GRADE 2 - AMARA SPACED REPETITION SEQUENCING RECOMMENDATIONS

Student mastery of skills is highly dependent on adequate exposure and threshold repetitions. For example, a student must correctly practice a skill over a short period (spaced) a threshold number of times (repetition). Spaced repetition is an efficient and effective means to reach the minimum number of repetitions for each student. General guidelines for the number of repetitions for most students are listed in the following table.

Student Classification	Number of Repetitions for Skill Mastery
Gifted and Talented Identified	1 to 4 repetitions
General Education Students	8 to 18 repetitions
Students Receiving Special Education Services	Varies widely from student to student – Consult each student's Individual Education Plan and follow legal guidelines

Below are the general recommendations for specific skill areas to reinforce Amara supplemental daily resources. Due to student dynamics, each classroom's teacher will experience different levels of presentation and intervention of each skill in a spaced repetition process. Therefore, spaced repetition pedagogy is unique for each classroom due to varying student ability in mathematics. Consistency is the key to success in most human endeavors, and this process is not an exception to that thinking.

It is suggested that 3 to 7 skills be presented quickly in a highly accountable and engaging teaching mode for approximately 5 to 10 minutes at the onset or the end of the core lesson. Many skills will require little time for students to master, but others may take more days for students to demonstrate mastery. The teacher should observe the students to determine which students require more practice until mastery of presented skills is accomplished. After skill mastery is achieved by all students, a teacher can drop that skill from the list below and add a new one. A variation in spaced repetition methodology is when the teacher presents a specific math skill each day until the majority of students have demonstrated skill proficiency. At that point, the teacher can engage students requiring additional practice in a small group setting while the other students complete independent work. Amara's Skill Support Resources are designed for both activities and are available on the Amara4education website for purchase. Also, it is recommended that with the use of Formative Loop's daily (www.formativeloop.com) numeracy program, students are exposed to mastery of math fact operations and process skills.

Class-wide accountability and comprehension checks can be done with small white boards, raising hands, a show of fingers to represent number answers, or paper and pencil to name a few. Teachers can position themselves to observe paper-pencil responses and identify specific students that demonstrate a lack of skill proficiency. Finally, please note that the skill list below is a guideline. A teacher should evaluate their students and adjust the list as they feel is appropriate.

Recommended Skill List – Second Grade

1.) **Whole Number lines and short whole number sequences (with missing numbers).** Students should repeatedly see whole number lines – with a slow implementation process during the fall semester. Per standards, students are required to count to 1,100/1,200 by year's end. Hence, some students will struggle at the end of a ten multiple series to determine the previous number (e.g. 19, 29, 39, etc.) when required to count backwards one digit. A significant number of students also struggle with numbers greater than 109 and less than 120, initially, until sufficient exposure to that

content. It is also recommended that a brief review of the end of each hundred series be a repetitive process. For example, short number sequences of the number sequences involving 199, 299, 399 through 1,099 should also be given until numeracy proficiency is demonstrated. Finally, students must also complete patterns by determining missing numbers to complete a short sequence. Students should also be provided number sequences in ascending order: ___, 50, 51, ___ , 53, ___ , 55 and descending order: 24, 23, ___ , 21, ___ , 19, ____. Use Amara Skill Set Resource Packets for readymade resources. **Note:** Students have the most difficulty counting backwards from a multiple of 10 number. For instance, 30 to 29, 40 to 39, etc.

2.) Addition representations with objects. Students need to recognize that a number sentence can be written with either objects or numerals, and they must understand the meaning of the equal sign. For example: 2 dots = 1 dot + 1 dot *and* 1 dot + 1 dot = 2 dots. Or, with numerals: 2 = 1 + 1 or 1 + 1 = 2. This exercise is a first grade review of fundamental equations.
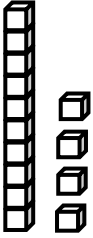
Examples:

$$3 + 1 = 4 \qquad\qquad 4 = 3 + 1$$

Note: Same number of dots on each side of the equal (=) sign (i.e. in the example above, 4 dots total on each side of the equal (=) sign. This conceptual idea of the equal sign is ***imperative*** for students to understand in elementary school.

