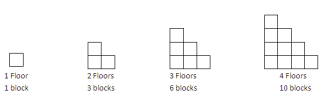
Mathematics: Level 5 NUMBER

Proportional thinking can be applied to solve real problems involving rational numbers.

I can		S	P	T	I know		S	P	T
Compare one part of a whole with the whole.	For example, in a class with 12 boys and 13 girls the ratio of the number of boys to the number of students in the class is 12:25				How to use multiple ways to represent the same number in operator situations,	E.g. 45% x 52 = can be seen as 0.45 x 52 and 45/100 x 52, or thinking relationally, 30% x 34 = 60% x 17 (by doubling and halving)			
Compare parts of a whole.	In the example above the ratio of boys to girls is 12:13 or a fruit salad could be described as having banana, apple and pineapple in the ratio 2:3:1.				How to calculate problems such as: • Each trip takes 3/4 of a full tank of petrol. You have 2/5 of a tank. What fraction of a trip can you make? • 3 pizzas shared among 5 boys (3/5 pizza each) results in a lesser share than 2 pizzas shared among 3 girls (2/3 pizza each), and find the difference in shares (2/3 -3/5=1/15) . • 4/7 > 5/9 since 4/7 is 1/14 greater than 1/2 and 5/9 is 1/18 greater than 1/2 or 4/7 = 36/63 and 5/9= 35/63 so the difference between 4/7 and 5/9 is 1/63. • 56% of 38 = ☐, ☐ % of 38 = 21.28, or 56% of ☐ = 21.28				
Write and understand rates which is a type of ratio which compares two different measures or quantities.	Common examples of rates include dollars per kilo, kilometres per hour, etc.				How to use the additive law of exponents, that is ab x ac = ab+c and ab ÷ a = ab - c and compare powers relationally. 36 >63 because (3x3)x(3x3)x(3x3)>6x6x6				
Express any of the fractions as decimals and percentages.					Know common square roots and estimate √36 = 6 and √49 = 7 so √42 ≈ 6.5				
Express a number or decimal measurement in standard form and vice versa and understand the potential rounding that may be involved.									
• Reason, for example, that given the fraction 5/11, that 5/10 and 6/11 will be greater, 4/11 and 5/12 will be less, and comparing it with 4/10 and 6/12 will require further investigation.									

Mathematics: Level 5 ALGEBRA

<table>
<tr><td colspan="4">Equations and Expressions: Some types of relationships between variables can be represented by a quadratic equation.</td><td></td><td></td><td></td><td colspan="3">Patterns and Relationships: Graphs and equations which represent a relationship between variables connect with each other in key and consistent ways.</td><td></td><td></td><td></td></tr>
<tr><td colspan="4">Understand that solving an equation involves finding the value of a variable when the other variable is given, and say how the solution relates to the original context.</td><td></td><td></td><td></td><td colspan="2">• Know that fractional numbers are defined as rational numbers in the form a/b, where a and b are whole numbers and b ≠ 0.</td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="2">Solve linear and simple quadratic equations by applying inverse operations</td><td>eg (3q + 7)/4 = 16, by multiplying both sides by four, subtracting seven, etc.</td><td></td><td></td><td></td><td colspan="3">Understanding of the properties of +,-,x and ÷ when working with fractional numbers and integers.</td><td></td><td></td><td></td></tr>
<tr><td colspan="4"></td><td></td><td></td><td></td><td>Express the operations on fractional numbers algebraically,</td><td>eg a/b + c/d = (ad + cb)/bd</td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="4"></td><td></td><td></td><td></td><td colspan="3">Substitute number values into an equation to confirm that it holds for all addition examples.</td><td></td><td></td><td></td></tr>
<tr><td colspan="4"></td><td></td><td></td><td></td><td>connecting constant first or second order difference in tables with linear and quadratic relations respectively, with the graph (linear and parabolic) and standard equation forms (y = mx + c and y = a x 2 + bx + c) for such relations.</td><td>eg given the spatial pattern below students can use a table, graph or equation to represent the relation and solve problems.
 
