

# Maths Refresher

## Working with Numbers

Learning, Teaching  
and Student Engagement

# Working with numbers

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## Learning intentions ....

- ▶ Arithmetic of Whole Numbers
- ▶ Order of Operations
- ▶ Rounding
- ▶ Approximating and Estimating
- ▶ Setting out
- ▶ Using your calculator

# Arithmetic of Whole Numbers

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- ▶ Arithmetic: the study of numbers and their manipulation.
- ▶ In this presentation we will work with whole numbers, or integers as they are often called.
- ▶ There are positive integers: 1, 2, 3, 4, 5 ....
- ▶ There are also negative integers: ...-5, -4, -3, -2, -1
- ▶ The dots indicate that this is a sequence of numbers that continues indefinitely.

# Arithmetic of Whole Numbers

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Some terminology:

- ▶ **SUM:** when two or more numbers are added together
- ▶ **DIFFERENCE:** to find the difference of two numbers, the second is subtracted from the first.
- ▶ **PRODUCT:** to find the product of two numbers, they are multiplied together
- ▶ **QUOTIENT:** to find the quotient of two numbers, the first number is divided by the second.
- ▶ **FACTORS:** a whole number that divides exactly into another number, or, a whole number that multiplies with another whole number to make a third number.

# Your turn

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- ▶ Find the **sum** of 3, 6 & 4
- ▶ Find the **difference** of 6 and 4
- ▶ Find the **product** of 7 & 3
- ▶ Find the **quotient** of 20 and 4
- ▶ Find the **factors** of 24

# Tip

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- ▶ Sometimes when writing a product calculation the multiplication sign 'x' is sometimes replaced with a dot '.' or '\*' and sometimes it is omitted altogether.
- ▶ For example:  $3 \times 6 \times 9$  could be written as
  - 3.6.9 or
  - (3)(6)(9)

# Directed numbers

- ▶ Directed numbers are numbers used in situation that represents a direction and a size.
- ▶ The concept of directed numbers relates to thinking of numbers on a number line.
- ▶ ‘Directed’ being the direction from the zero as being either positive or negative.
- ▶  $+4$  implies a quantity of four in a positive direction
- ▶  $-4$  implies a quantity of four in a negative direction

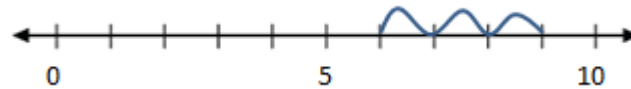


# Adding and subtracting positive and negative numbers

## KEY POINT:

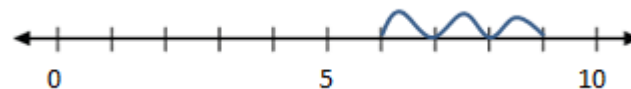
- ▶ Adding a negative number is equivalent to subtracting a positive number.

- $9 + (-3) = 6$     $9 - (+3) = 6$



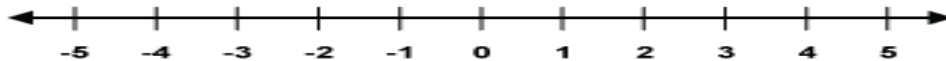
- ▶ Subtracting a negative number is equivalent to adding a positive number.

- $6 - (-3) = 9$     $6 + 3 = 9$





# Number lines are visual representations



To add a positive number	Positive direction: right
To subtract a positive number	Negative direction: left
To add a negative number	The opposite way of a positive direction: left
To subtract a negative number	The opposite way of a negative direction: right

Let's try

$$2+3$$

$$2-3$$

$$2+(-3)$$

$$2-(-3)$$

# Easy rule to remember ...

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## When you are adding or subtracting:

If the signs are the same, ADD

If the signs are opposite, SUBTRACT

# Your turn ...

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- $8 + (-4)$

- $15 + (-3)$

- $-15 - (-4)$

- $-15 + (-3)$

- $8 + (-4) = 8 - 4 = 4$

- $15 + (-3) = 15 - 3 = 12$

- $-15 - (-4) = -15 + 4 = -11$

- $-15 + (-3) = -15 - 3 = -18$

# Multiplying and dividing positive and negative numbers

The following rules apply for determining the sign of the answer when multiplying or dividing positive and negative numbers:

$(\text{positive}) \times (\text{positive}) = \text{positive}$	$(\text{positive}) \div (\text{positive}) = \text{positive}$ $\frac{+}{+} = +$
$(\text{positive}) \times (\text{negative}) = \text{negative}$	$(\text{positive}) \div (\text{negative}) = \text{negative}$ $\frac{+}{-} = -$
$(\text{negative}) \times (\text{positive}) = \text{negative}$	$(\text{negative}) \div (\text{positive}) = \text{negative}$ $\frac{-}{+} = -$
$(\text{negative}) \times (\text{negative}) = \text{positive}$	$(\text{negative}) \div (\text{negative}) = \text{positive}$ $\frac{-}{-} = +$

