Mathematics Progression Points: Year 5 – v8.0

Independent Schools Queensland (ISQ) has developed this version of the Progression Points to support teachers in independent schools with implementation of version 8 of the Australian Curriculum. This work has been done with support from officers at ACARA.

Teachers of Prep to Year 2 will find significant changes in English from previous versions of the Australian Curriculum – particularly with the inclusion of more specific references to phonics and phonemic awareness. Changes to the curriculum have also been made in all other year levels in both English and mathematics.

A word document version of the Progression Points is available so that teachers can rearrange the sequences of learning.

Personnel in independent schools are encouraged to consider how the Progression Points could be used to:-

* diagnose through formative assessment, the capabilities, strengths and weaknesses of individual students
* plan teaching programs to meet the needs of individuals and groups of students
* formally assess the progress of individuals and groups of students
* report to parents on the achievements of their children against the Australian Curriculum.

As with previous versions of the Progression Points, the “demonstrating” column accurately reflects the expectations of version 8 of the Australian Curriculum achievement standards – however with more detail and examples included.

ISQ welcomes any suggestions for improvement from teachers working very closely with the Progression Points.

More information

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| **Year 5 Achievement Standard**By the end of Year 5, students [solve](http://www.australiancurriculum.edu.au/glossary/popup?a=F10AS&t=Solve) simple problems involving the four operations using a range of strategies. (MKU5.1) They check the reasonableness of answers using estimation and rounding. (MKU5.2) Students [identify](http://www.australiancurriculum.edu.au/glossary/popup?a=F10AS&t=Identify) and [describe](http://www.australiancurriculum.edu.au/glossary/popup?a=F10AS&t=Describe) factors and multiples. (MKU5.3) They [identify](http://www.australiancurriculum.edu.au/glossary/popup?a=F10AS&t=Identify) and [explain](http://www.australiancurriculum.edu.au/glossary/popup?a=F10AS&t=Explain) strategies for finding unknown quantities in number sentences involving the four operations. (MKU5.4) They [explain](http://www.australiancurriculum.edu.au/glossary/popup?a=F10AS&t=Explain) plans for simple budgets. (MKU5.5) Students connect three-dimensional objects with their two-dimensional representations. (MKU5.6) They [describe](http://www.australiancurriculum.edu.au/glossary/popup?a=F10AS&t=Describe) transformations of two-dimensional shapes and [identify](http://www.australiancurriculum.edu.au/glossary/popup?a=F10AS&t=Identify) line and rotational symmetry. (MKU5.7) Students [interpret](http://www.australiancurriculum.edu.au/glossary/popup?a=F10AS&t=Interpret) different data sets. (MKU5.8)Students order decimals and unit fractions and [locate](http://www.australiancurriculum.edu.au/glossary/popup?a=F10AS&t=Locate) them on number lines. (MS5.1) They add and subtract fractions with the same denominator. (MS5.2) Students continue patterns by adding and subtracting fractions and decimals. (MS5.3) They use appropriate units of measurement for length, area, volume, capacity and mass, and [calculate](http://www.australiancurriculum.edu.au/glossary/popup?a=F10AS&t=Calculate) perimeter and area of rectangles. (MS5.4) They convert between 12- and 24-hour time. (MS5.5) Students use a grid reference system to [locate](http://www.australiancurriculum.edu.au/glossary/popup?a=F10AS&t=Locate) landmarks. (MS5.6) They [measure](http://www.australiancurriculum.edu.au/glossary/popup?a=F10AS&t=Measure) and [construct](http://www.australiancurriculum.edu.au/glossary/popup?a=F10AS&t=Construct) different angles. (MS5.7) Students [list](http://www.australiancurriculum.edu.au/glossary/popup?a=F10AS&t=List) outcomes of chance experiments with equally likely outcomes and assign probabilities between 0 and 1. (MS5.8) Students [pose](http://www.australiancurriculum.edu.au/glossary/popup?a=F10AS&t=Pose) questions to gather data, and [construct](http://www.australiancurriculum.edu.au/glossary/popup?a=F10AS&t=Construct) data displays appropriate for the data. (MS5.9) |
| **Strand**  | **Emerging**Beginning to work towards the achievement standard  | **Developing**Working towards the achievement standard | **Demonstrating**Demonstrating the achievement standard | **Advancing** Working beyond the achievement standard | **Extending**Extending with depth beyond the achievement standard |
| * *With explicit prompts (step-by-step oral scaffolding, concrete materials, reference to charts, etc)*
* *In familiar contexts*
* *Learning to follow procedures*
 | * *With prompts (oral or written questions, concrete materials, reference to charts, etc)*
* *In familiar contexts*
* *Attempts to explain*
 | * *Independent (with access to concrete materials, charts, etc)*
* *In familiar contexts*
* *Explains basic understanding*
 | * *Independent (with access to concrete materials, charts, etc)*
* *Applying in familiar contexts*
* *Explains with detail*
 | * *Independent (with access to concrete materials, charts, etc)*
* *Applying in new contexts*
* *Explains with connections outside the teaching context*
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| Proficiency strands*At this level:*  | * Understanding *includes connecting calculations with counting sequences, partitioning and combining numbers flexibly, identifying and describing the relationship between addition and subtraction and between multiplication and division.*
* Fluency *includes counting numbers in sequences readily, using units iteratively to compare measurements, listing possible outcomes of chance event, and describing and comparing time durations.*
* Problem Solving *includes formulating problems from authentic situations, making models and using number sentences that represent problem situations, planning routes on maps, and matching transformations with their original shape.*