</td><td></td><td></td><td></td></tr>
<tr><td colspan="4"></td><td></td><td></td><td></td><td colspan="3">Use these table and graphs for other relationships, such as simple exponential and step relations</td><td></td><td></td><td></td></tr>
</table>

Mathematics: Level 5- MEASUREMENT

All measurements are approximate

I …	S	P	T
Know that measurements are not exact- accuracy can be affected by both human error and the accuracy of units,			
Understand and use accuracy eg 1.80 metres represents a measure that is greater or equal to 179.5 cm and less than 180.5 cm.			
Know the meaning of prefixes used in the metric system eg “kilo” means one thousand, “centi” means one hundredth			
Convert between units (same attribute) with more than 1 decimal place, eg 0.125 kg = 125g, or 17.5 cm = 0.175			
Connect the formulae for finding areas of parallelograms, triangles, and trapeziums to the formula for the area of a rectangle by partitioning and reassembling the shapes.			
Find perimeters and areas of shapes where the side lengths are simple decimals in order to understand that area, in particular, is not restricted to whole numbers			
Understand that the formula for the circumference of a circle can be expressed in two ways: $C = 2\pi r$ (2 times pi times the radius), or $C = \pi D$ (pi times the diameter)			
Apply the formula to find the circumference of any circle, for example, the circumference of a bicycle tyre.			
Find the formula for area of a circle by cutting several circles into increasingly small sectors and reassembling			
Find the perimeters of composite shapes.			
Find the area of composite shapes by calculating the areas of the parts and adding them together.			
Find the volumes of prisms by multiplying the area of their cross-section by their length, for example for a cylinder multiply the area of the circle by the length of the cylinder.			

Mathematics: Level 5 - POSITION AND ORIENTATION

Lines and curves (called loci) can be described in terms of their relationship to certain fixed objects.

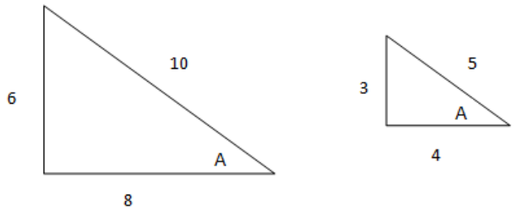
I can...	S	P	T
Can draw the graph of linear and simple quadratic equations.			
Can identify the linear equation for the graph of a given simple loci.			
Can describe the common properties of points on a circle or ellipse and recognise the circle as a special case of the ellipse			
Know that all points on a circle are the same distance from the centre.			
Know all points on an ellipse share a common sum of distances to two foci and as the foci close the ellipse “morphs” into a circle			
Use co-ordinate axes including positive and negative integers and decimals.			
Describe straight lines using equations or co-ordinate pairs, for example y = x + 4, or “the line that passes through (-4, 0.5) and (2, 1.5)”.			
Interpret points and lines on a map by calculating distances using map scales and directions using compass bearings.			
Use multiplicative and proportional strategies to interpret scales and compass bearings involving angles			

Mathematics: Level 5 -SHAPE

Geometric properties of shapes can be used to calculate lengths and angles.

I can...	S	P	T
Know that the angle properties of lines are: Vertically opposite angles are equal, Adjacent angles add to 180°, Corresponding angles are equal, Interior angles add to 180°, Alternate angles are equal.			
Apply the properties of intersecting and parallel lines to problems like constructing rectangular and skewed picture frames.			
Apply the angle properties of polygons.			
Find the formula for the internal angles of regular polygons (equal angles) by measuring and creating a table of results or by reasoning through cutting the polygons into triangles. Interior angles of a polygon with n sides are ((n-2) x 180°)/n. Exterior angles of any polygon add to 360°			
Know a range of polyhedra including the platonic solids, cuboids, right-angled prisms and pyramids			
Create a net for an icosahedron or a dodecahedron using 2 separate halves.			
Form three dimensional shapes drawn as plan views, isometric projections or nets.			
Am able to represent models of three dimensional shapes using plan views isometric projections or nets where appropriate.			

