

Checkpoint Maths Scheme of Work

Year 1

Unit 1: Number

Key Learning Outcomes

Pupils should be able to:

- understand decimal notation and place value
- add, subtract, multiply and divide fractions; identify equivalent fractions; convert between decimals and fractions
- use the equivalence of fractions, decimals and percentages to compare proportions
- calculate percentages and find the outcome of a given percentage increase or decrease
- use directed numbers in practical situations
- divide a quantity in a given ratio; solve simple problems involving ratio and proportion
- use mental methods of calculation with simple decimals, fractions and percentages
- check a result by considering whether it is of the right order of magnitude
- construct frequency tables and diagrams; compare two simple distributions using the range and one of the mode, median or mean
- understand the probability scale; find probabilities based on equally likely outcomes.

Links

The Checkpoint curriculum references are given in the Learning Outcomes column.

IGCSE Syllabus Topics 1, 2, 3, 4, 5, 7, 10, 11, 12, 33, 34.

Chapter references in *Checkpoint Maths 11-14 (Book 1)* by Ric Pimental and Terry Wall are given in the Resources column.

Vocabulary

Approximate, bar-line graph, certainty, class, class interval, common factor, decimal number, decimal place, denominator, dice, discrete data, equally likely, equivalent fraction, factor, fraction, frequency diagram, frequency table, grouped data, highest common factor (HCF), hundredth, impossibility, integer, lowest common multiple (LCM), mean, median, modal class, mode, multiple, negative number, numerator, outcome, percentage (%), percentage decrease, percentage increase, pictogram, pie chart, positive number, prime, prime factor, probability, probability scale, proportion, questionnaire, random, ratio, recurring decimal, round, simplest form, spinner, square number, square root, survey, tally chart, tenth, thousandth, triangular number, whole number.

Learning Outcomes		Suggested Teaching Activities	Resources
An1 Np5	<p>Understand decimal notation and place value.</p> <p>Multiply and divide integers and decimals by 10,100 and 1000.</p> <p>Round large positive whole numbers to the nearest 10, 100 or 1000 and decimals to the nearest whole number or a given number of decimal places.</p>	<p>Use a number line with place value headings and moveable cards with single digits on them to discuss place value. Investigate how the digits move in relation to the decimal point when multiplied or divided by the powers of ten.</p> <p>Ensure that the class understands that multiplying by 10, 100 and 1000 makes the number bigger while dividing by these numbers makes the number smaller. Progress to paper and pencil methods.</p> <p>Use a number line to investigate rounding by placing, for example, a decimal on the line and deciding which whole number it is closest to. Devise rules for rounding.</p>	<p>Search for 'place value' at www.learn.co.uk</p> <p><i>Checkpoint Maths 11-14 (Book 1) Chapter 1</i></p>
Np3	<p>Use fraction notation to describe parts of shapes and to express a smaller whole number as a fraction of a larger one.</p> <p>Simplify fractions by cancellation and identify equivalent fractions.</p> <p>Convert terminating decimals to fractions.</p> <p>Add, subtract, multiply and divide fractions.</p> <p>Know that a recurring decimal is a fraction.</p> <p>Use division to convert a fraction to a decimal.</p>	<p>Use paper, card and counters. Cut circles ('pies' or 'pizzas') into different numbers of slices to make comparisons between fractions. Ensure that the students understand that the denominator of the fraction is the 'name' of the fraction and represents the number of equal parts the whole is divided into, and that the numerator shows how many of these parts are being used. Discover equivalent fractions by further dividing each slice of the pie.</p> <p>Find fractions of counters and paper strips by dividing into equal parts and then selecting the required number of parts. Use the pie slices to add and subtract fractions, showing that only those fractions with the same 'name' or denominator can be added or subtracted. Multiply the pie slices by whole numbers.</p> <p>At each stage progress to formal methods of calculation, giving sufficient graded examples for further practice until each student is confident.</p>	<p>Find work using fraction pairs at http://www.mymaths.co.uk</p> <p>http://math.rice.edu/~lanius/Patterns/index.html</p> <p><i>Checkpoint Maths 11-14 (Book 1) Chapter 11</i></p>