3.) Math Facts: Addition and Subtraction. As students are presented addition or subtraction content in daily core lessons and/or Amara resources, students must become proficient in both math fact operations prior to the end of 2nd grade. Basic addition and subtraction number sentences should be shown in variety of ways. For example in addition: $5 + 7 = 12$ *and* $12 = 7 + 5$. And in subtraction, as well. Example: $11 – 8 = 3$ *and* $3 = 11 – 8$. With small amounts of practice students adapt to the differing equation form that is extremely beneficial to understand as students transition into the intermediate grade levels. ***Math fact mastery is essential in arithmetic mathematics for students to master many dependent concepts***. ***Slow and consistent practice will yield high-end results in time – daily exposure with purpose and an intent to achieve student mastery***. Note: Formative Loop offers a slow build-up via a short *writing* assessment that is key to students ingraining their math facts.

4.) Addition and Subtraction Models. Use whole number lines, circles, dominos, squares, etc., and students should demonstrate proficiency at the physical understanding of addition and subtraction as presented in core lessons and Amara resources – for both math facts and larger whole number sentences. Use Amara Resources Skill Support for blank number lines practice sheets that can be copied and easily used for students to demonstrate skill. Once completed, students can flip the sheet over for more quick repetitions of additional math skills to master in the spaced repetition process.

5.) Magnitude (size) words: The following words should be understood with objects and numbers as the core lessons and daily resources introduce the concepts: largest, most, fewest, greatest, least, smallest.

6.) Commutative Property of Addition. Students should fully understand that addends can be switched. For instance, $5 + 4 = 9$ *and* $4 + 5 = 9$ are representations of the same math equation.

7.) Addition Vocabulary: Addends and sum. Given: $4 + 5 = 9$. Indicate the correct name of each numeral (4 and 5 are *addends*, and 9 is called the *sum*.)
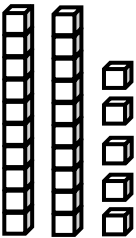
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8.) Place Value Base 10 Blocks. Tens and ones. Include hundred base 10 block at appropriate time during the fall semester. Examples below – review of 1st grade 2 digit numbers.
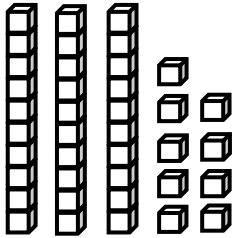
Write the correct number of tens and ones.

Tens	Ones

Tens	Ones

Shade the correct number of tens and ones.

Tens	Ones

9.) Standard Form Place Value. Students are given a number of many tens and ones, and they write the number in standard form. For example. 0 ones and 6 tens. Students respond with the number 60.

10. Multiples. Students should be able to count (skip count) by 1's; 10's; 5's and 2's – in this order of presentation/exposure/initial introduction. Include in the space repetition process of each multiple at the appropriate time during the fall semester. Challenge students with counting by 3's; 4's; 6's; etc. in small amounts each day to increase numeracy ability. Students will become adept very quickly with minimal practice. Add in multiples of 100 (0, 100, 200, 300, …) as the sequencing of core curriculum and Amara reaches that point of the school year. **Note:** Press the kiddos with support and consistent daily practice until the students are capable of counting the first 10 multiples of the numbers 1 through 12 by the end of the school year. Some students will be more adept at this skill than others will; however, if there is consistent practice, all students can master this fundamental numeracy skill.

11. Ordering Whole Numbers. Use two (2) small value 2-digit numbers to begin and add a third 2-digit number when students are sufficiently prepared. Transition to 3 digit numbers at the appropriate time during the school year. Order numbers in both directions: 'greatest to least' and 'least to greatest." **Note:** Students will struggle more when comparing numbers around the same number than with extremes. For instance, comparing 34 and 36 will be easier than 38 and 82.

12. Making 10 with number sentences. Begin with number sentences as needed, and transition to mental math using fingers. For example, during spaced repetition process, a teacher can extend 6 fingers and students respond by raising 4 fingers. This method is an easy visual to determine which students have mastered the skill as well as those that have not.

13. Computing a number sentence in words. Teacher states, *"What is 2 less than 9?"* or *"What is 1 more than 5?"* Transition to larger numbers and especially numbers that are 1 or 2 less than a multiple of ten. For example, *"What is 1 less than 30?"* or, *"What is 2 less than 40?"*.

