

## Checkpoint Maths Scheme of Work

### Year 2

#### Unit 4: Number

##### Key Learning Outcomes

Pupils should be able to:

- add, subtract, multiply and divide integers and decimals; use the order of operations when mathematical operations are combined
- write a number in terms of its prime factors; use index notation with positive integer powers
- divide a quantity into two or more parts in a given ratio; use the unitary method to solve simple word problems involving ratio and direct proportion
- construct a range of statistical graphs and charts to analyse data
- find and record all possible mutually exclusive outcomes for a single event in a systematic way.

##### Links

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

IGCSE Syllabus Topics 1, 2, 7, 10, 23, 33, 34.

Chapter references in *Checkpoint Maths 11-14 (Book 2)* by Ric Pimental and Terry Wall are given in the Resources column.

##### Vocabulary

The vocabulary listed for Unit 1 is assumed in addition to the words listed below.

Bar chart, continuous data, cube, direct proportion, distribution, independent, index, line graph, mutually exclusive, power, sample, scatter graph, square, square root, stem-and-leaf diagram, time series graph, unitary method.

Learning Outcomes		Suggested Teaching Activities	Resources
Np1 Ns4	<p>Understand place value.</p> <p>Multiply and divide integers and decimals by 0.1 and 0.01.</p> <p>Round positive numbers to any given power of 10.</p> <p>Round decimals to the nearest whole number or to 1 or 2 decimal places.</p>	<p>Revise place value and multiplying/dividing integers by 10 and 100.</p> <p>Progress to multiplying/dividing by 0.1 etc. Introduce rounding with practical work in measuring length, area, volume and mass.</p> <p>For example, using counting squares to estimate area and deciding whether it is nearer to 8 squares or 9 squares. Sandwich irregular areas between whole numbers of squares.</p> <p>Work with continuous scales such as temperature to show the need to round to decimal places as well as whole numbers.</p>	Search for 'place value' at <a href="http://www.learn.co.uk">www.learn.co.uk</a>
Np2	<p>Add, subtract, multiply and divide integers.</p> <p>Multiply and divide integers and decimals (up to two places).</p>	<p>Revise the four operations for integers. Give plenty of practice to ensure students are thoroughly familiar with the work.</p> <p>Use area work to investigate multiplying and dividing decimals.</p>	<a href="http://www.mathgoodies.com/lessons/toc_vol5.html">http://www.mathgoodies.com/lessons/toc_vol5.html</a>
Np2	Know and use the order of operations, including brackets.	<p>Make a set of cards with an operation and a simple number (for example +2 or <math>\times 5</math>) and use to experiment with different ordering in a calculation. Discover that the order does not matter if only add and subtract are used.</p> <p>Make a string of operations and simple numbers to challenge the class to include brackets in different places to see how many different answers can be obtained.</p> <p>How many different answers can be obtained from 3, 4 or 5 numbers using +, -, <math>\times</math>, <math>\div</math> and brackets. Devise a game based on 'Countdown'.</p>	<p><a href="http://www.mathgoodies.com/lessons/toc_vol7.html">http://www.mathgoodies.com/lessons/toc_vol7.html</a></p> <p>Information about Countdown at:  <a href="http://www.adonald.btinternet.co.uk/Numbers/Countdown.html">http://www.adonald.btinternet.co.uk/Numbers/Countdown.html</a></p> <p><i>Checkpoint Maths 11-14 (Book 2) Chapter 2</i></p>

