The Introduction	• Many important ideas are presented in the introduction (pages 5-16), but there is overlap between many of them, which overwhelms the reader. It is currently unclear how students are expected to work within the domain and what dispositions for thinking are most valued. For example, what is the difference between reasoning (proficiency strand), thinking and reasoning (core concepts), and to a lesser extent critical thinking (general capabilities)? Are each of these layers necessary? • Proficiencies are not considered in the current curriculum as they sit outside the content. Integrating them is an improvement but an extra layer (core concepts) has now been introduced, which according to the model (p. 6), sit outside the content. Under this revision, it is highly likely that these will experience the same fate as proficiency strands in the current curriculum. • Many of the ideas listed as descriptors for mathematising could also be listed under the "mathematical approaches" core concept. Mathematising, rather than being a separate core concept, is really the overarching idea for both mathematical structures and mathematical approaches and could readily be placed in the center of the image on page 6. The entire image reflects mathematics and, by placing mathematising at the center, the image more clearly reflects the fact that mathematising uses all we know about mathematics – content, structure, and approaches – to see and describe the world through a mathematical lens. Furthermore, the other two core concept organisers: 'mathematical structures' and 'mathematical approaches' are notably nouns. This is further argument for making this the centre-piece of the model rather than one of the core concept organisers. • The description for 'manipulating mathematical models' (p. 7) does not reflect common beliefs of what this really is. This core concept better aligns with 'representing'. If a mathematical model is manipulated, them mathematics is represented. They are one in the same and should not be across two core concept organisers. • An out-dated description of computation thinking (p. 15) lists five components. It is now more commonly accepted that computational thinking has only four components: Decomposition, abstraction, pattern recognition, and algorithms. We recommend ACARA review the UK curriculum, which lists the four mentioned above. • On page 10, it should be more clearly defined that ACARA is referring to 'Australian Aboriginal Cultures' as opposed to Aboriginal peoples from around the world. We would like to see greater acknowledgement of all Aboriginal cultures.

F-6 Content	• In general, the elaborations that refer to Aboriginal and Torres Strait Islander People, provide insufficient information for the everyday teacher to know what to do. For example, AC9M2N04_E8, AC9M2M04_E4 and AC9M3A01_E3 are particularly difficult. • There needs to be explicit work in the first three year-levels on the three types of subtraction problems – take away, missing/unknown addend and comparison/difference. This is especially important when students may be expected to do elaborations such as AC9M3N05_E5 and AC9M3N05_E6 in year 3. • Basic facts include facts up to 9 + 9 (and their inverse for subtraction), and 9 x 9 (and their inverse for division). It is not necessary to extend to 10 x 10 for multiplication as described in this revision. This is learned through numeration. • For the most part, the document is well sequenced. There does however seem to be inconsistent writing across Years 3-5 in some content descriptions and their matching elaborations in the space and algebra strands. For example, the elaborations for AC9M4SP01 seem less mathematical than Year 3 and fail to prepare students for expectations in AC9M5SP04. In this Year 5 descriptor, they are asked to sort and classify objects and recognise key features and distinctive properties of each group (AC9M5SP04_E1). The development of properties began in Year 3 but there was little to no work on properties in Year 4 that would prepare for this. Similarly, the work in algebra on properties of operations are done far too late to help with computation. These properties (commutative, associative, and distributive) are not complex and should be explored earlier so they can be used with computation with greater whole numbers, fractions and decimals. • The attempts to be too specific in its naming of types of numbers which results in errors (e.g. zero is not a natural number) and inconsistencies across the F-6 (e.g. natural versus rational numbers, and integers etc). Although many have been noted below, we suggest these are analysed in greater detail with the view to simplify and improve mathematical accuracy. In simple terms, 'whole numbers' can replace 'natural numbers' in the lower year levels and 'rational numbers' can categorise other numbers in the upper primary year levels. • The level description for each year refers to 'the <u>approaches</u> for working mathematically, including modelling, investigation, experimentation and problem solving'. These are four of the nine proficiencies listed on pages 13-16 of the introduction. This raises several questions. How do these 'approaches' to working mathematically differ from those listed under Mathematical Approaches in the model on page 6, and why aren't they discussed in the Introduction? Working mathematically is a phrase that has been