14. Ordinal Number Review. Place or name objects in a specific order – 1st, 2nd, 3rd, 4th, 5th and 6th.

15. Adding 3 or 4 numbers in a number sentence. The numbers selected should start small ($5 + 2 + 3 = ?$). Use a number line from Amara Skill Support Resources to have ready-made whole number lines. However, students should understand the physical understanding of addition does not change with more addends in the math equation. The teacher should model this process on blank whole number lines and students complete a quick assessment to ensure understanding.

16. Subtraction Vocabulary. Stress the terms: Minuend, Subtrahend, Difference. Note: **S**ubtrahend can be remembered by students since it is the number **S**ubtracted – both words start with the letter '**S**'. For example, $6 – 4 = 2$. Since 4 is the numeral subtracted, it is also called the subtrahend.

17. Computing simple addition equations. $15 + 3 = ?$; $21 + 8 = ?$; Note: No Regrouping or Carrying until the second semester. It is recommend that students understand that this process is **right**

justified and in a **vertical format** to preserve place value consistency – a one's place is added to a one's place, and a ten's place is added to a ten's place, etc.

2 Dimensional Shapes. Square, rectangle, circle and triangle. Students should recognize the name of the polygon (straight sided and closed figure) and a circle with the correct mathematical name. As the semester progresses and at the appropriate time in lesson sequencing – add pentagon, hexagon, rhombus, trapezoid, and octagon. **Note:** He**x**agon mnemonic - he**x**agon has an "**x**" in its spelling as does the number 'si**x**.' Octagon mnemonic – An octagon has 8 sides and an 'octopus' has 8 arms.

18. **2-Dimensional Shape attributes –** Sides and vertices (corners) and angles of 2-dimensional polygons and circles as presented in core lessons and Amara daily resources. Begin with triangles, squares, circles, rectangles.

19. **Writing Addition and Subtraction equations in different forms.** Students demonstrate ability at writing math equations _other_ than from left to write. Again, with small amounts of practice, students become adept quickly. For example: $4 + 5 = 9$ _or_ $9 = 5 + 4$. $15 - 9 = 6$ _or_ $8 = 11 - 3$.

20. **Computing simple addition equations.** $15 + 13 = ?$; $21 + 38 = ?$; Note: No Regrouping or carrying until the second semester. **Note:** Students should be given the problem horizontally, and they rewrite the equation vertically. To ensure they understand right justifying,

21. **Doubles/Equal Addends:** $6 = \_\_\_ + \_\_\_$; $\_\_\_ + \_\_\_ = 10$; Transition to mentally double a one digit number. For example: Given 4 – Double to 8. Recommend students understand Base 10 of doubling a number as teacher transitions to two digit numbers. For instance, Double 3 to 6; as well Doubling 30 to 60, when appropriate in core lesson sequencing or Amara Supplemental Resources.

22. **Doubles – Doubles Plus 1/ Less 1.** Implement in spaced repetition as students are introduced to content in core lessons and Amara resources. Use for students to understand math facts in addition. By learning a double, the student can learn two more. Ex. $6 + 6 = 12$; $5 + 6 = 11$; $6 + 7 = 13$.

23. **Place Value Expanded Form.** Begin with 2-digit expansion to show the value of each digit. $34 = 30 + 4$. Transition to 3 digit expansion when appropriate in lesson sequencing ($208 = 200 + 0 + 8$).

24. **Drawing 2 Dimensional Shapes.** Triangle, square, rectangle, circle. Add in pentagon, rhombus, trapezoid, etc. at the appropriate time during the school year.

25. **Counting by 5's and 10's on a Whole Number Line.** Use Amara blank number lines in Skill Resources for students to practice this skill. Teacher can provide a number line with missing values. After students complete, turn (i.e flip) sheet over to blank side and continue short spaced repetition review. **Note:** A consistent spiral review skills covered up to this point ensure that those important math skills have been mastered and ingrained into long-term memory.

26. **Fact Family.** Begin with students filling in missing numbers and transition to students writing and completing the fact family given 3 related numbers. For instance, Given 5, 7 and 2. Students write addition and subtraction fact family: $2 + 5 = 7$; $5 + 2 = 7$; $7 - 2 = 5$; $7 - 5 = 2$.