* Reasoning *includes using known facts to derive strategies for unfamiliar calculations, comparing and contrasting related models of operations, describing connections between 2-D and 3-D representations, and creating and interpreting simple representations of data.*
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| **Relevant part of the Achievement Standard** | **Students identify and describe factors and multiples. (MKU5.3)** |
| **Number and Algebra:** Number and place value[*ACMNA098*](http://www.australiancurriculum.edu.au/curriculum/contentdescription/ACMNA098) | **Students are beginning to:** * **Generate** skip counting sequences involving the multiples of all single digit numbers
* **Recognise and describe** numbers as the multiples of 2, 3, 4 and 5 if they are written as a group (e.g. say that the numbers 12, 20, 32, 8, and 16 are all multiples of 4)
 | **Students are developing the ability to:*** **Identify and describe** the multiples of any single digit number within a larger set of numbers (e.g. study a set of numbers and select all of the multiples of 6)
* **Describe** strategies for identifying the multiples of the single digit numbers (e.g. say that you can count mentally using the multiples; or when checking whether 43 is a multiple of 7, recall that 35 is one, add on 7 to get 42 and decide that 43 is not a multiple of 7)
 | Students **independently**:* **Identify** and **describe** factors and multiples of whole numbers and use them to solve problems(e.g. decide a number is divisible by 6 as it can be evenly divided by both 2 and 3)
* **Explore** factors and multiples using number sequences (e.g. explain that 4 is a factor of every multiple of 4)
* **Identify and describe** the strategies to decide whether a given number can be evenly divided by any of the single digit numbers (e.g. explain how they know that 75 will divide evenly by 5)
* **Use** simple divisibility tests to determine all of the factors of given numbers
 | Students:* **Apply** the divisibility rules to determine whether given numbers are divisible by other whole numbers (e.g. say that a number such as 1035 must be divisible by 5 and 9 to be divisible by 45, so the test is that it must end in 5 or 0, and the total of the digits in the number must be divisible by 9)
 | Students:* **Investigate** larger prime numbers by applying any known rules for divisibility and using calculators where necessary to continue the investigation (e.g. apply the divisibility rules to work our whether 1001 is a prime number, and decide that it is not necessary to check for factors more than 31)
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| **Relevant part of the Achievement Standard** | **They check the reasonableness of answers using estimation and rounding. (MKU5.2)**  |
| Number and place value[*ACMNA099*](http://www.australiancurriculum.edu.au/curriculum/contentdescription/ACMNA099) | **Students are beginning to:*** **Develop** a sense of the size of whole numbers to 5-digits and identify strategies for rounding numbers (e.g. say that a football crowd of 12 724 could be described as nearly 13 000 or more than 12 000 depending on the context)
 | **Students are developing the ability to:*** **Identify and describe** situations where estimation by rounding is a useful strategy (e.g. say that when calculating $19.75 × 6 a quick mental estimate after rounding to get $20 × 6 = $120 is useful for checking)
* **Identify and explain** when rounding is not useful, especially when an exact answer can be reached just as easily (e.g. say that when calculating 8 × 4 × 5, it does not make sense to round)
 |  They **independently**:* **Use** estimation and rounding strategies including front-end methods to quickly check the reasonableness of answers to calculations (e.g. round 346 × 18 to 350 × 20 and know that the answer is a bit less than 7000; or use a front-end strategy to round 3248 – 1386 to 3000 – 1000 and say that the answer will be around 2000)
* **Recognise** the usefulness of estimation to check calculations and explain that the method of estimating must be a quick and easy mental calculation to reach an idea of the size of the answer
* **Apply** mental strategies to **estimate** the result of calculations ( e.g. estimating the cost of a supermarket trolley load by rounding all of the amounts to whole dollars)
 | Students:* **Analyse** situations involving calculations and **identify** those where an estimation of the answer is a useful step to take (e.g. decide that situations such as 12 × 6 × 5 should not be estimated because the rounding results in a distorted answer, however 12 × 16 × 11 could be rounded to give a reasonable estimation of the magnitude of the actual calculation)
 | Students:* **Investigate** ways of improving the estimation of the answers to calculations (e.g. say that to work out an estimate to 35 × 46, rather that round both numbers to the next ten, make the decision to only round one higher, and get 40 × 40)
* **Investigate** the use of multiples when rounding division examples to make the estimates easier to calculate mentally (e.g. given 257 ÷ 8, round the calculation to 240 ÷ 8)
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| **Relevant part of the Achievement Standard** | **Students solve simple problems involving the four operations using a range of strategies. (MKU5.1)** |
| Number and place value[*ACMNA100*](http://www.australiancurriculum.edu.au/curriculum/contentdescription/ACMNA100)Number and place value[*ACMNA101*](http://www.australiancurriculum.edu.au/curriculum/contentdescription/ACMNA101)Number and place value[*ACMNA291*](http://www.australiancurriculum.edu.au/curriculum/contentdescription/ACMNA291) | **Students are beginning to:** * **Recall** many of the multiplication facts or use efficient strategies for working them out (e.g. say that I know 5 × 7 = 35 so 6 × 7 is one more 7 and makes 42; or quickly count up to the 6th multiple of 7...7, 14, 21, 28, 35, 42)
* **Identify** some division situations where a remainder exists (e.g. say that whenever an odd number is divided by 2, there is always a remainder of one; 13 ÷ 2 = 6 r 1)
* **Identify** the remainder in division situations using concrete materials (e.g. use counters to show that when 14 ÷ 3 there will be three groups of 4 and 2 left over as the remainder)

