Mathematics: Level 4 NUMBER

Rational numbers can be represented and operated on in a variety of ways to solve problems.

Strategies and Knowledge		S	P	T	Strategies and Knowledge		S	P	T
I have strong mental strategies and show critical choice, (mental, machine or paper) recognise when to use estimation, check calculated answers.	eg • 37 + 41 + 40 + 38 = [ ] as 4 x 40 – 4, • 24 x 36 = 20 x 36 + 4 x 36, • 9 x 78 = 9 x 80 – 9 x 2, 276 ÷ 12 = 240 ÷ 12 + 36 ÷12, • 12 x 33 = 4 x 99 • 216 ÷ 12 = 216 ÷ 2 ÷ 2 ÷ 3 • 354 ÷ 6 = [ ] as 6 x [ ] = 354,				I know how to find answers to problems such as 40% of 56 using decimal strategy 0.4 x 56 = 4 x 5.6 = 22.4. • Multiple fractions with understanding 2/3 x 3/5 and use multiplicative understanding of pv to solve e.g. 1.6 x 0.4, as 16 x 4 ÷100 = 0.64 and 24 ÷ 0.3 as 24 ÷ 3 x 10 = 80				
I can calculate powers 4^3 = 4 x 4 x 4 = 64, and factorials 4! = 4 x 3 x 2 x 1					I can solve problems of the form a/b x c = d (a, b, c and d are whole numbers) where one number is unknown	e.g., 4/7 x [ ] = 24 or [ ] % of 76 = 19.			
I can express decimals as fractions and vice versa	e.g., 2.47 = 2 + 4 tenths + 7 hundredths or 247 hundredths.				I can compare size of two fractions by converting	e.g., 2/3 > 4/9 because 2/3 is greater than one half or because 2/3 =6/9			
I can solve add/sub with decimals and fractions	e.g., 13.2 – 5.79 = 7.41 and ¾ + 7/8 = 1 5/8 (Denominators must be related multiples)				I can find equivalent ratios by scaling up/down	e.g., 2:5 is same ratio as 8:20 or 12:18 is the same ratio as 2:3			
I can recognise when sharing division situations give equal or unequal answers	e.g., 3 pizzas shared between 5 is a smaller share than 2 pizzas shared between 3 people.				I can find equivalent rates	e.g., 18km in 15mins is same speed as 72km in 60 mins			
I can find how many measures of a fraction fit into one	e.g., A trip used 2/5 tank of petrol. How many trips can be made on a full tank (1 ÷ 2/5 = 5/2 = 2 ½)				I recognise when two 'fractions of an amount' situations give equal or unequal answers	e.g., 75% of $12 is same as 25% of $36			
I know the equivalent decimal and percentage forms for everyday fractions.	Eg • 3/8 = 375/1000 = 0.375 • 3/8 = 37.5/100 = 37.5%. • 240% = 2.4 = 12/5.				Know fractions from halves, thirds, quarters, fifths, eighths and tenths as decimals/percentages and convert back to simplest form e.g., 0.8 = 4/5.				
I see a mental number line and am able to locate position of integers and decimals on a given line to scale.					I know the significance of positions	e.g., 24.671 where 7 means seven hundredths, 3.509 has 35.09 tenths, 350.9 hundredths, 3509 thousandths.			
I can calculate problems like 4.2 – 2.68 = [ ] by decomposing it as the difference between 420 hundredths and 268 hundredths,					I know one hundredth equals ten divided by one thousand, 30.4 divided by one hundred equals 0.304.				
I know the effect of adding/subtracting integers on a number line	e.g., +3 - -2 = [ ] and +3 + +2 = [ ] have the same answer, +5								

Mathematics: Level 4 ALGEBRA

Equations and Expressions: Linear relationships between variables can be represented by a linear equation.					**Patterns and Relationships: Rules to describe the relationship between variables can involve multiple operations.**				
I can write and solve equations like y = mx + c, where x and y are related variables, m is a whole number, c is an integer	e.g., 3p – c or a + 5 = 4b, 3p – 6 = 18				I use appropriate mathematical terminology and symbols and describe and apply laws.	Eg 4 x 6 = 24 so 24 ÷ 6 = 4 and 24 ÷ 4 = 6, leading to a x b = c so c ÷ b = a and c ÷ a = b.			
Can find the required value using both sensible estimation and improvement, and by formal methods	e.g., 3p-6 = 18 so 3p = 24 (add 6 to both sides) so p = 8 (divide both sides by three)				I can describe function rules for a linear relationship.	Eg a matchstick pattern can be represented in a table and graph and use this to predict future terms.			
					I can give linear rules connecting variables	e.g., no. of matches is six times no. of counters plus two			
					I can extend a graph or table of a linear relationship to make predictions				
					Use recursive methods to predict further members of a sequence(Recursive means finding what is added to or subtracted from one term to get the next.)	e.g., triangular numbers.			