27. **No commutative property for subtraction.** $5 - 3 = 2$, but $3 - 5$ does not equal 2. Only addition and multiplication possess commutative mathematical properties. This mathematical fact should be stressed to students.

28. **Mentally adding 1 more, 2 more, 10 more, 100 more.** Given a number (say, 5), students add 1 more or 2 more, etc.

29. **Skip counting by 2's with odd numbers.** Use Amara number lines. Fill in missing values or count by odd numbers (1, 3, 5, 7, 9, 11)

30. **Compute missing addends.** $4 + \_\_\_ = 7$ _or_ $\_\_\_ + 6 = 9$.

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31. **Understanding equal (=) sign in a number sentence.** For example: Students quickly find the missing number of an addition equation -- $5 + \underline{\quad} = 6 + 4$. Use larger numbers that are developmentally 'easy' for 2nd grade students to add quickly -- $30 + 15 = \underline{\quad} + 5$.

32. **Coin Names and Values.** Penny 1¢; Nickel 5¢; dime 10¢; quarter 25¢; half-dollar 50¢. Show visuals of coins and students write down or visually show using their fingers how much the coins are worth. For a penny, nickel and dime, students can show value by showing appropriate number of fingers. For a quarter or half-dollars, students can show two fingers on one hand and 5 on the other.

33. **Count by 5's with Tally Marks.** Dual goal objective. Multiple of 5 application, and students understand tally marks that will be needed later for graphing activities.

34. **Mentally subtracting 1 less, 2 less, 10 less, 100 less.** Given a number (say, 5), students find 1 less or 2 less, etc. Note: Choose a multiple of 10, and find 1 or 2 less to a value of 100 (i.e. students find 1 or 2 less than the number 30).

35. **Clocks. Reading and understanding time.** Begin with hours and half-hours. Students should begin by recognizing the time shown on the clock. It is recommended that besides showing 10:30 or 2:00 o'clock form, use terms like "half-past" ; "quarter till" ; "quarter after" so students understand the vernacular of clock time description. Transition to 10 and 5-minute increments when appropriate. Many students will struggle with times near the hour until they have had sufficient and corrective practice. For example, 10 minutes till 4 (3:50). Use Amara Skill Resource Packets for readymade student learning exercises.

36. **Basic fractions and the descriptive language to describe fractions.** For example: $^{2}/_{3}$; $^{1}/_{3}$; $^{3}/_{3}$ in picture form, and their description as well: two-thirds, one-third and three-thirds. **Note:** *Students must understand that $^{3}/_{3}$ is equal to 1 whole or 1.*

37. **Fraction Vocabulary:** For example: ¼ ; the 1 is the numerator and the 4 is the denominator. **Note:** Denominator mnemonic – The word denominator begins with a "d" and so does the word "down."

38. **Understanding a fraction's denominator.** Computing the fraction *denominator* given an unshaded figure. This understanding is imperative for students in the later grade levels to conceptualize blank number lines parsed in equal segments between two given whole numbers. Furthermore, fractions *must* have equal segments. Finally, students should know that given two fractions, for example: $^{1}/_{3}$ and/or $^{1}/_{10}$ --- that as the denominator increases from 3 to 10, the segments in the fraction become proportionally smaller. Quick reviews each day, and the students will own this level of knowledge with basic fractions that is also critical when they are in the intermediate grades.

39. **Spelling numbers in word form from 1 to 20, multiples of 10 to 100.** Cumulative practice every day spelling two (2) number words and students will spell the numeral names correctly from 1 to 10 with relative ease. For instance, a teacher can write 1 and 2 using the document camera or on the classroom white board, and students correctly spell the numbers in word form. Then, the teacher adds the numerals 3 and 4, but students cumulatively spell 1, 2, 3 and 4 until they reach the number 10. Repeat cumulative spelling exercise beginning at 11 and ending at 20. Then, repeat again for multiples of ten (0, 10, 20, 30, etc. to 100.) Students should physically write the words on a piece of paper or small, erasable white boards. **NOTE:** English Learners (EL) will struggle with words like thirty and thirteen due to the 'th' sound since the words may sound similar to them – there is not a 'th' blend sound in Central American or Mexican Spanish. ELs/ELLs may require more practice until distinction between the two words is recognized. However, small amounts of practice/exposure and any issue is rectified.