**Solve** simple problems either by making a link with known facts or by using suitable concrete materials (e.g. solve 56 ÷ 4 by sharing out 56 counters into four equal groups) | **Students are developing the ability to:*** **Demonstrate** simple examples of the distributive property using arrays (e.g. show that 6 × 7 has the same value as two lots of 3 by 7 or other equivalent values such as 4 by 7 and 2 by 7)
* **Explore** alternative methods for multiplying whole numbers (e.g. show that repeated addition, such as 14 + 14 + 14 + 14 leads to the same answer as 14 × 4; or demonstrate that multiplying by 4 is the same as *double double*)
* **Demonstrate and describe** the technique for multiplying whole numbers by 10 (e.g. use a calculator to show the results of multiplying by 10, and use a place value chart to demonstrate the process and the need to add a zero to the Ones Place)
* **Solve** some division situations by using repeated subtraction (e.g. show how a problem such as... *I have 37 balloons, how many bags of 5 balloons can I make and will there be any left over? ...*can be solved by subtracting 5 over and over again)
* **Demonstrate and describe** an efficient written method that matches the procedure when concrete materials are used to assist calculations (e.g. work with another student on a division task, with one using concrete materials and the other recording each step of the procedure)
 | Students **independently:*** **Represent** and **solve** problems involving multiplication by 1- and 2-digit numbers using:
* efficient mental strategies
* written strategies
* digital technology
* **Explore** techniques for multiplication including:
	+ **Apply** the distributive law (e.g. explain that 45 × 12 can be represented as (45 × 10) + ( 45 × 2) to simplify the calculation)
	+ **Use** arrays to model multiplication (e.g. use an array to support reasoning about the distributive property)
	+ **Explain** calculation strategies (e.g. explain that multiplying by 20 is the same as multiplying by 10 and then doubling the answer, and use a calculator to support that reasoning)
* **Solve** problems involving division by a one digit number, including those that result in a remainder
* **Use** knowledge of the fact that equivalent division calculations result if both numbers are divided by the same factor (e.g. say that the answer (4) to 32 ÷ 8 will still be the same if both numbers are halved before dividing 16 ÷ 4)
* **Interpret** and **represent** the remainder in division calculations in given contexts
* **Use** efficient mental and written strategies to solve problems (e.g. describe the method used to calculate answers including explaining each step of written procedures or the steps used when calculating mentally)
* **Apply** appropriate digital technologies to solve problems including using calculators to check the reasonableness of answers
 | Students:* **Investigate** ways of using the distributive law to make multiplication calculations easier (e.g. work out that 34 × 25 can be written as 30 × 25 plus 4 × 25 to make it easier)
* **Describe** the links between the different ways that the answers to division situations involving remainders can be written (e.g. explain why the answer to 45 ÷ 4 can be written as 11 r 1 or as 11 and 11.25 and why they have the same value)
* **Identify** ways of simplifying division situations using common factors (e.g. change 120 ÷ 30 to 12 ÷ 3 by dividing both numbers by the common factor 10)
* **Demonstrate** knowledge of the concept of each operation and its associated procedures for calculating (e.g. explain the relationship between the divisor and the possible remainders in whole number division situations by saying that when dividing by 9, the remainder can be any of the numbers from 0 to 8)
 | Students:* **Investigate** ways of using the distributive law to make division calculations easier (e.g. rewrite 161 ÷ 7 as 140 ÷ 7 plus 21 ÷ 7 and calculate the parts (20 + 3) mentally before adding them to get 23)
* **Select and use** the most suitable format for the answers to division situations (e.g. say that the use of a remainder is most suitable format when working out how many boxes each holding 12 tennis balls are required to package 500 balls because there will some balls left over, not fractions of boxes)
* **Investigate and describe** the link between equivalent division calculations and equivalent fractions (e.g. demonstrate that 16 ÷ 4 can be written as $\frac{16}{4}$, but also as $\frac{4×4}{4}$ and as 4 ×$\frac{4}{4}$ or 4 × 1)

**Interpret** **and describe** the display when a calculator is used for division (e.g. enter 347 ÷ 12 into a calculator and say that the answer 28.916667 is nearly 29, so the answer might have been 28 with a remainder of 11) |
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| **Relevant part of the Achievement Standard** | **Students order decimals and unit fractions and locate them on number lines. (MS5.1)** |
| Fractions and decimals[*ACMNA102*](http://www.australiancurriculum.edu.au/curriculum/contentdescription/ACMNA102)Fractions and decimals[*ACMNA104*](http://www.australiancurriculum.edu.au/curriculum/contentdescription/ACMNA104)Fractions and decimals[*ACMNA105*](http://www.australiancurriculum.edu.au/curriculum/contentdescription/ACMNA105) | **Students are beginning to:** * **Identify and name** the common unit fractions (e.g. use the names of the unit fractions appropriately, such as one-half and one-quarter, and explain that they all have a numerator of 1)
* **Demonstrate** a sound knowledge of the whole number place value system (e.g. describe how the values of digits change as they move into columns to the left or right)
* **Identify** the key decimal marks on number lines such as the whole numbers and halfway marks (0.5 and 1.5) (e.g. find the halfway mark between 3 and 4 and mark it as 3.5)
 | **Students are developing the ability to:*** **Describe** the relationship between related pairs of unit fractions (e.g. say that of an object is double the size of $\frac{1}{4}$ of the same object; or of a piece of rope is half as long as of the same piece of rope)
* **Identify** the tenths column within the place value system and describe how it links with the Ones place (e.g. describe the values of the individual digits in a number such as 3.7, saying that the 3 is worth 3 Ones and the 7 is worth 7 tenths); or say that in a number such as 5.5, the first 5 is worth ten times the value of the 5 on the right)
* **Count** in tenths with the support of calculators and also number lines marked in tenths (e.g. use a metre ruler, locate each tenth, and count from 0 to 1 in tenths and label each mark with its number)
* **Identify and use** all of the formats for recording numbers involving tenths (e.g. read and recognise 1.7 when it is represented as:
	+ One and seven tenths;
	+ One point seven
	+ Seventeen tenths
	+ 1 + 0.7
* **Describe** strategies for deciding whether a number involving decimal fraction to tenths is larger or smaller than another number (e.g. say that 7.3 is larger than 7 and use measures such as 7.3 m and 7 m to support reasoning)
 | They **independently**:* **Compare** and **order** common unit fractions (e.g. use a fraction wall to compare unit fractions and explain why one would be larger than another)
* **Locate** and **represent** common unit fractions on a number line
* **Recognise** the connection between the order of unit fractions and their denominators
* **Recognise** that the place value system can be extended beyond hundredths (e.g. identify examples, including on calculator displays, of numbers with more than two decimal places)
* **Use** knowledge of place value and division by 10 to extend the number system to thousandths and beyond (e.g. create place value charts that include up to four decimal places and use the symmetry of names to work out the values of each place)
* **Recognise** the equivalence of different formats involving decimal fractions (e.g. identify equivalent forms of the same number such as one thousandth, 0.001 and $\frac{1}{1000}$)
* **Compare, order** and **represent** decimals (e.g. place numbers such as 3.8, 3.095 and 3.78 in order and describe the strategies used)