	around for more than two decades. Why isn’t it discussed in the Introduction, or why is it used at all? At best, we find the overuse and inconsistent use of jargon very confusing.
Year F Content	• AC9MFN03_E3 and AC9MFN03_E4 refer to ‘natural numbers’. We suggest this is simplified for teachers by replacing this with ‘whole numbers’ in the first instance and ‘counting numbers’ in the second. • While we believe AC9MFSP01_E2 is referring to 3D objects, the use of the terms ‘closed and open’ will be problematic for teachers and especially so for students. Either remove these terms or change the elaboration to reflect a ‘collection of shape pictures’. • AC9MFN02_E2 suggests the tens frame is horizontally opposed. Reword to make position irrelevant. This is important for later work when students record the addition of two numbers on a double-ten frame. When double-ten frames are horizontally opposed, it lends itself to recording the numbers in a vertical fashion, much like an algorithm (which is not the intention of this curriculum revision). • AC9MFST01_E2 is implicitly referring to a Yes/No graph. We suggest making explicit reference to a Yes/No graph.
Year 1 Content	• AC9M1N01_E2 should include the phrase ‘with and without benchmarks’. • AC9M1N02_E5 is going too far for Year 1. Students are only beginning to learn about 2-digit numbers and should not be expected to partition a large 3-digit number (365). • AC9M1N04 needs an elaboration to better prepare students for AC9M2N04. We suggest that AC9M1N04_E3 is reworked to provide specific names of strategies with examples involving single-digit numbers – much like the way AC9M2N04_E4 is worded. In so doing, money becomes less of a focus, but can be used in the example. • AC9M1A01_E1 should remove ‘and exploring other sequences later’ or be specific as to which sequences. We believe counting in threes should be introduced in Year 2, so our preference would be for this phrase to be deleted. • Generally, the language used in the elaborations for AC9M1A02 needs to be tightened. The references to repeating ‘parts’ versus ‘units’ should be made consistent to improve readability and comprehension. • We believe AC9M1SP01_E1 should refer to ‘a collection of shapes pictures’. • We believe AC9M1SP01_E3 is referring to 3D objects and not 2D shapes. As such, this needs to be reworded to reflect this.

	• AC9M1SP02_E1 should include 'left' and 'right'. These words are more relevant to this age group than the proposed terms 'clockwise' and 'anticlockwise' as the students in this year level have not yet learned to read time on an analogue clock.
Year 2 Content	• AC9M2N01 should refer to 'whole numbers' rather than 'natural numbers'. More specific comments have been provided elsewhere regarding this. • AC9M2N01_E3 is very challenging for young students. To better prepare students, we suggest inserting or reworking elaborations in Year F and 1 to describe experiences with number tracks. • In AC9M2N02_E3, we suggest replacing 'base 10' with 'Hindu-Arabic'. • It is good that AC9M2N05_E4 describes the use of cross-product multiplication and making connections to arrays. However, it appears as though this idea starts and stops in Year 2. It should be continued across years, or serious consideration should be given to deleting it. • AC9M2N05_E4 is currently written as though it belongs better in Measurement (area). Consider reworking to emphasise the method used to work out the number of squares. Also consider proposing the use of square tiles to cover rectangles on paper as this is far less labour intensive. • In AC9M2M01_E1, we suggest removing the 'sundial' as an example, as they are not easily used to measure short events. • AC9M2SP02_E1 would benefit from some examples. • AC9M2SP03_E1 would be challenging for students. We suggest proposing experiences with 3D objects (e.g., pattern blocks) before this 2D experience.
Year 3 Content	• To be clear, in the second paragraph of the Achievement Standard on page 46, change references to 'objects' to '3D objects'. • As mentioned in earlier year levels, remove the reference to natural numbers as this set does not include zero (0). See AC9M3N01 and AC9M3N03. • AC9M3N01_E1: While the use of the term 'proportional' is not incorrect, we are putting our interpretation to the context, and we wonder if all teachers will do the same. • AC9M3N03_E1 has been very loosely written. We suggest changing it to the following: estimating how much grid paper will be required to show a large number, such as 20 200, and how much space it will take up on the wall • In AC9M3N04_E4, the requirement to have students cut objects such as oranges and sandwiches into fifths is very difficult for young students.