Mathematics: Level 4- MEASUREMENT			
Application of multiplicative thinking to measurement.			
I…	S	P	T
Work with commonly used units: o Length (Km, m, cm, mm -using rulers and tape measures) o Area (kS2, hectare, S2, cS2) o Volume/capacity (Litre, decimetre, cubic cm, m, km – using jugs, cylinders) o Weight (Tonnes, kg, g- using scales), (˚C -using thermometers) o Temperature (Degrees, hours, mins, secs – for angle and time) o Angle/time (degrees, hours, minutes, seconds)			
Can **Estimate** approximate measurements, use **appropriate** units, accuracy with protractors & rulers, use of symbols to record their results.			
Am able to convert units with whole numbers, common decimals. Eg 0.6ha = 6000S2 or 675mm = 67.5cm			
Use multiplicative strategies to find perimeter and area of polygons and volume of cuboids where length of sides is given.			
Can express areas and volumes using correct symbols and units			
Can use a range of scales- clocks, rulers, protractors, thermometers (ones on computer games, personal fitbits, infographics)			
Can read timetables (12/24hr)for things like travelling, tides, tv programmes, sports events.			

Mathematics: Level 4 - POSITION AND ORIENTATION			
Position, direction and pathways can be operated on using coordinate systems and maps.			
I can...	S	P	T
Convert scale on a map to actual measurements,			
Describe any direction given the orientation of North.			
Give/interpret location of a map feature using grid references on a range of maps: street maps, topographical maps, world maps.			
Follow instructions using o Compass o Distances o Grid references by interpreting scale maps. Eg Auckland to Wellington			

Mathematics: Level 4 -SHAPE			
I can...	S	P	T
• Sort shapes by classes: o number and relationship of sides (equal/parallel) o number and nature of angles (4 right angles) o symmetry and shape of faces/surfaces (3D shapes)			
Know that polygons are defined by no. of sides, (triangles, quads, hex, oct).			
Know that 3D shapes are defined by the nature of faces/surfaces (prisms, cylinders, prisms, cones, regular polyhedra).			
Describe & identify classes of 2D closed curves and their 3D equivalents by rotation' circles and spheres, ellipses and ellipsoids.			
Find subclasses: squares within rectangles, rectangles within parallelograms, parallelograms within quadrilaterals.			
Identify and describe classes that are disjoint scalene, isosceles, prisms and pyramids			
Create 2D drawings from 3D-Isometric projections, plan views, nets.			
Construct a model from 2D drawings.			
Visually 'unwrap' 3D shapes to visualise them as nets			

Mathematics: Level 4 - TRANSFORMATION			
Some properties of objects do not change under different transformations.			
I can …	S	P	T
Know the invariant properties of a figure do not change. ● Rotate; lengths, areas, angles don't but orientation does. ● Reflect; lengths, areas, angles don't but orientation does. ● Translate; length, areas, angles and orientation don't. ● Enlarge (positive); angles and orientation don't but lengths and areas do.			

Mathematics: Level 4 - STATISTICS				
PPDAC- Telling the story in detail with supporting evidence. Thinking beyond the data provided.				
I		S	P	T
Use statistical enquiry cycle to plan and conduct investigations: o Pose questions o Consider data to collect (multivariate) o Gather/sort the data o Develop an answer to my question.				
Ask summary comparison, summary and relationship questions				
Decide which variables are important to answer investigation				
Consider methods of data collection- samples, surveys, bias				
For category data display my information using tally charts, frequency tables, pictographs, bar graphs, strip graphs, pie charts				
For measurement data display my information using dot plots, stem and leaf graphs, scatterplots.				
For time series data display my information using line graphs				
Use technology to find and justify patterns including differences and similarities e.g., clusters, outliers, association of variables				
Evaluate strength of argument proposed by others.				
Consider weight of the findings	e.g., appropriateness of sampling methods (sample representative), quality of data collection (fairness, Q asked), data analysis (tech used, choice of displays) extent to which claims are made and supported by the evidence			

Mathematics: Level 4 - PROBABILITY

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

I can...		S	P	T
Know that probability is about the chance of outcomes occurring.				
Know that it is not possible to know the exact probability of everyday situations.				
Use trialling to gain information and I understand that trial samples vary.				
Know that there can be variation between expected outcomes and experimental outcomes.				
• Use systematic models for simple one or two stage situations: o Listing o Tree/network diagrams o Tables.				
Compare distributions from my trials with expectations from models accepting variation and independence.				
Use benchmarks like half (50%), third (33.3% and 66.6%), quarters (25% and 75%), fifths (20%, 40%, 60%, 80%) tenths (10%, 20%,)				
Describe certain outcomes by fractions equalling 1 (100%)				
Describe impossible outcomes with fractions equalling 0 (0%)				
Know that in realistic situation where probabilities are estimated	e.g., bottle landing upright, it is expected to accept variation from exact fraction e.g., 37 out of 100 were upright which is about 33.3%			
Know that the count of **all possible** outcomes gives the denominator of a probability fraction	e.g., two dice have 36 possible outcomes.			
Know that he count of desired outcomes gives the numerator	e.g., 9 ways to get a total of 2,4 or 6 so prob is 9/36 or ¼.			