Learning Outcomes		Suggested Teaching Activities	Resources
Np4 Np6	<p>Write a number in terms of its prime factors.</p> <p>Use squares, square roots and cubes of numbers.</p> <p>Use index notation for positive integer powers.</p>	<p>Refer back to the Sieve of Eratosthenes in Year 7 to find prime factors of numbers. Investigate numbers such as 36 which have a variety of factors, but only 2 prime factors.</p> <p>Introduce index notation as a shorthand form of multiplying the same number several times. Progress to algebraic symbols to see the difference between <math>4x</math> and <math>x^4</math>.</p>	Information on prime numbers at <a href="http://primes.utm.edu/">http://primes.utm.edu/</a>
Ns3	<p>Reduce a ratio to its simplest form, including a ratio expressed in different units.</p> <p>Use the unitary method to solve simple problems involving ratio and direct proportion.</p>	<p>Discuss ratio notation and its relationship with fractions. Use practical examples such as recipes, journey times, chemical formulae (such as <math>\text{CaCO}_3</math> is <math>\text{Ca}:\text{C}:\text{O}=1:1:3</math>), mixing sand and cement for different strengths of mortar, mixing paint colours.</p> <p>Use speed, distance, time and map scales for direct proportion. Find other examples of quantities that are in direct proportion and others such as students' ages and their heights that are not directly proportional.</p>	Find examples of the use of ratio in chemistry at <a href="http://www.creative-chemistry.org.uk/molecules/alkanes.htm">www.creative-chemistry.org.uk/molecules/alkanes.htm</a>
Ns5	Use an electronic calculator to carry out more sophisticated calculations involving powers and fractions.	Make tables of values for more complicated functions such as $y = 2 + \frac{1}{2}x$ , using the memory button to store each value of $x$ before each calculation. Plot the results and check any that appear out of line.	Find useful examples at <a href="http://education.ti.com">http://education.ti.com</a> <a href="http://pegasus.cc.ucf.edu/~ucfcasio/casio.htm">http://pegasus.cc.ucf.edu/~ucfcasio/casio.htm</a>
Ns6	<p>Recall known number facts, including simple fraction to decimal conversions and vice-versa.</p> <p>Use known facts to multiply simple fractions together.</p> <p>Use known facts to multiply simple decimals together.</p> <p>Recall simple squares, square roots and cubes.</p> <p>Solve simple problems mentally.</p>	<p>Revise common fraction and decimal pairs. Introduce some more complicated ones.</p> <p>Learn squares, square roots and cubes as far as <math>10^2</math> and <math>5^3</math>. Ask students to construct a spreadsheet that will do all these calculations.</p>	

Learning Outcomes		Suggested Teaching Activities	Resources
Nd1	<p>Know the difference between discrete and continuous data.</p> <p>Identify and collect data to answer a question, choosing the method of data collection and the degree of accuracy needed.</p> <p>Construct frequency tables with given equal class intervals for sets of continuous data.</p> <p>Construct and interpret stem-and-leaf diagrams, pie charts, bar charts, frequency diagrams for discrete and continuous data, simple line graphs for time series and simple scatter graphs.</p> <p>Compare two distributions using the range and one or more of the mode, median or mean.</p>	<p>Discuss continuous and discrete data.</p> <p>Collect information about the length of a student's foot in cm and his/her shoe size. Use real life data, collected from school and family and, for example, from government and population statistics.</p> <p>Devise a project such as setting up of a local popular music radio station, to be funded by advertising.</p> <p>Find out how much time should be devoted to each type of music, which types of advertising would be most suitable and for which products.</p> <p>Refer to students' Science and Geography lessons to see if there has been any new statistical work that can be incorporated into the lessons.</p>	<p>Population statistics at <a href="http://www.geohive.com">http://www.geohive.com</a></p> <p><a href="http://www.ibiblio.org/lunarbin/worldpop">http://www.ibiblio.org/lunarbin/worldpop</a></p> <p><i>Checkpoint Maths 11-14 (Book 2) Chapter 4</i></p> <p><i>Checkpoint Maths 11-14 (Book 2) Chapter 14</i></p> <p><i>Checkpoint Maths 11-14 (Book 2) Chapter 15</i></p> <p><i>Checkpoint Maths 11-14 (Book 2) Chapter 24</i></p>
Nd2	<p>Calculate statistics, including the range, mean, median and mode and, for grouped data, the modal class.</p>	<p>Revise the meanings of these terms.</p> <p>Group the data already and use to calculate various statistics. Use weather statistics to compare different parts of the world. Answer questions such as where is the largest mean temperature difference between summer and winter.</p>	<p>Weather statistics at <a href="http://www.met-office.gov.uk/climate/uk/">http://www.met-office.gov.uk/climate/uk/</a></p>
Nd3	<p>Know that if the probability of an event occurring is <math>p</math> then the probability of the event not occurring is <math>1-p</math>.</p> <p>Find and record all possible mutually exclusive outcomes for a single event; understand the difference between mutually exclusive and independent events.</p>	<p>For example, show that the probability of getting a six when rolling a dice is <math>1/6</math>. List all other possible outcomes (not six) and show that the probability of not getting a six is <math>5/6</math>.</p> <p>Show that getting a six or a five are mutually exclusive outcomes, but that getting a six or an even number are not.</p>	<p><a href="http://www.mathcs.carleton.edu/probweb/probweb.html">http://www.mathcs.carleton.edu/probweb/probweb.html</a></p> <p><i>Checkpoint Maths 11-14 (Book 2) Chapter 19</i></p>