Mathematics Department

David McCulloch, Principal Teacher of Mathematics

Supporting Numeracy through Mathematics in the Senior Phase

Welcome!

Mathematics Department

Curricular Pathways

Mathematics is the study of numbers, formulae, shape, space and measure that makes up the world around us.

By studying Mathematics, you develop not only your knowledge and skills in these areas, but also your analytical, creative and problem solving skills.

Mathematics helps us think strategically, equipping us with the ability to break down problems into manageable steps so that we can process and logically tackle solve them.

The study of Mathematics is essential for further education and careers in the STEM fields but is also a useful qualification for a wider range of pathways.

"***To not know Maths is a severe limitation to the understanding of the world***."

– Richard P. Feynman

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Numeracy

Numeracy is the term used for Numerical Literacy, i.e. being able to read, write, say, use and understand numbers in a variety of contexts.

Like Literacy and Health & Wellbeing, Numeracy is the responsibility of ALL teachers.

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Pathways: The BGE

Point of Entry in S1: Mixed Attainment Classes

Diagnostic Block

Generalised Mathematics Course with a focus on developing basic Numeracy skills.

Primarily working at 2nd Level with scaffolding to 1st and 3rd levels where appropriate.

Diagnostic Assessment* – September of S1

	Pathway 1	Pathway 2	Pathway 3	Pathway 4
S1	Generalised Mathematics Course covering the broad topics of Numeracy, Algebra, Geometry, Data Handling and Problem Solving. Primarily working at 3rd Level with extension to 4th Level where appropriate.	Generalised Mathematics Course covering the broad topics of Numeracy, Algebra, Geometry, Data Handling and Problem Solving. Primarily working at 3rd Level with scaffold to 2nd level where appropriate.	Generalised Mathematics Course covering the broad topics of Numeracy, Algebra, Geometry, Data Handling and Problem Solving. Primarily working at 2nd Level with extension to 3rd level and scaffold to 1st level where appropriate.	Generalised Mathematics Course covering the broad topics of Numeracy, Algebra, Geometry, Data Handling and Problem Solving. Primarily working at 1st Level with extension to 2nd and 3rd level where appropriate.
S2	Continuation of a Generalised Mathematics Course. Primarily working at 4th Level scaffold to 3rd level and extension to N5 where appropriate.	Continuation of a Generalised Mathematics Course. Primarily working at 3rd Level with extension to 4th level where appropriate.	Continuation of a Generalised Mathematics Course. Primarily working at 3rd Level with some extension to 4th level where appropriate.	Continuation of a Generalised Mathematics Course. Primarily working at 2nd Level with some extension to 3rd level where appropriate.
S3	Continuation of a Generalised Mathematics Course in preparation for ***N5 Maths***. Primarily working at 4th Level with the aim of completing ***N5 Numeracy*** and a minimum of two blocks of the ***National 5 Course***.	Continuation of a Generalised Mathematics Course in preparation for ***N5 Maths*** or ***N5 Applications of Maths***. Primarily working at 4th Level with the aim of completing ***N4 Maths*** evidence, ***N5 Numeracy*** *and a minimum of one block of the* ***National 5 course***.	Continuation of a Generalised Mathematics Course in preparation for ***N4 Maths*** or ***N4 Applications of Maths***. Primarily working at 4th Level with the aim of completing ***N3 Applications of Maths*** evidence and ***N4 Numeracy***.	Continuation of a Generalised Mathematics Course in preparation for ***N3 Applications of Maths***. Primarily working at 3rd Level with the aim of completing ***N3 Applications of Maths*** evidence and ***N4 Numeracy***.