	• AC9M3N04 encompasses part-to-whole thinking. Given that AC9M3N04_E3 is rather token, we recommend replacing it with an elaboration that directly address the part-to-whole thinking of the content descriptor. For example, *if this square tile is ¼, show me the whole*. Or, *if three people equally shared a bag of apples and one person received two, how many apples were in the bag?* Then connect the number that each received to the fraction of the total. (They each received 1/3). • AC9M3N05_E1 and AC9M3N05_E2 would benefit from an example. • AC9M3N05_E5 is the idea of constant difference. There is no mention in earlier year levels of comparison/difference subtraction, so students will struggle with this elaboration without the necessary pre-requisite concepts and skills. • AC9M3N06_E1 makes specific reference to bar models. Bar models are very abstract, especially when used with multiplication. While we are not against their use, we recommend NOT singling out one type of representation by referring to it directly. Simply delete 'a bar model' so it reads: 'using materials or a Think Board to model a multiplication problem'. In this sentence, 'model' is a verb, which allows teachers/students to use any representation they wish. • In AC9M3A03, change 'larger numbers' to 'greater numbers' • In AC9M3A03_E1, refer to the full range of commonly used strategies by including 'counting on', and 'making (bridging) ten'. • AC9M3M02_E3 does not match/align to the content descriptor. • In AC9M3SP01_E1, change to show: '…. and number of curved surfaces, flat faces, edges and vertices' • The last point of AC9M3SP02_E4 seems too complex for Year 3.
Year 4 Content	• Remove unnecessary detail/jargon, by changing the term 'stochastic' that is mentioned in the Level Description on page 58. • In the Achievement Standard, change 'natural numbers' to 'whole numbers'. At the top of page 59, consider changing 'patterns' to 'designs'. • An area model would be a better representation for AC9M4N01_E2. • In AC9M4N01_E6, add 'two and seventy-five hundredths' as a second example for how 2.75m is said. • While the wording of AC9M4N02 is not incorrect, we wish to highlight that the quotients will not always be natural numbers. • AC9M4N02_E1 would benefit from given examples of materials. For example, place-value charts, numeral expanders or sliders.

- The wording of AC9M4N04_E2 will cause misconceptions (especially at this year level). For example, that generalisation cannot be extrapolated to 3.6. We suggest changing the wording to reflect ‘numbers that have 0, 2, 4, 6, and 8 in the ones place’ and similarly for the odd digits.
- AC9M4N04_E3 needs clarification.
- The first bullet point in the Year 5 Level Description states that students will begin to make and use proportional comparisons of quantities. If this should remain true, then we suggest the interpretation of fractions as ratios as described in AC9M4N05_E1 should be deleted. (i.e. Seeing ¾ as 3 in each 4)
- In AC9M4N06_E1, we highly recommend the use of a length model that can easily allow counts beyond 1 whole. If a hands-on activity is preferred, then we suggest students fold paper to show the parts and place them on a length of string to build a length model that continues beyond 1.
- AC9M4A02_E1 describes the exploration of the commutative property for addition with basic facts. This MUST be explored in earlier year levels (possibly Year 1) using concrete materials or diagrams.
- The example in AC9M4A02_E3 is not ideal. Improve relevance by showing an example involving two-digit numbers. For example, *If I start with 19 + 27, I know this is the same as 19 + (1 + 26), which is the same as 20 + 26 = 46.*
- We believe the examples in AC9M4A02_E5 should be switched and simplified. For example, solving 53 – 27 = ___ by thinking 27 + __ = 53.
- In AC9M4A03_E2, we highly recommend listing all known efficient strategies and removing skip counting (NOTE: while skip counting is a pre-requisite skill to several strategies, it is not an efficient strategy itself). *For example, using the commutativity principle, doubling, and using a known fact.* Note that ‘adding one more group to a known fact’, does not capture the x9 facts which involves subtracting a group from a known fact (as described in AC9M4A03_E3), or the x5 facts which involves halving a known tens fact – if 10 x 4 = 40 then 5 x 4 = 20.
  It is also recommended that ‘arrays’ be provided as an example of materials or diagrams.
- In AC9M4A03_E4, it is recommended that ‘arrays’ be provided as an example of materials or diagrams.
- In AC9M4M05_E3, replace ‘cardboard or paddle-pop sticks’ (which is actually a product brand) with ‘a double-folded piece of paper’
- In AC9M4SP02_E4, insert, ‘a simple image or artwork’, as enlarging will be challenging
- In AC9M4SP02_E5, we suggest the students use grids to explore scale
- More direction needs to be given in AC9M4SP03_E3