# Your turn ...

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▶  $(-1) \times 7$

▶  $(-2) \times (-4)$

▶  $12 \div (-4)$

▶  $\frac{-8}{4}$

# Answers

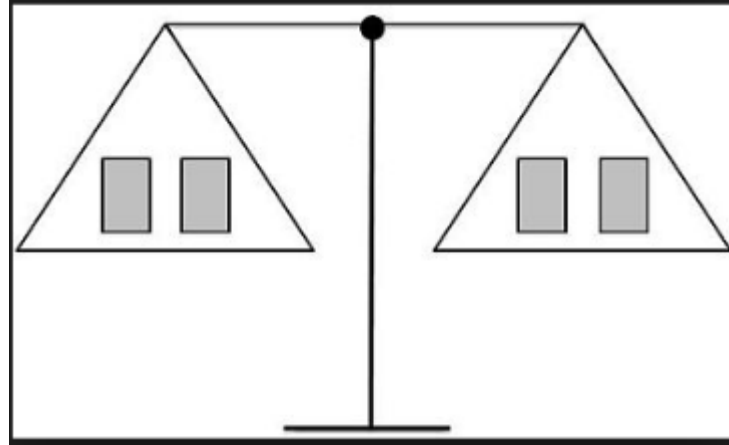
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- $3 \times (-2) = -6$
- $(-1) \times 7 = -7$
- $(-2) \times (-4) = 8$
- $12 \div (-4) = -3$
- $\frac{-8}{4} = -2$

# Calculation Priority Sequence

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- ▶ When solving problems we are balancing both sides of the equals sign.



# Calculation Priority Sequence

- ▶ When solving problems there is a specific sequence to follow:
- ▶ Two mnemonics: BODMAS or BIDMAS
  1. Follow the order as right:
  2. If two operations are of the same level work from left to right.
  3. If there are multiple brackets, then work from the inside brackets moving

1. 2. 3. 4.  
B O D A  
or M or S

Brackets	{{( )}}
Other or Indices	$x^2, \sin x, \ln x, etc$
Multiplication or Division	$\times$ or $\div$
Addition or Subtraction	$+$ or $-$



# Calculation Priority Sequence

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1. **Brackets:** first priority
2. **Of/Powers:** second priority
3. **Division/Multiplication:** third priority
4. **Addition/Subtraction:** fourth priority

Note: 'Of' is used to show multiplication when dealing with fractions eg. Find  $\frac{1}{2}$  of 6 means  $\frac{1}{2} \times 6$ .

## The rules are:

1. Follow the order (BOMDAS or BODMAS)
2. If two operations of the same level. E.g. ( $\times$  or  $\div$ ) or (+or -) you work from left to right.
3. Work from the inside set of brackets outwards.

# Your turn ...

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▶  $2 + 3 \times 4$

▶  $(2 + 3) \times 4$

# Using the distributive law ...

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- You can also solve using the distributive law ...

For example:

$$\begin{aligned}(2 + 3) \times 4 \\ &= (2 \times 4) + (3 \times 4) \\ &= 8 + 12 \\ &= 20\end{aligned}$$

- This is the approach to take when your equations include an unknown variable. What is  $a$ ?
- $(2 + a) \times 4 = 20$
- $(2 \times 4) + (a \times 4) = 20$
- $8 + 4a = 20$
- $4a = 20 - 8$
- $4a = 12$
- $a = 12 \div 4$
- $a = 3$

# Your turn

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- ▶ Work through practise examples

# Rounding

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- ▶ We round whole numbers to a place value – for example, round 34 to the nearest 10 or 100 (as we do with money)
- ▶ You can also round decimals. Usually you will be asked to round to a number of decimal places – for example, Round to 2 decimal places.
- ▶ Round up from 5.
- ▶ Your turn:
- ▶ Round 82.654 to (i) one decimal place, (ii) two decimal places (iii) three decimal places.



# Estimating & Approximating

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## Estimating

- ▶ For example, multiply  $4.2 \times 1.7$
- ▶ Estimate as  $4 \times 2 = 8$
- ▶  $\therefore 4.2 \times 1.7 \approx 8$
- ▶ Close to the answer:  $4.2 \times 1.7 = 7.14$

## Approximation

- ▶ Approximately  $\approx 7.1$

# Setting out

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- ▶ Aim for neat working
- ▶ Work in columns
- ▶ Move down your page simplifying as you go
- ▶ Be methodical in your approach
- ▶ Always include the sign for the operation that you are performing

# Develop automaticity

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- ▶ Learning to work mathematically requires practise.
- ▶ Create opportunities to develop your skills.
- ▶ For example,
  - When at the check out see if you can calculate the change to be given before the cash register.
  - When buying sushi, calculate your bill before your waitress.
- ▶ Bit by bit you will develop strategies that make mental computation easier. This automaticity will enhance your ability to work mathematically more than you realise!

***The essence of mathematics is not to make simple things complicated, but to make complicated things simple.***



# Using your calculator

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- ▶ Take some time to get to know your calculator.
- ▶ If you have lost the manual, download one – just Google the model!
- ▶ Today: find the following buttons: brackets & negative sign – not the subtract sign

# For English as an Additional Language students ...

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Operator Symbol	English	Your first language
X . *	Multiply Multiplication	
+	Add Addition	
-	Subtract Subtraction	
÷ Or /	Divide Division	
( )	Brackets Parentheses	

# Working with numbers

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## Reflect on the learning intentions .....

- ▶ Arithmetic of Whole Numbers
- ▶ Order of Operations
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