***Data from Diagnostic & P7 Transition Data taken into account before courses are set**

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Pathways: The Senior Phase

Point of Entry in S4

	Pathway 1	Pathway 2		Pathways 3 & 4
S4	National 5 Maths	National 5 Applications of Maths	National 4 Maths	National 4 Applications of Maths
S5	Higher Maths	National 5 Maths	National 5 Applications of Maths	SCQF Level 5 Personal Finance Award
S6	Advanced Higher Maths	Higher Maths	National 5 Maths	National 5 Applications of Maths

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Exit Points/Positive Destination

Advanced Higher Mathematics

Higher Mathematics

- MMath (Hons) Mathematics (University of St Andrews)
- HND Computer Aided Architectural Design & Technology (Forth Valley College)
- BEng Electrical Engineering (Glasgow Caledonian University)
- Economics and Management (AH - Grade A) (University of Oxford)
- BSc Mathematics (University of Strathclyde)

National 5 Mathematics

- MEd Education with Primary Teaching (University of Glasgow)
- LLB (Hons) Bachelor of Laws (Glasgow Caledonian University)
- Foundation Apprenticeship in Civil Engineering (Forth Valley College)
- BSc Adult Nursing (University of the West of Scotland)
- LLB (Hons) Bachelor of Laws (Glasgow Caledonian University)

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Exit Points/Positive Destination

National 5 Applications of Mathematics

- BA (Hons) French and Spanish (University of Strathclyde)
- BA (Hons) Primary Education (University of Stirling)
- BSC Adult Nursing (University of the West of Scotland)
- BA (Hons) Psychology and Social Policy (University of Strathclyde)

National 4 Mathematics

- Modern Apprenticeship - Mechanic (Arnold Clark)
- HNC Agriculture (Oatridge College)
- HND Media Studies (Forth Valley College)
- Modern Apprenticeship - Naval Ships Pipefitter (BAE Systems)

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Exit Points/Positive Destination

National 4 Applications of Mathematics

- NQ Accounting (West Lothian College)
- NC Horticulture (Oatridge College)
- NQ Child, Health & Social Care (Forth Valley College)
- NPA Construction* (West Lothian College)
  *with the addition of Level 5 Numeracy

National 3 Applications of Mathematics

- SVQ/Modern Apprenticeship Process Industries (Operations Control) (Forth Valley College)
- Modern Apprenticeship in Customer Service (SCQF L5) (Forth Valley College)
- Foundation Apprenticeship in Automotive Skills (West Lothian College)
- City & Guilds Air Cabin Crew Level 5 Diploma (City of Glasgow College)
- NQ Beauty & Make-up (Level 4) (West Lothian College)

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Levelling Up

National 3 Applications of Mathematics	National 4 Numeracy Unit

National 4 Applications of Mathematics or Mathematics	National 5 Numeracy Unit

National 5 Applications of Mathematics or Mathematics or SCQF Level 5 Personal Finance	National 5 Numeracy Unit

Higher Mathematics	SCQF Level 6 Numeracy

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Across the Levels

Level 3

- Four operations on whole numbers
- Rounding to decimal places
- Fractions & Percentages of Quantities
- Place Value to 10,000
- Fraction, Decimal, Percentage Equivalences
- Measurement and Units of Measure
- Reading Scales and Accuracy
- Making Decisions and Conclusions
- Simple Graphs, Charts & Tables
- Plans and Scale Drawings
- Perimeter and Area of Simple Shapes
- Probability

Level 4

- Four operations on integers and decimals
- Rounding to decimal places and significant figures
- Fractions & Percentages of Quantities, Percentage Change
- Place Value to 1,000,000
- Fraction, Decimal, Percentage Equivalences
- Measurement and Units of Measure
- Reading Scales and Tolerance
- Making Decisions and Conclusions
- Graphs, Charts & Tables including Comparative Charts
- Plans and Scale Drawings
- Probability

- Money – Hire Purchase, VAT, Currency Exchange
- Ratio & Proportion including Distance, Speed & Time
- Perimeter and Area of Compound Shapes