Year 5 Content	• Remove unnecessary detail/jargon, by changing the term ‘stochastic’ that is mentioned in the Level Description on page 71. • In the Achievement Standard, change all references to ‘natural numbers’ to ‘rational numbers’. This is essential as students will be working with more than natural numbers when dealing with financial situations, decimals and percentages. • In AC9M5N01_E1, what does ‘one-digit, two-digit and three-digit decimals’ mean? Does this mean tenths, hundredths and thousandths. Please clarify. The language in the example is ambiguous as it is using the language of multiplication (times) to suggest division. Change the language to read, *I can trade one hundredth for ten thousandths*. • In AC9M5N02, remove the reference to ‘natural numbers’ and change to ‘whole numbers’. • In AC9M5N02_E2 delete the reference to a 0-100 board (on a counting board you cannot give 0 the same value as other counting numbers) and replace with a 1-100 chart. • In AC9M5N02_E3, we suggest they use base-10 blocks to investigate the divisibility rules and list them in the order they should investigate them (i.e. ÷2, ÷5, ÷10, ÷4, ÷8, ÷3, ÷9, ÷6) • The example for 60% in AC9M5N05_E3 is complex. Consider explaining why 60% of 40 is 24. (‘Because …..’) • In AC9M5N05_E4, delete ‘connecting representations to a model’ and start the elaboration with ‘using models to investigate the …’ • AC9M5N08_E3. Should include a reference to <u>doubling and halving</u> to solve 253 x 4, as much emphasis was given to developing this idea in the lower year levels. For example, 253 x 4 is the same as 506 x 2 = 1012 • AC9M5N07_E3 and AC9M5N08_E5 are exactly the same apart from ‘technologies’ versus ‘tools’. This is relatively unhelpful for teachers. • A better pattern to use as an example in AC9M5A01_E3 would be the doubling pattern derived from binary numbers (powers of 2). • AC9M5A02_E1 is far too basic for Year 5. This needs to move to Year 4. (see also F-6 Content) • We believe the examples in AC9M5A02_E3 should be switched and simplified. For example, solving 240 ÷ 20 = ___ by thinking 20 x __ = 240. • The elaborations in AC9M5A02 are at lower level of complexity than they need to be for Year 5. (see also F-6 Content)

	• The elaborations in AC9M5A03 seem to be a level down from even Year 4. (see also F-6 Content) • AC9M5M04_E4 needs clarification. • The elaborations in AC9M5SP01 seem far more complex than the elaborations for Algebra in this year level. (see also F-6 Content) • In this world of political correctness, the game of battleships is probably inappropriate as an example for AC9M5SP02_E3. • AC9M5ST01_E1 is very technical. Maybe soften it by focusing on what numerical data is. • We are not sure how AC9M5ST02_E2 would work. For example how would one show data about a bush fire on a line graph? We suggest simplifying the example to show rainfall totals over a day.
Year 6 Content	• The Achievement Standard on page 84 clearly mentions operations with decimals. Therefore the third bullet point in the Level Description on the same page needs to change from 'natural numbers' to 'rational numbers'. • Reword the fourth bullet point in the Level Description as such: develop a repertoire of written and digital means for representing 3D objects and real-world spaces in two dimensions. • The seventh bullet point in the Level Description mentions 'measure(s) of centre'. Consider using 'central measures (mean, median and mode)' to make it even more clear for teachers. • AC9M6N02_E3 is very basic and can be explored in earlier year levels. • In AC9M6N03_E6, change 'estimating strategies' to 'estimation strategies' • In AC9M6N04_E4, change 'bigger than' and 'smaller than' to 'greater than' and 'less than' respectively. Also, consider inserting other known comparison strategies such as 'using a common numerator'. This builds on work with counting fractions in previous year levels. For example, when comparing ¾ and 3/5 the common numerator equalises the 'count' so the denominators can be compared. • AC9M6N06_E2 mentions 'using prime and composite numbers' to determine the lowest common denominator. In reality, lowest common multiples are used to determine lowest common denominators. • AC9M6N06_E4 mentions the use of array models to give meaning of adding and subtracting fractions. The array model is best used for multiplication of fractions and would add little benefit in this situation. We recommend the use of number lines. • AC9M6N07_E1 mentions mental strategies for the addition and subtraction of decimal numbers to at least thousandths. We believe mentally adding and subtracting decimals involving thousandths is extreme and