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40. **Making 10, 100 and 1,000.** Once the student has mastered Making 10, Making 100/1,000 is completed very quickly. After making 10 is mastered, it is recommended that students engage in doing all three related number sentences at the same time to show the Base 10 connection: $4 + \_\_\_ = 10$ (previously mastered); $40 + \_\_\_ = 100$; $400 + \_\_\_\_ = 1,000$. Transition to mental math after students master equation form. For instance, teacher will provide students with quick multiples of 10 or 100 and students show answer on white boards or respond orally. Teacher should closely monitor the students who may be struggling if student audio responses are given. **Note:** These exercises are tremendous numeracy building exercises.

41. **Draw a fraction and shade it.** Draw halves or thirds or fourths of simple polygons or circles. This exercise is easy to do once kids know how to divide a figure in equal parts by partitioning. Partition 2 dimensional figures in halves between tick marks, and students will easily create equally parsed two-dimensional figures up to 8. After equal divisions are created, shade some fractional amount as provided by the teacher's instruction. For instance, the teacher may say, *"Draw a square on your paper. Divide the figure into fourths (half on each side of square – connect lines)*. Or, for instance, the teacher may state, *"The numerator is 3 and the denominator is 4. Draw and shade your square."* or *"Shade three-quarters of the rectangle."*

Examples: *Divide* the rectangle into **4** equal parts.

Divide the triangle into **3** equal parts. (*Vertices to the Dot*).

Shade **a quarter** of the rectangle.
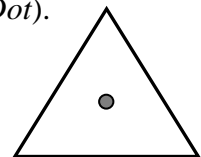
Shade **two-thirds** of the triangle.

Note: After the core lesson on partitioning is finished, students need to reinforce this skill set to master it, as with all learning. One to three practice examples a day with varied polygons and circles and students will demonstrate mastery.

42. **Comparing two numbers with < , > or = .** Teach students to place 2 dots by the larger number and 1 dot by the smaller number. Connect the dots to form a < or >. If equal numbers, place 2 dots by each numeral, then connect the dots to form an equal (=) sign. Transition to comparing 3 digit numbers in the same manner when the daily core lessons and Amara reach that sequence point in the fall semester. Transition to 3 digit numbers when students are prepared to do so.

Compare 23 and 32 using < , > or = .

$$23 \quad 32 \quad \Rightarrow \quad 23 \bullet \vdots 32 \quad \Rightarrow \quad 23 < 32$$
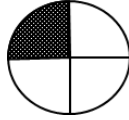
Note: If the numbers are equal, then, place 2 vertical dots by each number and connect the dots with two horizontal, parallel lines to form an equal sign (=).

43. **Computing differences – two digit numbers.** Simple subtraction – no regrouping (vertical format).

44. **Qualitative Computing using words.** Example: The teacher states, *"What is 5 more than 5?"* or *"What is 6 less than 13?"* Transition to number relationships later in the semester when children are developmentally and instructionally ready – *"What is 15 less than 35?"* or *"What is 20 less than 50?"*

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45. **Skip counting by 10's from a number other than 0.** After numeracy is clearly established, provide children with a number…5 or 4 or 3…and count by 10's for 10 to 15 iterations. Please note that children receiving special education services may require assistance of a 100 or 200 chart.

46. **Using fractional words to describe a polygon or circle.** Shade a quarter of a square/rectangle/circle/rhombus.

    Examples: Shade a quarter of a circle.   Shade half of a rectangle.
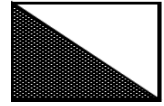
    Note: Students may not know that a quarter and a fourth are synonymous. Reinforce with all students so they are familiar with this terminology. Thus, when learning clock terminology and time concepts, they will not be confused when a '*quarter* after 4' means a 4:15 or a *fourth* of 60 minutes (i.e. 15 minutes).

47. **Base 10 Place Value Blocks for Hundreds, Tens and Ones.** Use Amara Resources to make quick copies. Students finish exercise and flip over their sheet to the blank side for more rapid skill mastery practice.