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Across the Levels

Level 5

- Four operations on integers and decimals
- Rounding to decimal places and significant figures
- Repeated Percentage Changes
- Adding & Subtracting Fractions
- Reading Scales
- Making Decisions and Conclusions
- Graphs, Charts & Tables including Comparative Charts
- Probability & Expected Frequency
- Ratio & Proportion
- Time and Time Intervals (including across time zones)

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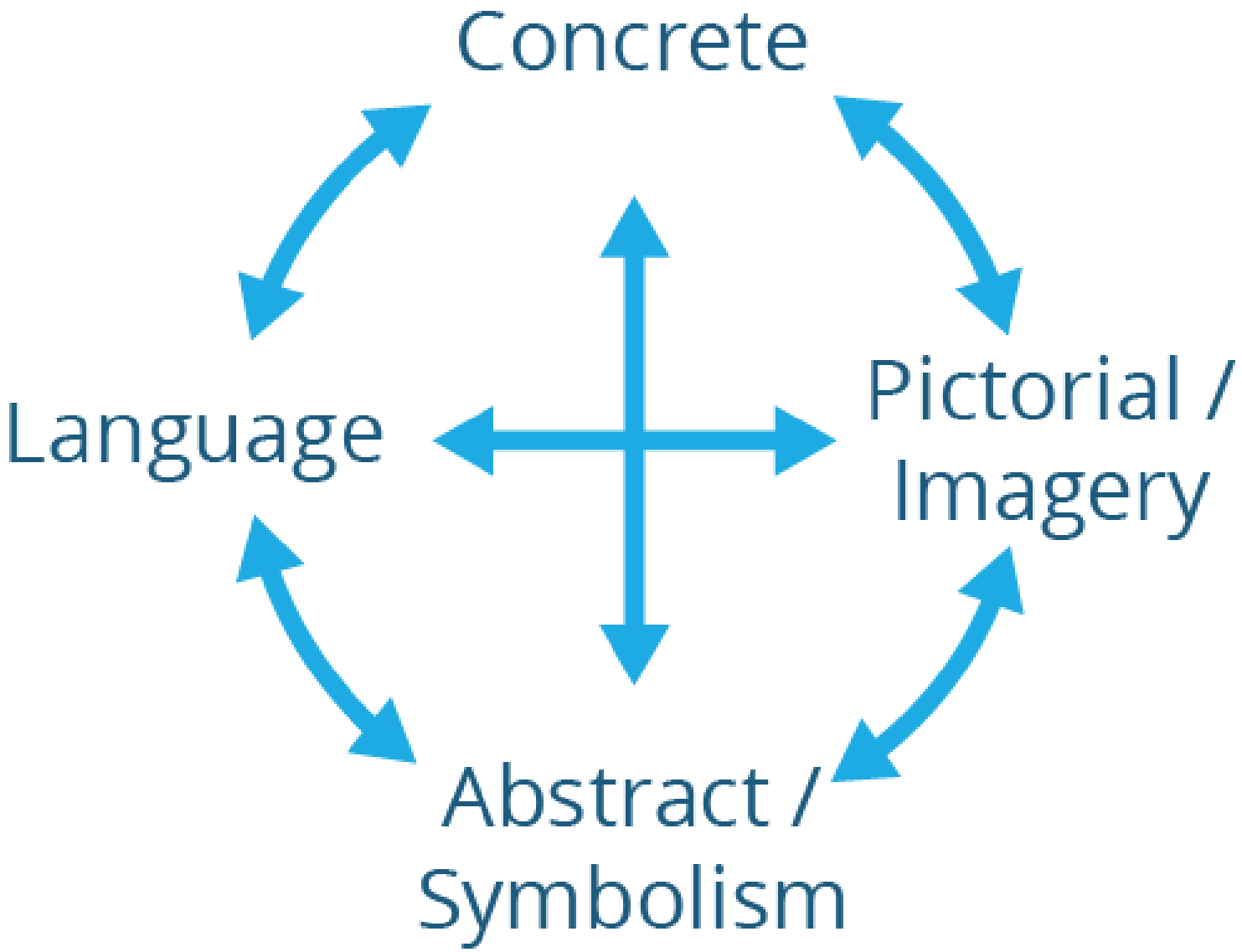
Supporting Numeracy Development



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Supporting Numeracy Development

Empty number lines

Multiplication arrays

Bar model

Informal jottings

encourage pupils to make jottings as they work and to recognise how these can support their thinking; model this process for them and distinguish between a presentation and a jotting.