	unnecessary. It makes sense to mentally add and subtract decimals to hundredths using the context of money. There are implications here for AC9M6N07_E4. • In AC9M6N07_E2, we recommend being consistent in the descriptions of measurement units. Currently some units show abbreviations, and some do not. • In reference to the sequencing of elaborations in AC9M6N07, we believe AC9M6N07_E3 should come before AC9M6N07_E1. • In AC9M6N08_E1, the language '10 times smaller' is ambiguous. Consider simplifying. • The language in AC9M6N08 is inconsistent with that in AC9M6N08_E2. The descriptor mentions multiplying and dividing decimals by natural numbers and yet the elaboration mentions situations involving a natural number that is multiplied or divided by a decimal. We believe the elaboration should be reworded. The same issue is evident in AC9M6N08_E3. • In AC9M6A01_E1 mentions 'rational' numbers. This same term should be used to replace 'natural numbers, fractions and decimals' mentioned in the descriptor (AC9M6A01). • With reference to all elaborations in AC9M6A03, there is no commonly accepted 'order of operations' in Australia. This means different parts of Australia follow different rules (e.g. BODMAS, BOMDAS etc) for calculating examples such as 40 ÷ 2 x (4 + 6) = __. We suggest explicit guidance (with examples) be given in the elaborations for dealing with equations involving multiple operations and brackets. • We feel AC9M6SP01 carries little significance and that it should be replaced with a descriptor focusing on sorting 3D objects in different ways. • AC9M6SP04_E1 needs clarification. What transformations are being referred to?
Errors	• Formatting issues on page 17. (time.Students) (Theydescribe) • The language of 'larger or smaller' in AC9MFN03_E1 should be changed to 'more or less' to match the attribute of quantity. • The word 'roleplaying' has different spelling throughout the document. For example, see AC9MFSP02_E2 and AC9M1N04_E4. • The words 'to trace around' appear twice in AC9MFSP01_E1 (p. 22). We believe the first appearance of these words is redundant. • AC9M1A01_E6 belongs with AC9M1A02 as it makes direct reference to repeating patterns as opposed to growing patterns.

	• AC9M1N01 makes reference to ‘natural numbers’. As natural numbers do not include 0, we suggest changing this to ‘whole numbers’. • Formatting issue with AC9M1N02_E4. (ten $1coins) • In AC9M1N04_E5 make ‘passenger’ plural (‘passengers’) • Redundant language in AC9M1N05_E4. Delete ‘a set of’. • Formatting issue with AC9M2A01_E3. (‘…?’and recording’) • AC9M1A02_E4 refers to natural numbers that include 0-9. As zero is not a natural number, this needs to be changed to read ‘whole numbers’. In the same elaboration, the term ‘larger’ is used. This should be changed to ‘greater’. • Incorrect word in AC9M1M03_E1. (‘to’ should be ‘of’) • AC9M1M03_E2 refers to months ‘cycling across a year’. Months DO NOT cycle within one year. • Missing italics in AC9M1ST02_E1 • In AC9M2N04_E7 and AC9M2M02_E3, delete ‘there’ or the question mark at the end of that sentence. • In AC9M2N04_E5, delete ‘or a story’ • In AC9M3N01_E2, the word ‘between’ needs to be changed to ‘within’ as ‘between’ should only be used when two entities are described. • In AC9M3N02_E2, we assume ‘face value’ should be ‘place value’ • In AC9M3N04_E2, all other references to Think boards make use of capital letters. (i.e. Think Board). • Redundant language in AC9M3N05_E6. Delete ‘along’. • In AC9M3N06_E2, consider changing ‘kilo’ to ‘kilogram’ • Missing word in AC9M3A04_E5. Insert ‘of’ to show ‘….a collection of 5 cent ….’ • In AC9M3A04_E5, make ‘milks’ singular (i.e. ‘milk’) • Formatting issue with AC9M4N05_E1 (collections of materials , for) • In AC9M4N06_E2, make ‘number line’ plural (number lines) • Missing italics in AC9M4N08_E4 • Spelling error in AC9M4M02_E5. (‘boarders should be ‘borders’) • In AC9M4M04_E1, delete ‘the between’ • In AC9M4M05_E3, delete first use of ‘a’ • In AC9M4SP01_E1, make ‘composite shapes’ singular (i.e. ‘composite shape’)

	• In AC9M4SP01_E2, make 'cartoon animal' plural (i.e. 'cartoon animals') • In AC9M4ST03_E1, make 'representation' plural (i.e. 'representations)' • In AC9M5N07_E2, make 'how many 9' plural (i.e. 'how many 9s or nines') • AC9M5N07_E1 and E2 are alongside the wrong content descriptor. These are division so belong with AC9M5N08. • Similarly, AC9M5N08_E1, E2, E3, and E4 belong alongside AC9M5N07. • In AC9M5M04_E3, insert 'measures' ('the angle measures and side lengths') • Remove the hyphen in 'two-dimensions' mentioned in the Level Description on page 84. (hyphens are used when part of an adjective.) • In AC9M6A02_E3, we believe 'three folds – six regions' should read 'three folds – eight regions' • In AC9M6M03_E3, make 'way' plural. ('ways') • In AC9M6ST03_E4, make 'samples' singular ('sample') • Check wording of AC9M6P01_E4. It currently reads 'large numbers spins on a spinner' and we are unsure of the intent here. • In AC9M6P02_E1, we suspect 'tend' should be 'trend' and 'with a larger numbers of trials' should read 'with a larger number of trials'