**Locate** decimals on a number line / Create and interpret number lines involving numbers with decimal fractions (e.g. use suitable models including builders’ tape measures to locate specific numbers or measures such as 6.25) | Students:* **Investigate** the connection between some unit fractions including a half, a quarter and an eighth and their decimal fraction equivalents (e.g. record the decimal equivalent of , and on a number line and observe that they confirm the order of the unit fractions)
* **Explore** the place value system by extending the decimal places up to millionths and identify the continuing symmetry of the place value names around the ones place (e.g. observe the relationship of the names...tens / tenths, hundreds / hundredths, thousands / thousandths, ten-thousands / ten-thousandths, and so on)
* **Estimate** the position of decimal fractions to thousandths on number lines and **explain** the strategies used (e.g. place 0.245 just before the mark on a number line because it is just less than 0.25)
 | Students:* **Investigate** the decimal equivalents of all unit fractions up to sixteenths and record them on a number line and in a table to reinforce the order of the fractions
* **Record** the decimal equivalents of unit fractions on a place value chart and observe that some have repeating parts (e.g. enter in a calculator as 1 ÷ 7 and note that the display shows 0.142 857 1 and say that the first six digits repeat)

**Describe** the connections between proper fractions and decimal fractions and use them to estimate the positions of decimal fractions to three places and beyond (e.g. know that is equivalent to 0.75, so know that 0.7708 would be just after that mark on a number line) |
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| **Relevant part of the Achievement Standard** | **They add and subtract fractions with the same denominator. (MS5.2)** |
| Fractions and decimals[*ACMNA103*](http://www.australiancurriculum.edu.au/curriculum/contentdescription/ACMNA103) | **Students are beginning to:** * **Identify** situations where two halves are added to make 2 halves or 1 whole (e.g. describe the act of moving two halves of a shape are identified as halves, moved apart then back together to make 2 halves or 1 whole)
 | **Students are developing the ability to:*** **Demonstrate and describe** the addition of quarters of familiar shapes using models (e.g. cut a square into quarters, identify that there are 4 separate quarters, place two together to make 2 quarters or 1 half and also 4 quarters together to make 1 whole)
* **Recognise** that fractions such as halves and quarters can only be added together if they are parts of the same shape (e.g. show that the ‘quarters’ on a number line are identical fractions of the same whole and that is why they can be used for counting or adding)
 | They **independently**:* **Investigate** strategies to solve problems involving addition and subtraction of fractions with the same denominator
* **Model** and **solve** addition and subtraction problems involving fractions (e.g. by using intervals on a number line, making diagrams of fractions as parts of shapes)
 | Students:* **Investigate** strategies for adding fractions that have different but closely related denominators such as quarters and eighths (e.g. say that + can be solved because the can be changed to $\frac{2}{8}$ and then added to to make )
 | Students:**Investigate** strategies for adding fractions and mixed numbers where the denominators are not related (e.g. say that when adding + , both fractions must be changed to the same denominator such as 42 before they can be added; $\frac{7}{42}$ + $\frac{12}{42}$ = $\frac{19}{42}$) |

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| **Relevant part of the Achievement Standard** | **They explain plans for simple budgets. (MKU5.5)** |
| Money and financial mathematics[*ACMNA106*](http://www.australiancurriculum.edu.au/curriculum/contentdescription/ACMNA106) | **Students are beginning to:** * **Recognise** the relationship between available money and planned purchases and that when shopping with cash, the total of the purchases cannot exceed the cash in hand (e.g. say that if you are shopping with a $20 note, you cannot buy goods that total more than that)
 | **Students are developing the ability to:*** **Describe** the factors involved when shopping with ‘plastic cards’ and shopping with cash and realise that a budget is important with all shopping (e.g. say that money will always be needed to cover amounts spent when shopping with plastic cards)
 | They **independently**:* **Create** simple financial plans such as a simple budget (e.g. design a budget for a class fundraising event, showing the expenses in detail)
* **Identify** the GST component of invoices and receipts (e.g. describe the parts of a simple invoice such as the Company name and the goods or services to be paid for, and particularly how much GST would be paid in the total cost)
 | Students:* **Create** a financial plan associated with a class project, identifying all of the outlays and make a presentation to the school administration (e.g. prepare a financial plan to convince the principal to support and fund the production of a vegetable garden)
 | Students:* **Create** a financial plan associated with class excursion to a local attraction (e.g. identify and describe all aspects of the excursion, including transport, educational aims of the trip, total and individual costs, times of departure and return)
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| **Relevant part of the Achievement Standard** | **Students continue patterns by adding and subtracting fractions and decimals. (MS5.3)** |
| Patterns and algebra[*ACMNA107*](http://www.australiancurriculum.edu.au/curriculum/contentdescription/ACMNA107) | **Students are beginning to:** * **Count** forwards using fractions including halves and quarters with the support of number lines marked with the appropriate graduations
 | **Students are developing the ability to:*** **Count** forwards using proper fractions and decimal fractions up to tenths with the support of number lines marked with the appropriate graduations
* **Experiment** with counting patterns with the support of number lines involving multiples of fractions up to tenths (e.g. count in multiples of 2 fifths.. $\frac{2}{5}$, $\frac{4}{5}$, $\frac{6}{5}$, $\frac{8}{5}$, $\frac{10}{5}$,.....or $\frac{2}{5}$, $\frac{4}{5}$, 1 $\frac{1}{5}$, $ 1\frac{3}{5}$, 2,,.....)
 | They **independently:*** **Describe**, **continue** and **create** patterns with fractions, decimals and whole numbers resulting from addition and subtraction
* **Use** number lines or diagrams to create patterns involving fractions or decimals (e.g. show that it will take 20 steps to reach 0 when counting back from 1 whole in steps of 0.05 or $\frac{5}{100}$)
 | Students:* **Compare** counting techniques involving whole numbers with counting involving decimal fractions and identify the similarities (e.g. use a calculator to count in multiples of 0.01 and explain that after one hundred multiples, the count will be one whole)
 | Students:**Describe** the connection between counting patterns involving proper fractions and decimal fractions (e.g. say that the pattern $\frac{2}{5}$, $\frac{4}{5}$, $\frac{6}{5}$, $\frac{8}{5}$, $\frac{10}{5}$,.... could also be written as 0.4, 0.8, 1.2, 1.6, 2,.... or as 4 tenths, 8 tenths, 12 tenths, 16 tenths, 20 tenths,....) |