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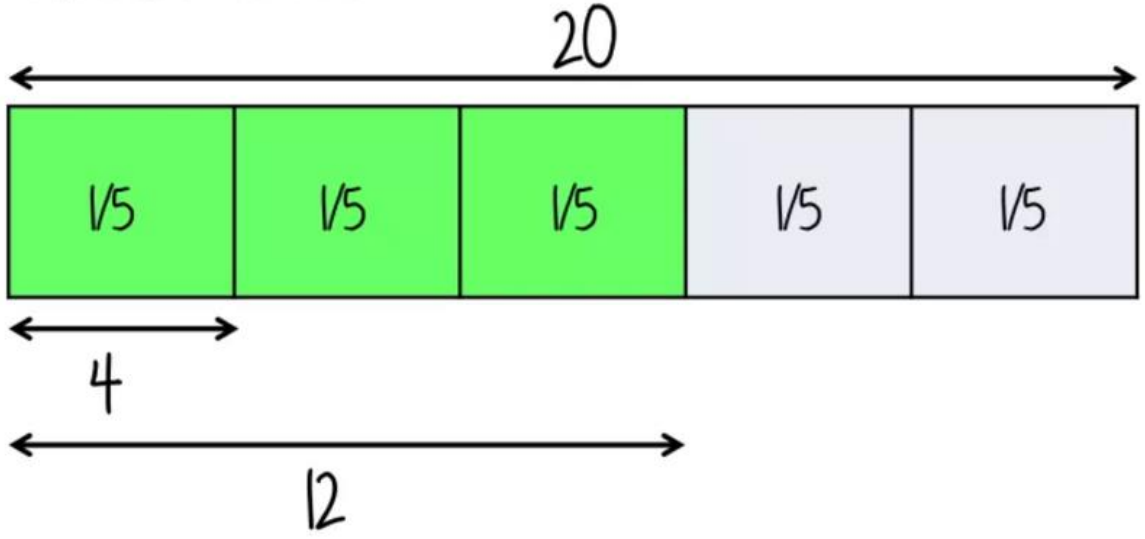
Supporting Numeracy Development

fraction of an amount

calculate 3/5 of 20

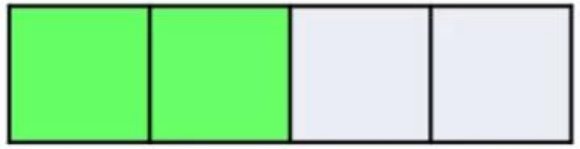


draw rectangle and show its length is 20
split into fifths and shade in 3
total length of one fifth?
total length of three fifths?

adding fractions different denominators

1/3 + 2/4

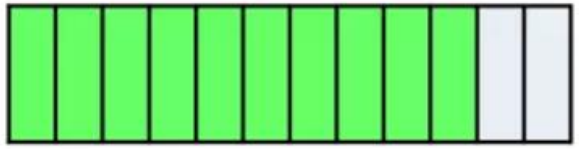
1/3 + 2/4 =



"let's turn both into twelfths." we split both bars into twelfths and the diagrams become as per those on the right