48. **Even and Odd Numbers.** Begin with small numbers to show why the one's digit determines if a number is classified as an even or odd number. It is recommended separating the number in two equal groups to show an odd number. For example, 6 is an even number due to the fact it can be separated in two equal groups of 3. Seven (7) is an odd number because it cannot. *The divisibility rule of 2 will not make sense to students at this point in second grade.* Use larger numbers until a pattern can be established that even numbers end in 0. 2, 4, 6, 8; and odd numbers in 1, 3, 5 ,7, 9. Finally, a valuable tactile method is for students to use their fingers on each hand to determine if a number is even or odd regardless of magnitude. The students match fingers on each hand. For instance, if the number is 6, students should count to 6 alternating extending a thumb/finger on each hand – starting with the thumbs. Then, match the 3 extended fingers on each hand. The two thumbs and extended fingers all pair up – with none left over. Hence, the number 6 is even. If the number were 7. one hand would have an extended finger that does not match with a finger on the other hand. Consequently, 7 is a classified as an odd number. **Note:** A common pedagogy to transition and show an even numbers is using equal addends. Hence, if a number has equal addends, then the number is even. Example: 4 + 4 = 8; therefore, 8 is an even number. If not, it is an odd number (e.g. 5 = 3 + 2). Use small numbers, so the math equation is not an impediment to the students' learning.

49. **Missing Subtrahends and Minuends.** This skill only takes practice and exposure. Children become very adept after only 3 to 4 days of quick daily practice. Begin with small numbers. __ - 3 = 1 *or* 8 - ___ = 5. Use the correct vocabulary (subtrahend or minuend) when discussing the solution to each problem. For instance, "*The subtrahend is 8 and the difference is 5. What is the minuend?*" With small amounts of consistent practice students become very adept at this types of equations.

50. **Doubling numbers small and large.** Use numbers that are related to show students number pattern. For example. Double 2 and Double 20. Double 5 and Double 50. Daily mental math exercises until students are adept at doubling numbers.

51. **Write in number in Standard Form from Word Form.** Teacher gives a 2 digit or a 3 digit number in word form, children write standard form equivalent (e.g. teacher gives 'thirty-four.' Students write 34.) Note: Stress the hyphen between the two words.

52. **Halves.** Begin with small numbers. Use equal addends as base point (6 = 3 + 3). So, half of 6 must be three. Second graders will not understand divisibility rule of 2. So, provide students with

numbers that they can easily separate into two equal groups. For example, 2 , 4, 6, 8, 10, 12. Transition to larger numbers, but show pattern as in number 51. above. Half of 2 is 1; then, half of 20 must be 10. Half of 4 is 2; thus, half of 40 is 20. **Note:** Students must be shown patterns with numbers to connect the ease of the arithmetic.

53. **Dollars and cents.** Teacher can show students 2 bills (1 and 5 dollar bills) and several coins. Students compute the overall amount. Students should write their answers both ways. 6 dollars 15 cents and $ 6.15. Students should be shown coins and bills quickly, and find a sum. With small amounts of daily practice, their money numeracy proficiency will be firmly established. Increase complications of bills and change as students are prepared to do so.

54. **Adding 3-digit numbers.** Add two 3-digit numbers – without regrouping or carrying. Use a 3-digit number and a 2-digit number sporadically, so students must line-up digits by place value – right justified. Begin carrying of addition and subtraction in the second semester of second grade. Begin with 2 digits and transition to the 3 digits as students are prepared to do so.

55. **Place Value and value of a digit.** Students begin with two digit numbers and transition to three digit numbers. Name the place value and its value. For instance, 2**0**8 – the *place value* is tens and the *value* is zero (0). Review place value using 100 blocks, as needed.

56. **Place Value in word form.** Write the 2 and 3 digit numbers in word form each day until mastered. This is a critical skill to learn. Students should include the hyphen between words. Example. Teacher presents the number '48.' Students write forty-eight. Transition to 3 digit numbers after students have mastered two digit numbers.

57. **Skip counting by 15's and 25's – first 5 multiples (including zero).** This skill is important for time and money. Counting by 15's: 0, 15, 30, 45, 60. Counting by 25's: 0, 25, 50, 75, 100. **Note:** If a student is ready to proceed to the first 10 multiples of 15 and 25, press and encourage the students to do well. Skip counting is a tremendous asset in building fundamental arithmetic numeracy.