Learning Outcomes		Suggested Teaching Activities	Resources
Np3 Np5 Ns1	<p>Understand, use and calculate simple percentages.</p> <p>Use percentages to compare simple proportions.</p> <p>Recognise the equivalence of percentages, fractions and decimals.</p> <p>Express one quantity as a percentage of another.</p> <p>Calculate percentage increase or decrease; order fractions, decimals and percentages by magnitude.</p> <p>Know and use the symbols $>$, $<$, $=$, \neq.</p>	<p>Use local sale prices, discounts, examination results or inflation figures to illustrate the use of percentages.</p> <p>Make cards with percentages, fractions and decimals to practise matching equivalent values. Find examples from advertising about percentages. Use these in calculations. Change examination marks out of 100, 75, 50, 25, etc. to decimals and then to percentages.</p> <p>Make a large number line and investigate ways of finding the correct place for various decimals, percentages and fractions. Encourage the students to learn the common fractions and their equivalents in decimals and percentages, and ways to visualise them.</p> <p>Introduce the inequality symbols in connection with the number line, including ways to define a given interval.</p>	<p>http://www.mathgoodies.com/lessons/toc_vol4.html</p> <p>http://www.illuminations.nctm.org/lessonplans/6-8/percent/index.html</p> <p>Look at the Cost of Living project at: http://www.mathsnet.net/mec/costofliving.html</p> <p><i>Checkpoint Maths 11-14 (Book 1) Chapter 11</i></p> <p><i>Checkpoint Maths 11-14 (Book 1) Chapter 16</i></p>
Np4	<p>Recognise and use multiples, factors, common factors, highest common factor, lowest common multiple, primes and use simple tests of divisibility.</p> <p>Recognise triangular numbers, squares and the corresponding square roots.</p>	<p>Use the Sieve of Eratosthenes to introduce multiples, factors, and primes etc, using different colours to cross out the multiples of each prime number. List the various results, and answer questions such as 'which numbers have the most factors?' Ensure that the class knows that 1 is not considered to be a prime number and show that to use it as a prime number in for example factors and multiples would be meaningless.</p> <p>Look at patterns in numbers in the multiplication tables to find tests for divisibility.</p>	<p>Information on prime numbers at http://primes.utm.edu/</p> <p><i>Checkpoint Maths 11-14 (Book 1) Chapter 6</i></p>
Ns2	<p>Understand and use negative numbers.</p> <p>Order, add, subtract, multiply and</p>	<p>Make classroom and individual number lines. Use them to order integers, and to add and subtract integers.</p>	<p>Weather statistics at http://www.weatherpost.com</p> <p>Ordering numbers at: http://www.projects.ex.ac.uk/trol/trol</p>

Learning Outcomes		Suggested Teaching Activities	Resources
	divide positive and negative integers in context.	Use weather statistics to illustrate directed numbers in practice.	<i>Checkpoint Maths 11-14 (Book 1) Chapter 6</i>
Ns3	<p>Understand the relationship between ratio and proportion.</p> <p>Use ratio notation.</p> <p>Reduce a ratio to its simplest form and divide a quantity in a given ratio.</p> <p>Solve simple problems involving ratio and proportion in context.</p>	<p>Divide the class into groups according to features such as areas in which they live, or the number of siblings they have etc., to compare ratio and proportion. Where possible also show the reduction of these ratios to their simplest forms.</p> <p>Look at ratios in chemical reactions, such as 2 atoms of oxygen to 1 atom of hydrogen to make water. Use recipes to increase and decrease ratios.</p> <p>Find examples of the use of ratio and proportion in students' other subjects and in the workplace.</p>	<p>http://math.rice.edu/~lanius/proportions/index.html</p> <p><i>Checkpoint Maths 11-14 (Book 1) Chapter 21</i></p>
Ns5 Ns6	<p>Use a calculator to:</p> <ul style="list-style-type: none"> multiply and divide whole numbers (up to 3-digits) carry out calculations involving brackets, the memory, the square root and sign change keys. <p>Interpret a calculator display in different contexts.</p> <p>Check results mentally by considering the order of magnitude.</p>	<p>After initial teaching investigate the inverse operations of the square and square root keys.</p> <p>See how many answers can be obtained from a string of numbers and operations by various uses of brackets. Use the memory to replace brackets.</p> <p>Use the sign change key to enter $-2 + 5$ and show that this is the same as $5 - 2$.</p> <p>Make shopping lists. Estimate totals, decide how much money needs to be taken to the shop and roughly what change to expect. Check with the calculator for the exact answers.</p>	<p>http://www.virtu-software.com/articles/MyPetNumber.asp</p> <p><i>Checkpoint Maths 11-14 (Book 1) Chapter 6</i></p>
Ns6	<p>Without using a calculator:</p> <ul style="list-style-type: none"> add and subtract whole numbers and decimals (up to two places) Multiply and divide whole numbers and decimals (up to two places) by single-digit whole numbers. 	<p>Revise multiplication tables from 1 to 10, and addition and subtraction facts for numbers between 0 and 20.</p> <p>Look for patterns that make mental calculations easier, for example what happens when 9 is added to a two digit number, or that $5 + 7$ is the same as $6 + 6$.</p>	<p>http://www.virtu-software.com/articles/HappyNumbers.asp</p> <p><i>Checkpoint Maths 11-14 (Book 1) Chapter 6</i></p>