4/12 +

6/12 =



10/12

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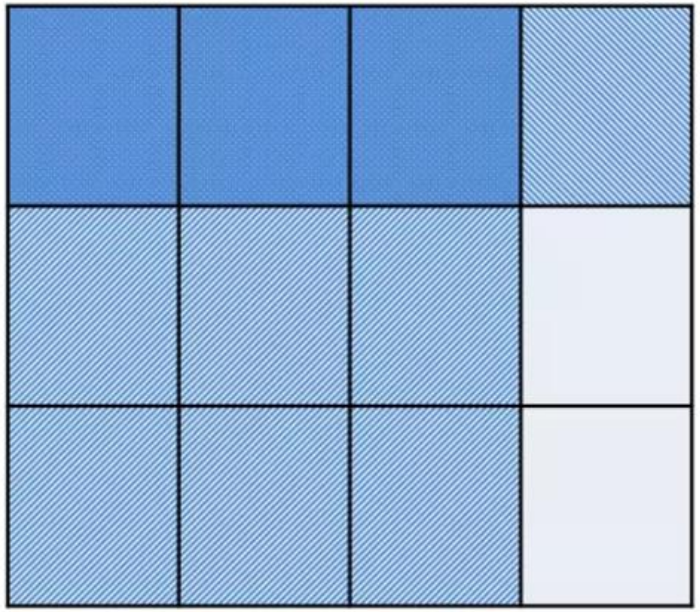
multiplying fractions

1/3 x 3/4

3/4

1/3



= 3/12

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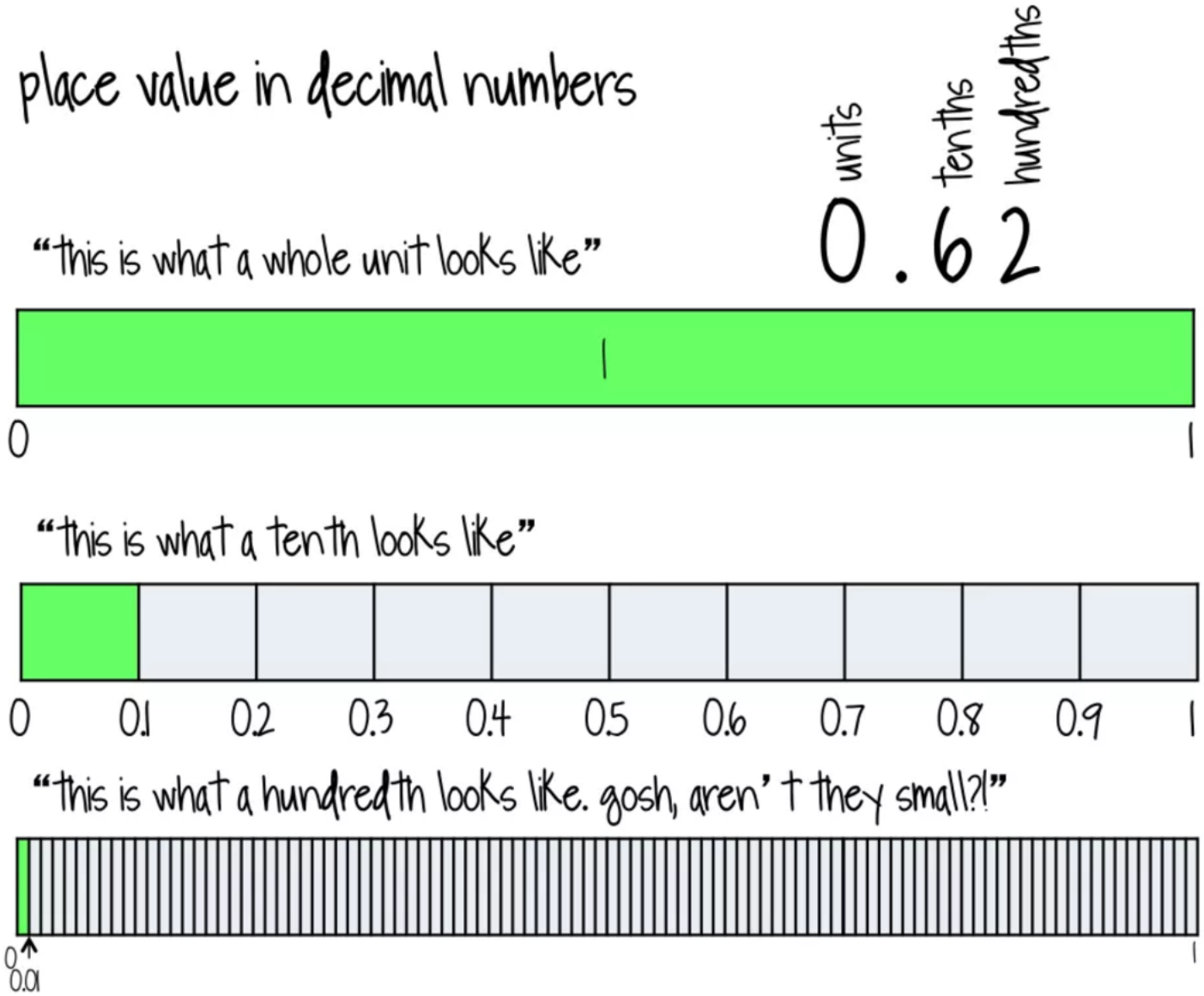