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| **Relevant part of the Achievement Standard** | **They identify and explain strategies for finding unknown quantities in number sentences involving the four operations. (MKU5.4)** |
| Patterns and algebra[*ACMNA121*](http://www.australiancurriculum.edu.au/curriculum/contentdescription/ACMNA121)[*ACMNA107*](http://www.australiancurriculum.edu.au/curriculum/contentdescription/ACMNA107) | **Students are beginning to:** **Use** the commutative property with multiplication when working out facts (e.g. say that 9 × 2 is easier to work out when written as 2 × 9 or two 9s) | **Students are developing the ability to:*** **Construct** equivalent number sentences based on known number facts (e.g. knowing that 6 × 9 = 54, write down9 × 6 = 54; 54 ÷ 9 = 6 and also 54 ÷ 6 = 9)
* **Solve** for unknowns in simple number sentences by using the inverse relationship between multiplication and division (e.g. solve 56 ÷ 7 = 🗌 by thinking that 7 × 8 = 56 and that division *undoes* multiplication)
 | They **independently:*** **Use** equivalent number sentences involving multiplication and division to find unknown quantities (e.g. write given number sentences such as 8 × 🗌 = 112) in an equivalent form that can be solved such as 112 ÷ 8 = 🗌; or write 🗌 ÷ 6 = 13 as 13 × 6 = 🗌; or think of 7 × 8 = 56 to solve 🗌 ÷ 8 = 7)
* **Use** relevant problems to create number sentences
 | Students:* **Explore** different ways of expressing number sentences in equivalent forms (e.g. write 35 × 14 as (7 × 7) × (5 × 2) by rearranging the factors)
* **Experiment** with different ways of writing multiplication expressions to make them easier to work out (e.g. the factors of 15 × 8 can be written as 3 × 4 × 5 × 2 or 12 × 10 to make the calculation easier)
 | Students:**Investigate** ways of writing equivalent number sentences involving division (e.g. say that the expression 522 ÷ 5 can be written as 1044 ÷ 10 by doubling both numbers, and the calculation can be completed mentally) |
| **Strand**  | **Emerging**Beginning to work towards the achievement standard  | **Developing**Working towards the achievement standard | **Demonstrating**Demonstrating the achievement standard | **Advancing** Working beyond the achievement standard | **Extending**Extending with depth beyond the achievement standard |
| **Relevant part of the Achievement Standard** | **They use appropriate units of measurement for length, area, volume, capacity and mass, and calculate perimeter and area of rectangles. (MS5.4)** |
| **Measurement and Geometry:** Using units of measure[*ACMMG108*](http://www.australiancurriculum.edu.au/curriculum/contentdescription/ACMMG108)Using units of measure[*ACMMG109*](http://www.australiancurriculum.edu.au/curriculum/contentdescription/ACMMG109) | **Students are beginning to:** * **Select** appropriate units when estimating of measuring lengths (metres or centimetres), masses (kilograms or grams) and capacities (litres or millilitres)
* **Calculate** the perimeter of any polygonal shape by measuring and adding the lengths of the sides
 | **Students are developing the ability to:*** **Identify** the need for larger units of length (kilometres), mass (tonne) and capacity (kilolitres)
* **Identify** benchmarks that assist with the estimation of large measures (e.g. say that a small car weighs about 1000 kg or 1 tonne; that the distance from home to the shops is just more than 1000 m or 1 kilometre; and that the water tank at home holds 3000 L or 3 kilolitres)
* **Describe** ‘shortcuts’ for working out the perimeter of any regular shape (e.g. explain that with regular shapes, the length of one side is multiplied by the number of sides)
* **Recognise** that the units of length used for measuring perimeters of shapes are different from the square units (such as square centimetres and square metres) used for measuring areas of surfaces (e.g. use a ruler to measure the perimeter of a 8 cm by 10 cm rectangle, and then use a square centimetre plastic grid to overlay the shape and measure its area)
 | They **independently**:* **choose** appropriate units of measurement for length, area, volume, capacity and mass
* **recognise** that some units of measurement are better suited for some tasks than others ( e.g. kilometres rather than metres to measure the distance between two towns)
* **calculate** the perimeter of rectangles using familiar metric units
* **calculate** the area of rectangles using familiar metric units
* **explore** efficient ways of calculating the perimeters of rectangles (e.g. adding the length and width together and doubling the result)
* **explore** efficient ways of finding the areas of rectangles
 | Students:* **Investigate** differences between the units used for measuring in various countries (e.g. find out that while Australia uses the metric system other large countries such as the USA use the imperial system; say that large distances are measures in miles (about 1.6 km), petrol is measured in gallons (about 3.8 L) and mass is measured in pounds (nearly half a kilogram)
* **Generalise** the method for finding perimeters of polygons and describe the formulae for rectangles and squares (e.g. say that the perimeter of a rectangle can be found using 2L + 2W or by 2 × (L + W)
* **Explore** a range of irregular polygons and describe the ways of working out their perimeters
 | Students:* **Convert** measurements such as temperatures and distances from other countries into the units used in Australia using suitable internet converters (e.g. work out that a temperature of 20° F in New York is actually below freezing or less than - 6° Celsius)
* **Generalise** the method of finding the area of any rectangle by using a formula (e.g. say that the formula for finding the area of any rectangle is A = L × W)
* **Explain** about the units used to measure areas of surfaces and distinguish them from the length or perimeter units (e.g. say that because area involves square measure, the units must also be square units such as square centimetres and square metres; add that length measures such as metres only measure distances not areas)
* **Investigate** the areas of triangles and devise ways of working out their areas (e.g. see that the diagonal of a rectangle divides it into two identical triangles, and explain that one triangle must be half the area of the rectangle)
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| **Relevant part of the Achievement Standard** | **They convert between 12- and 24-hour time. (MS5.5)** |
| Using units of measure[*ACMMG110*](http://www.australiancurriculum.edu.au/curriculum/contentdescription/ACMMG110) | **Students are beginning to:*** **Read and interpret** times on analogue clocks and record these times in digital formats (e.g. say that the time is 4:20 in the afternoon, write this as 4:20 p.m. and say that the time is twenty past four)
 | **Students are developing the ability to:*** **Demonstrate** an awareness of the relationship between 12-hour time and 24-hour time (e.g. say that 12-hour times need a.m. or p.m. to show whether the time is before noon or after noon, but 24-hour times show the hour of the day and the minutes after that hour)
 | They **independently:*** **Compare** 12 and 24 hour systems and describe the ways that the times are recorded (e.g. explain that 3:15 a.m. would be recorded as 0315 using the 24-hour format, while 9:45 p.m. would be recorded as 2145)
* **Convert** time between 12 and 24 hour systems (e.g. explain that when changing to 24-hour times, 4 digits are always used but with no colon (:) to separate them, the digits from 00 to 23 are used for the hours, and the last two digits are the minutes after the hour)
* **Use** units of hours, minutes and seconds in various contexts and select the appropriate unit or units to match those contexts (e.g. select seconds when timing a 100 m running event but use hours and half hours when creating a daily diary)
 | Students:* **Explain** the method used to change a.m. and p.m. times to 24-hour formats (e.g. say that with p.m. times such as 4:40 p.m., the hour 4 is added to 12 to make 16, and then the minutes are recorded to give 1640 as the 24-hour equivalent)
 | Students:* **Investigate** the common use of 24-hour formats such as with some timetables (e.g. describe the ways time is recorded and explain that some timetables still include the use of a colon when recording 24-hour time)