Mathematics: Level 5 - TRANSFORMATION

I can ...	S	P	T
• Describe which properties of shapes change for each transformation: 1. Under rotation lengths, areas, angles do not change but orientation does. 2. Under reflection lengths, areas and angles do not change but orientation does. 3. Under translation lengths, areas, angles and orientation do not change. 4. Under positive enlargement angles and orientation do not change but lengths and areas do not			
• Can apply trigonometric ratios to find the angles and lengths of sides in right-angled triangles.			
• Recognise two features of trigonometric ratios: 1. Given similar right angled triangles the ratios of side lengths are the same, for example  1. 2. For both triangles the ratio of the sides opposite and adjacent to angle A is 6/8 = 0.75. For any similar triangle this is also true. This ratio is the tangent of angle A, so A = 37°. 3. The trigonometric ratios can be found using a right-angled triangle with a hypotenuse of one and applied to any other similar right angled triangle by scaling.			
The trigonometric ratios are: • sin θ = side opposite θ/hypotenuse, • cos θ = side adjacent to θ/hypotenuse, • tan θ = side opposite θ/side adjacent to θ • Remember the ratios using the mnemonic SOH CAH TOA. • Use Pythagoras' theorem ($a^2 + b^2 = c^2$) to find the lengths of sides of right angle triangles.			

Mathematics: Level 5 - STATISTICS

Telling a story about the wider universe with supporting evidence.

I	S	P	T
Can use the statistical enquiry cycle to plan and conduct investigations The questions may be: 1. Summary, eg, what is the normal height of a 14-year-old female? 2. Comparative, eg, do males do more exercise than females? 3. Relational, eg, is there a relationship between television watching and lack of exercise?			
Collect and analyse data that extends to the need for representative sampling and adequate sample size, avoidance of bias in surveys and sampling techniques, systematic collection and processing of data that does not narrow potential responses, and appropriate use of technology to sort and display data.			
Use a variety of displays to find patterns or relationships in multivariate data sets. This range of displays should extend to using measures of centrality and spread such as mean or median, range and quartiles. This means that displays such as box and whisker plots and histograms are accessible.			
Analyse data by comparing distributions visually using multiple graph types, preferably generated by technology.			
Use informal inference to look for differences between distributions, eg the median of one group is higher than the upper quartile of the other.			
Choose the most appropriate data display to report findings and draw conclusions from the data related to the investigative question.			
Recognise that all findings from the analysis of samples must be interpreted with uncertainty and be cautious in generalising the results to the whole.			
Evaluate the statistical investigation or probability activity undertaken by others by considering features of the investigation. ○ Features include the appropriateness of sampling methods (eg. number, representativeness), quality of the data collection (eg. questions asked, accuracy of measurement, fairness of the experiment), choices of measures (types of questions, and responses allowed), data analysis (technology use, choice of displays) and the extent to which claims made are supported by the evidence.			

Mathematics: Level 5 - PROBABILITY

Estimating probabilities and probability distributions from experiments and deriving probabilities and probability distributions from theoretical models for two- and three-stage chance situations

Recognising the connections between experimental estimates, theoretical model probabilities and true probabilities.

I can...	S	P	T
• Know that statistics usually involves situations where the actual probabilities are not known, for example, probability of catching a disease. Theoretical models are not always possible.			
• Recognise that the probability of rolling an even number on a standard die is 1/2 because there are 6 possible outcomes and 3 of them are even, 3/6 = 1/2.			
• Carry out experiments to test the probability of events and compare the results with theoretical probabilities.			
• Understand and explain why there can be some variation between experimental estimates of probability and theoretical probabilities is normal.			
• Understand that a larger sample is likely to provide a more accurate theoretical probability, proportionally speaking, than a small one.			
• Understand that the results of past trials in probability experiments do not impact on future events (independent events).			
• Calculate probabilities for probability situations that involve two or more events. These events may be independent (eg rolling two dice) or dependent (eg drawing two cards from a deck of cards without replacement)			
• Model these situations using models such as tree diagrams, tables and systematic lists and assign theoretical probabilities as proportions using fractions, percentages and ratios			
• Estimate probabilities given results of sufficient trials. Such estimates are always approximate.			