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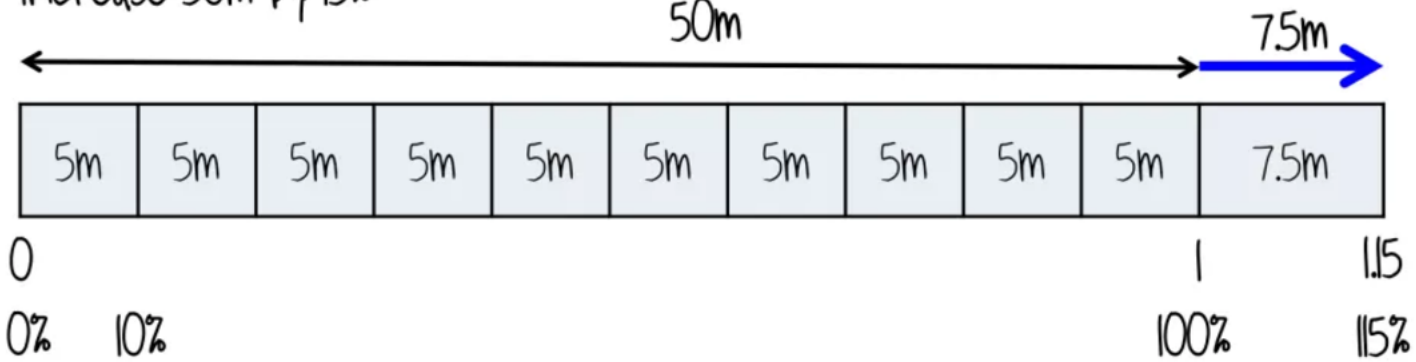
Supporting Numeracy Development

increase/decrease by a percentage

increase 50m by 15%



15% is 7.5m

answer is 50 + 7.5 = 57.5m

1) find 10%
2) use multiplicative reasoning to find 15%
3) increase, so it's getting added on to the original amount
4) by putting on both the perc and decimal number line you can link to multipliers, in this case it is 1.15

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reverse percentages

a tablet computer is reduced by 10% in a sale to £180. what was the original price?

if £180 = 90%,
£20 = 10%
£2 = 1%
original price must be £200 (100%)

