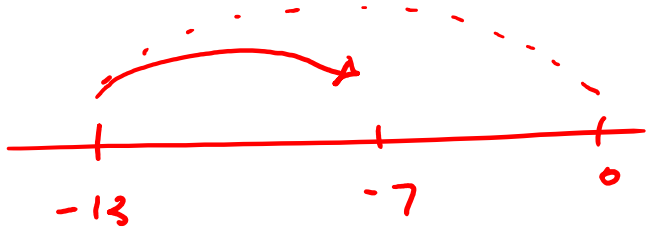
Example:

$6 - 13$ $= -7$

$-13 + 6$

6 - 13





$+ \ and \ + = +$

$- \ and \ - = +$

$+ \ and \ - = -$

$- \ and \ + = -$

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Examples have been extracted, with permission, from the Cambridge General Mathematics Units 1 and 2 Textbook

Examples using directed numbers

Example:

$(-5) - 11 = -16$

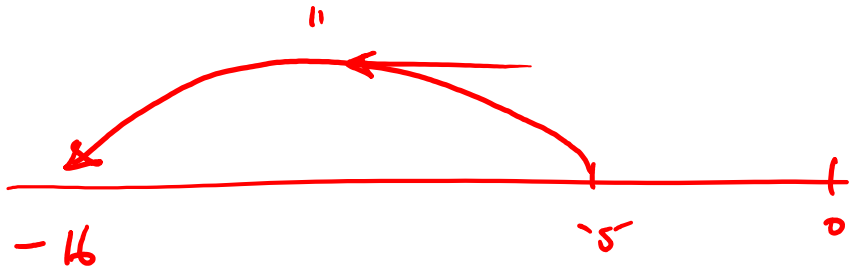
$-5 - 11$

$+ \; and \; + = +$

$- \; and \; - = +$

$+ \; and \; - = -$

$- \; and \; + = -$



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Examples using directed numbers

It's important to know when we use the four rules.

Don't get tricked.

Example:

$9 - (-7)$

$+ \; and \; + = +$

$- \; and \; - = +$

$+ \; and \; - = -$

$- \; and \; + = -$

9 − (−7)

= 9 + 7

= 16

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Examples using directed numbers

It's important to know when we use the four rules.

Don't get tricked.

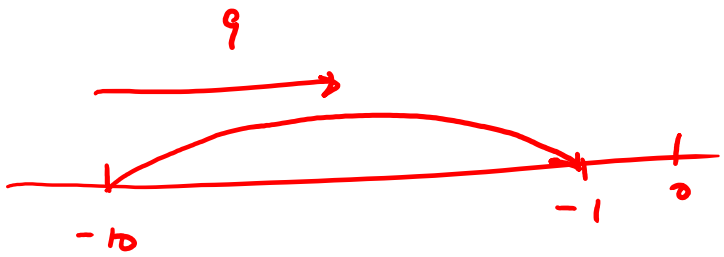
Example:

$(-10) - (-9)$

$-10 \leftarrow -9$

$= -10 + 9$

$= -1$



$+ \; and \; + = +$

$- \; and \; - = +$

$+ \; and \; - = -$

$- \; and \; + = -$

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Examples using directed numbers

Notice here that they don't have a bracket around the negative three. My brain is really trying to ignore it!

Don't get tricked.

Example:

5×-3

$+ 5 \times -3$

$= -15$

$+ \ and \ + = +$

$- \ and \ - = +$

$+ \ and \ - = -$

$- \ and \ + = -$

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Examples using directed numbers

That's better! The brackets are back.

Don't get tricked.

Example:

$(-8) \times (-7)$

-8×-7

$= 56$

$+ \ and \ + = +$

$- \ and \ - = +$

$+ \ and \ - = -$

$- \ and \ + = -$

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Examples have been extracted, with permission, from the Cambridge General Mathematics Units 1 and 2 Textbook

Examples using directed numbers

Don't get tricked.

Example:

$(-16) \div 4$

$\ominus 16 \div \oplus 4$

$= \quad -4$

$+ \; and \; + = +$

$- \; and \; - = +$

$+ \; and \; - = -$

$- \; and \; + = -$

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Examples using directed numbers

Don't get tricked.

Example:

$(-60) \div (-5)$

$-60 \div -5$

$= 12$

$+ \; and \; + = +$

$- \; and \; - = +$

$+ \; and \; - = -$

$- \; and \; + = -$

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Examples using directed numbers

Don't get tricked.

Example:

$(-100) \div (-4) \div (-5)$

$= \dfrac{-100 \div -4}{} \boxed{\div -5}$

$= \oplus 25 \div \ominus 5$

$= -5$

$+ \; and \; + = +$

$- \; and \; - = +$

$+ \; and \; - = -$

$- \; and \; + = -$

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Examples using directed numbers

Don't get tricked.

Example:

$(-3)^2$

$(-3)^2$

$= -3 \times -3$

$= 9$

$+ \ and \ + = +$

$- \ and \ - = +$

$+ \ and \ - = -$

$- \ and \ + = -$

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Thanks for watching

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