* **Explore** methods of working out the duration of events when the starting and finishing times use the 24-hour format (e.g. explain the importance of the fact that 60 minutes = 1 hour when subtracting and the need to separate hours and minutes during the procedure)
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| **Relevant part of the Achievement Standard** | **Students connect three-dimensional objects with their two-dimensional representations. (MKU5.6)** |
| Shape[*ACMMG111*](http://www.australiancurriculum.edu.au/curriculum/contentdescription/ACMMG111) | **Students are beginning to:*** **Identify** common 3D shapes from pictures and realistic drawings
 | **Students are developing the ability to:*** **Create** realistic models, including solid and skeletal models, of common 3D shapes using suitable materials (e.g. choose 12 identical sticks and sufficient plasticine for the eight vertices and construct a skeletal model of a cube)
* **Match** pictures of common 3D shapes with actual objects and describe the obvious properties of those objects (e.g. say that a cone has a curved surface with a point at one end and a circular face at the other)
 | They **independently**: * **Connec**t three-dimensional objects with their nets and other two-dimensional representations (e.g. identify nets of different cardboard boxes in the shape of prisms by cutting along some of the edges so that the net folds out flat)
* **Identify** the shape and relative position of each face of a solid, including prisms and pyramids, to determine the net of the solid (e.g. say that the net of a square based pyramid must have four identical triangular faces and a square shape attached to the base of one of the triangles)
* **Represent** two-dimensional shapes in a variety of ways including through the use of photographs, sketches and images created by digital technologies (e.g. describe the properties of 3D shapes that have been constructed using computer technology)
 | Students:* **Create** models of common 3D shapes including a variety of prisms, cylinders and pyramids using their nets and investigate the nets of cones (e.g. use different sized rectangles to construct a range of cylinders)
* **Investigate** the nets of various cones by dismantling them and describe the results (e.g. say that the base of the net is always a circle and the curved surface becomes a part of a larger circle as it flattens to become part of the net)
 | Students:* **Investigate** the nets of various 3D objects and identify whether the nets can be drawn in different ways (e.g. work out that there may be 11 different nets for a cube, but only two different nets for a tetrahedron)
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| **Relevant part of the Achievement Standard** | **Students use a grid reference system to locate landmarks. (MS5.6)** |
| Location and transformation[*ACMMG113*](http://www.australiancurriculum.edu.au/curriculum/contentdescription/ACMMG113) | **Students are beginning to:** * **Describe** the procedure for using simple alpha-numeric grid references (e.g. say a reference such as C5 means the square or point where the C and 5 meet on the grid)
 | **Students are developing the ability to:*** **Explain** that when using grid references, the character along the horizontal axis should be placed first (e.g. say that if the numerals are written along the horizontal axis in an alpha-numeric grid, one reference could be 3F – but add that the traditional way is to write the alpha characters along the horizontal axis and numerals along the vertical axis)
 | They **independently:*** **Use** a grid reference system to describe locations
* **Describe** routes using landmarks and directional language
* **Compare** aerial views of maps with grid references
* **Create** a grid reference system (e.g. for the classroom and use it to locate objects and describe routes from one object to another)
 | Students:* **Investigate** commonly available grid reference systems such as street directories and describe how each system operates (e.g. look up the reference for a street in the local area in the index, note the grid reference and map number and then locate the street on the map)
 | Students:**Create** a set of directions and problems to solve based on a grid reference system such as a street directory (e.g. interpret a series of street directory codes and turn them into a set of directions based on street names and turns to locate significant features on a map) |
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| **Relevant part of the Achievement Standard** | **They describe transformations of two-dimensional shapes and identify line and rotational symmetry. (MKU5.7)** |
| Location and transformation [*ACMMG114*](http://www.australiancurriculum.edu.au/curriculum/contentdescription/ACMMG114)Location and transformation [ACMMG115](http://www.australiancurriculum.edu.au/curriculum/contentdescription/ACMMG115) | **Students are beginning to:** * **Construct** simple designs or patterns that exhibit symmetry and describe the symmetrical parts e.g. say that there is a ‘line’ in the design and to be symmetrical, the design must be the same outwards to the left and right of that line)
* **Create** a range of rectangles (or squares) on square centimetre grid paper and then check the changes that occur to the area of those shapes when both length and width are doubled (e.g. say that a shape where both sides are doubled is more than double the size of the original shape)
 | **Students are developing the ability to:*** **Identify** the lines of symmetry in some of the common shapes such as squares and rectangles (e.g. discuss the ‘mirror image’ effect with symmetry in shapes where one side reflects the other exactly)
* **Explore** the use of computers to increase or reduce the size of pictures by ‘dragging’ on one of the corners (e.g. say that using this method, each side increases or decreases relative to the other...if one doubles or halves so does the other)
* **Demonstrate and describe** the effect of using computers to increase or decrease one side only using the ‘dragging’ procedure (e.g. say that the picture distorts because only one side is changing, the other stays as it was)
 | They **independently:*** **Describe** translations, reflection and rotations of two-dimensional shapes (e.g. say that a translated shape looks exactly the same but its position has changed, however a rotated shape is the same shape but in a changed orientation)
* **Identify** and **describe** the line and rotational symmetry of a range of two-dimensional shapes by:
* cutting
* folding
* turning
* using digital technologies
* **Apply** the enlargement transformation to familiar two dimensional shapes (e.g. explain that when enlarging shapes, both dimensions must change at the same rate, otherwise the shape will change)
* **Explore** properties of the resulting image compared with the original (e.g. draw shapes on square centimetre grid paper, then double both sides and work out that the area of the new shape is four times that of the original)
* **Use** digital technologies to enlarge shapes
* **Use** a grid system to enlarge an image
 | Students:* **Explain** that shapes with a rotational symmetry of 1 really means that they have no rotational symmetry (e.g. say that if a shape has to be rotated through a complete 360° turn to look the same, it has no rotational symmetry)
* **Generalise** about enlargements and reductions of 2D shapes and predict the changes in area as a result (e.g. say that if a rectangle has been reduced by half of each dimension, the result is a shape with × or of the area of the original shape)
* **Apply** the enlargement transformation to familiar two dimensional shapes (e.g. explain that when enlarging shapes, both dimensions must change at the same rate, otherwise the shape will change)
* **Explore** properties of the resulting image compared with the original (e.g. draw shapes on square centimetre grid paper, then double both sides and work out that the area of the new shape is four times that of the original)
* **Use** digital technologies to enlarge shapes
* **Use** a grid system to enlarge an image
* **Describe** these properties with everyday examples
 | Students:* **Investigate** the properties of shapes that have rotational symmetry of 2 or more and how this figure relates to 360° (e.g. explain that a shape with rotational symmetry of 2 must be rotated through 180° or 360°/2 to look the same; while a shape with rotational symmetry of 3 must be rotated through 120° or 360°/3 to look identical)