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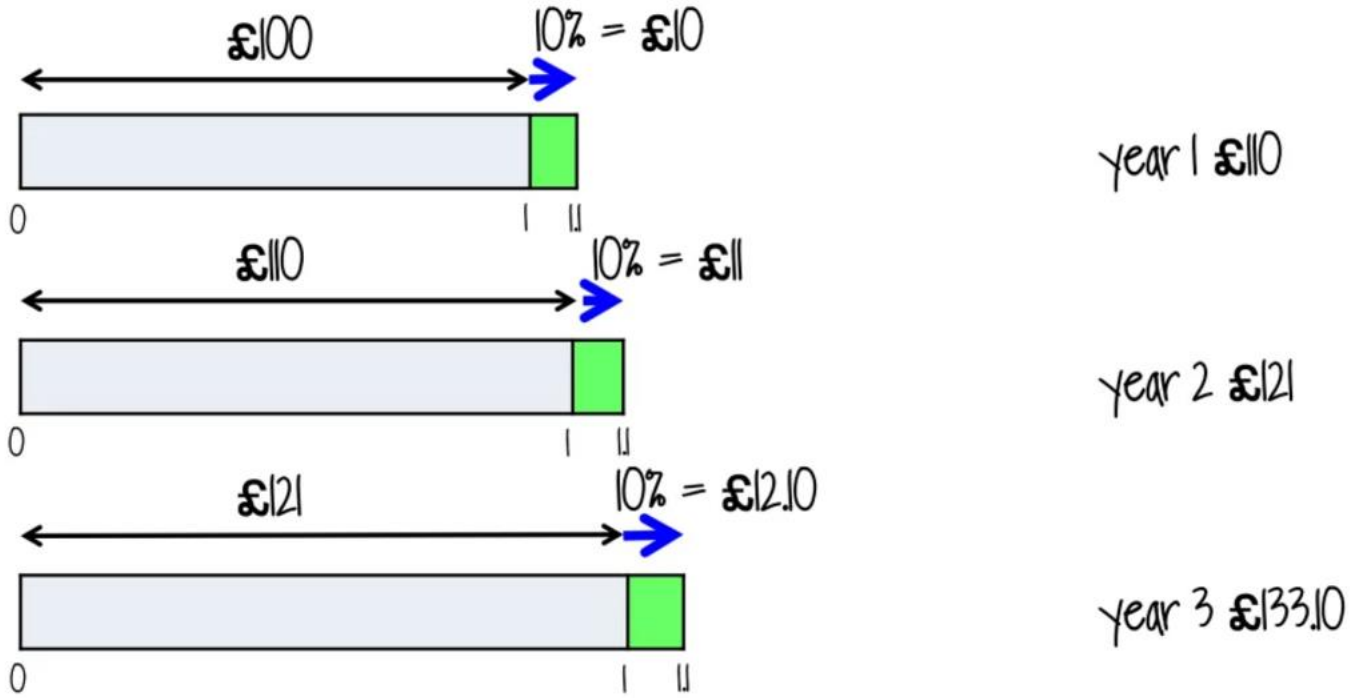
compound interest

what is value of a £100 investment paying 10% compound interest per annum after 3 years?



if you kept going and then rotated all the bars 90 degrees acw you would see the exponential curve you'd get if you plotted balance vs time!

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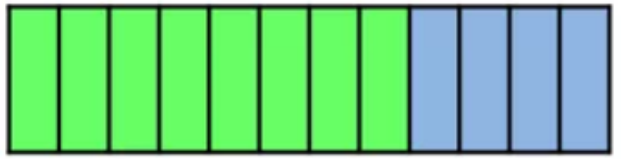
equivalent and simplifying ratios

1 : 2

is equivalent to...

2 : 4

8 : 4



simplifies to...

2 : 1

sharing a quantity in a given ratio

share £20 in the ratio 3 : 2

draw bar model showing ratio 3: 2 and total length £20
find 1 part is £4
answer is £12 : £8

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Beyond and Outside School

Operational	Functional
Generally describes the mathematical processes associated with number: - The Four Operations on Whole Numbers & Decimals - Working with Fractions, Decimals, Percentages.	Skills required to function in everyday life: - Time Management - Estimation - Managing Money - Lateral Thinking - Organisation - Pattern spotting

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Supporting Fucntional Skills

1. Sequencing
2. Asking mathematical questions
3. Organising information
4. Presenting information
5. Seeing relationships
6. Accuracy matters

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Wide Range of Resources

national5maths.co.uk