Learning Outcomes		Suggested Teaching Activities	Resources
		<p>Ask questions such as 'which pairs of numbers will add together to make 17?' Use 'count on' methods to calculate the change in money transactions.</p> <p>Practise using mental methods for simple numbers, and then formal methods of written working.</p> <p>Encourage the students to start a multiplication sum from the right hand end of the number, and a division sum from the left, so that carries and remainders go in the right directions.</p>	
Ns6	<p>Recall number facts, including multiplication facts to 10 x 10 and derive associated division facts.</p> <p>Use mental methods of calculation with simple decimals, fractions and percentages.</p>	<p>Investigate multiplication tables, using them to aid division by considering it as the inverse operation.</p> <p>Revise the rules for calculations with fractions, decimals and percentages and include mental practice.</p> <p>Practise recalling conversions between fractions, decimals and percentages. Encourage mental imagery of a fraction by referring back to the pizza slices or similar work.</p>	<p>http://www.virtu-software.com/articles/game0003.asp</p>
Nd1	<p>Collect and organise data.</p> <p>Design a data collection sheet or questionnaire to use in a simple survey.</p> <p>Construct frequency tables for discrete data, grouped where appropriate in equal class intervals.</p> <p>Construct and interpret bar-line graphs, pictograms and frequency diagrams for grouped discrete data.</p> <p>Draw conclusions based on the shape</p>	<p>This topic will benefit from the use of ICT.</p> <p>Investigate the popularity of different TV programmes or popular music, either in the class or in the whole school. Construct frequency tables, draw bar-line graphs and pie charts both on paper and using a spreadsheet.</p> <p>Check which simple statistics are being used in other lessons (e.g. Science and Geography) and incorporate similar examples into lessons where possible.</p>	<p>Choose 'Charts' at http://uk.launch.yahoo.com/index.html</p> <p>http://standards.nctm.org/document/eexamples/chap5/5.5/index.htm</p> <p><i>Checkpoint Maths 11-14 (Book 1) Chapter 4</i></p> <p><i>Checkpoint Maths 11-14 (Book 1) Chapter 4</i></p> <p><i>Checkpoint Maths 11-14 (Book 1) Chapter 9</i></p>

Learning Outcomes		Suggested Teaching Activities	Resources
	of graphs; compare two simple distributions using the range and one of the mode, median or mean.		
Nd2	<p>Find the mode (or modal class for grouped data), median and range.</p> <p>Calculate the mean, including from a simple frequency table.</p>	Investigate the heights and ages of students in different categories (e.g. male and female, or class by class). Make comparisons between the groups using mean, median and mode.	<p>http://standards.nctm.org/document/eexamples/chap6/6.6/index.htm</p> <p><i>Checkpoint Maths 11-14 (Book 1) Chapter 19</i></p> <p><i>Checkpoint Maths 11-14 (Book 1) Chapter 20</i></p>
Nd3	<p>Understand and use the probability scale from 0 to 1.</p> <p>Find probabilities based on equally likely outcomes in simple contexts.</p> <p>Use experimental data to estimate probabilities; compare experimental and theoretical probabilities in simple contexts.</p>	<p>Make a probability scale (classroom size and/or notebook size) and place events according to their probabilities (e.g. that the dawn will break tomorrow or that the class will see a flying horse by the end of the lesson, or that it will rain today).</p> <p>Use spinners and/or coloured beads to compare experimental and theoretical probabilities.</p>	<p>Choose 'Data' at www.mymaths.co.uk/</p> <p><i>Checkpoint Maths 11-14 (Book 1) Chapter 14</i></p> <p><i>Checkpoint Maths 11-14 (Book 1) Chapter 24</i></p>