* **Apply** the enlargement transformation to familiar two dimensional shapes (e.g. explain that when enlarging shapes, both dimensions must change at the same rate, otherwise the shape will change)
* **Explore** properties of the resulting image compared with the original (e.g. draw shapes on square centimetre grid paper, then double both sides and work out that the area of the new shape is four times that of the original)
* **Use** digital technologies to enlarge shapes
* **Use** a grid system to enlarge an image
* **Explain** these properties with everyday examples
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| **Relevant part of the Achievement Standard** | **They describe transformations of two-dimensional shapes and identify line and rotational symmetry. (MKU5.7)** |
| Geometric reasoning[*ACMMG112*](http://www.australiancurriculum.edu.au/curriculum/contentdescription/ACMMG112). | **Students are beginning to:** * **Identify** some of the common angles including those used with set squares (30/60/90 and 45/45/90) and use them to find similar-sized angles
 | **Students are developing the ability to:*** **Describe** the features of protractors, especially the 360° circular protractor (e.g. say that turning from 0° to 360° completes a whole turn; up to 180° is a half turn)
* **Identify and describe** degrees as the unit for measuring the amount of turn
 | They **independently:*** **Estimate**, **measure** and **compare** angles using degrees (e.g. identify or make close estimates of the common angles including 90°, 45°, 60° and 30°)
* **Measure** and **construct** angles using both 180° and 360° protractors (e.g. demonstrate how to mark the arms of common angles such as 60° using the scale on the protractor)
* **Recognise** that all angles have two arms, one vertex
* **Recognise** that the size of an angle is the amount of turn required for one arm to coincide with the other
 | Students:* **Investigate** the use of a simple NSEW compass and the relationship with 360° (e.g. demonstrate how the compass can assist with measuring the amount of turn from facing one direction to facing another)
 | Students:* **Investigate** ways of constructing the common angles using a pair of compasses (e.g. show how after a circle is drawn, the compass can cut off exactly six marks around the circumference, and if the centre is connected to each of these marks, six angles of 60° are formed)
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| **Relevant part of the Achievement Standard** | **Students list outcomes of chance experiments with equally likely outcomes and assign probabilities between 0 and 1. (MS5.8)** |
| **Statistics and Probability:**Chance[*ACMSP116*](http://www.australiancurriculum.edu.au/curriculum/contentdescription/ACMSP116)Chance[*ACMSP117*](http://www.australiancurriculum.edu.au/curriculum/contentdescription/ACMSP117) | **Students are beginning to:** * **Identify** chance events where all of the outcomes have an equal chance of occurring (e.g. say that tossing a coin, rolling a dice or picking a card out of a pack all have outcomes that are equally likely)
* **Recognise** that some events are more likely than others, that some events will not happen and that others are much more likely (e.g. say that you would be much more likely to draw a red card than an ace from a pack of playing cards and prove this by experimenting with a pack)
 | **Students are developing the ability to:*** **Identify** chance events where the outcomes are not equally likely and say why that is the case (e.g. say that throwing basketballs at the hoop has two outcomes – in or out – and they do not have the same chance of occurring; explain that the thrower’s experience and distance from the hoop are important factors)
* **Identify** impossible and certain events and say how they are different (e.g. say that impossible events have no chance or zero chance and certain events must occur because no other outcome is possible)
 | They **independently:*** **List** outcomes of chance experiments involving equally likely outcomes (e.g. say that rolling a dice can result in a 1, 2, 3, 4, 5 or 6 and they have the same chance of occurring)
* **Represent** probabilities of those outcomes using fractions (e.g. say that because there are 6 outcomes with the same chance of occurring, they each have a probability of one in six or )
* **Recognise** that probabilities range from 0 to 1 (e.g. say that an impossible event has a probability of 0, but a certain outcome has a probability of 1, and all other outcomes come somewhere between 0 and 1)
* **Investigate** the probabilities of all outcomes for a simple chance experiment and verifying their sum equals 1 (e.g. select a dice, record that each of the six outcomes has a probability of one in six or $\frac{1}{6}$ and then add them all to get $\frac{6}{6}$ or 1)
 | Students:* **Investigate** a variety of spinners and identify those where the outcomes are equally likely (e.g. locate a spinner where each of three colours occupy the same area and say that each colour has a probability of )
* **Design** a simple chance experiment which has 2 or 3 possible outcomes and collect data to estimate the probabilities of each outcome (e.g. say that when a drawing pin drops on a hard surface, it can land point up or point down; drop a pin 50 times, note the results and estimate the probability of each outcome)
 | Students:* **Explain** that even when outcomes have the same probability, they may not occur the same number of times during an experiment (e.g. plan to toss a coin or roll a dice 100 times, predict the results, conduct the experiment and comment on the results)
* **Investigate** a variety of spinners and identify those where the outcomes are NOT equally likely (e.g. locate a spinner where each colours occupy a different amount of area, state that each colour will then have a different probability, and make an estimate of the probability of each one)
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| **Relevant part of the Achievement Standard** | **Students pose questions to gather data, and construct data displays appropriate for the data. (MS5.9)** |
| Data representation and interpretation [*ACMSP118*](http://www.australiancurriculum.edu.au/curriculum/contentdescription/ACMSP118)Data representation and interpretation [*ACMSP119*](http://www.australiancurriculum.edu.au/curriculum/contentdescription/ACMSP119) | **Students are beginning to:** * **Recognise** that the collection of data about chosen topics adds some strength to any statements made about the topic (e.g. say that before making public statements about homework after school, people’s opinions in the community should be found out)
* **Construct** simple displays of categorical data using tables and bar / column graphs (e.g. create a column graph to display the results when a dice is rolled 100 times)
 | **Students are developing the ability to:*** **Identify** the most obvious categories associated with data collections and list them in a table, leaving space for others that arise during the collection (e.g. make a list of the most popular fruits before interviewing all of the Year 5 students in the school about their favourite fruit)
* Interpret displays of data and make statements that relate the data to the original questions or issues (e.g. read and analyse a column graph showing data collected about favourite fruits)
 | They **independently:*** **Pose** questions and **collect** categorical or numerical data by observation or survey(e.g. pose questions about insect diversity in the playground)
* **Construct** displays including column graphs, dot plots and tables (with and without the use of digital technologies)
* **Identify** the best methods of presenting data to illustrate the results of investigations and justify the choice of representations
 | Students:* **Identify** issues of interest and decide whether data can be collected to provide reliable information about each topic (e.g. say that students would be interested in people’s favourite songs and that categorical data could be collected about that topic)
* **Experiment** with the use of digital technology including Excel to enter categorical data and select various ways of displaying that data.
 | Students:* **Investigate** the ABS website and determine what kind of data was collected in the last Census (e.g. find out that data about religion, age group, ancestry, marital status is collected and presented in tables and that the last Census was in 2011)

**Experiment** with the use of digital technology to construct new kinds of graphs using available categorical and numerical data and decide whether the new displays provide a useful presentation of the data (e.g. enter data into an Excel spreadsheet with the category names in the first column and the associated data in the second column and find that bar, column, line and pie graphs all result in displays that can be readily interpreted) |
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| **Relevant part of the Achievement Standard** | **Students interpret different data sets. (MKU5.8)** |
| Data representation and interpretation[*ACMSP120*](http://www.australiancurriculum.edu.au/curriculum/contentdescription/ACMSP120) | **Students are beginning to:** * **Demonstrate** awareness that sets of data sometimes support their opinions and other times, the available data supports the opposite viewpoint (e.g. say that a graph showing Year 5 students’ favourite TV shows does not include any of my best shows, so maybe we should survey our own class)
 | **Students are developing the ability to:*** **Identify** different ways to organise data to assist with its interpretation (e.g. say that some data needs to be sorted into categories or groups, other data needs to be arranged from smallest to largest)
* **Identify** different kinds of data, whether it has been counted or measured, and decide whether there is sufficient data to be sure about making statements or predictions
 | They **independently:*** **Describe** and **interpret** different data sets in context (e.g. use the context of the data collection to decide whether data is categorical or numerical
* **Use** and **compare** data representations for different data sets to help decision making
 | Students:* **Analyse and interpret** sets of data and associated displays to identify whether some variation exists within the sets, if that variation is due to natural causes or whether a problem exists with the questions or the data collection methods (e.g. observe that a set of data about dress sense appears to be strongly influenced by younger female views over males and then check whether the sample of people interviewed was balanced across the genders and age groups)
 | Students:**Experiment** with different ways of organising of grouping given data and describe any changes to the nature of the data or its features (e.g. group data which had been organised around age groups into gender groups and comment whether the nature of the data changes) |