58. **Subtracting 3-digit numbers.** Subtract two 3-digit numbers – without regrouping or carrying. Use a 3-digit number and a 2-digit number sporadically, so students must line-up digits by place value – right justified. Begin regrouping of subtraction in the second semester of second grade. At that point, in the core lessons and spaced repetition process, begin with two digit numbers and transition to three digits, as students are prepared to do so. It is recommended that students are given an occasional subtraction problem with a 3 digit and a 2 digit number, so they must right justify to preserve place value (e.g. 345 – 48). Finally, students should always rewrite the equations vertically to compute differences.

59. **Space Figures Naming (3D).** Students need rapid, repeated exposure; however, the teacher should be repetitive with the same space figures on successive days until mastered. After students demonstrate mastery of (three) space figure shapes, add one more in the rotation. For example, begin the process with the following three dimensional space figures: a rectangular prism, cube and triangular prism. After those three space figures are mastered -- add in a sphere. When students are capable of recognizing all four-space figures, add in another space figure, etc., etc. **Note:** Students should be able to see the space figure names in print on an anchor of support or placard, so students associate the auditory name of the space figure with its name in print.

60. **Space Figure Attributes (edges, faces and vertices).** Repeat the pedagogical review process used in 60 above. The core class lessons should have ingrained the space figure vocabulary (edges, faces and vertices); however, since these attributes were most likely introduced discretely, the teacher may want to emulate that pedagogy in the spaced repetition process. For example, students could name a rectangular prism (i.e. that the teacher is holding in his or her hand), and then teacher asks, *"Count the total **vertices** on this rectangular prism, and use your fingers to show me the total."*

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Note: the word Vertices - plural (Vertex – singular) begins with a 'V'. The letter 'V' makes an acute point – So, this mnemonic is helpful for students to remember that vertices or a vertex is a singular 'point' on a space figure. Continue with pedagogy that includes faces and edges on the same space figure until mastered. **Note:** Spaced repetition should be a daily, rapid process, but it is designed to be a SLOW methodology over time to provide students a threshold number of repetitions to ingrain math skills/concepts into long-term memory. **Note:** Refer to the introduction or concluding statements in this document.

61. **AM and PM Understanding.** The first important aspect of time (clock time) a student must understand is that there are 24 hours in one Earth day, and humans separate the 24 hour day into two equal 12 periods (i.e. 12 + 12 = 24). **Note:** The earth completes one _rotation_ on its axis every 24 hours, and that is how humans define, one earth day. The second aspect that students must understand is what AM and PM are defined (i.e. From the Latin words meridies (midday), **ante** (before) and post (after), the term **ante meridiem** (a.m.) means before _midday (lunch)_ and post **meridiem** (p.m.) means after midday). AM does NOT mean 'After Midnight!' A time number line visual approach is an easy means for students to visually associate the two 12 hour time periods.

AM		PM	

12
midnight — *(morning)* — **12** midday (lunch) — *(afternoon)* — **12** midnight
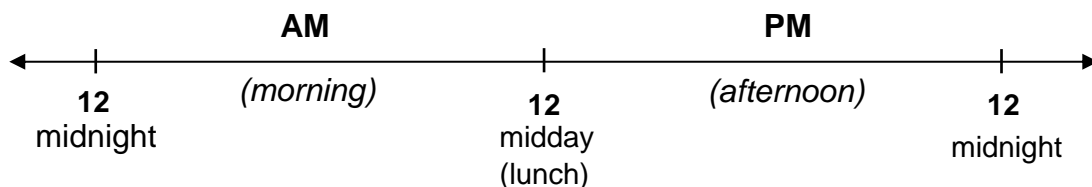
Using the diagram above, the teacher can provide a phrase description and the students name a time with either AM or PM. (Focus students' attention on the known point on the number/time line – 12 PM (midday or lunch)) For instance, the teacher can state, "*You are eating breakfast. What time is it*?" Student Answer(s) 6:30 AM, 7 AM or 8:00 AM. The teacher should point to the approximate place on the time/number line. **Note:** The important aspect of this exercise is to provide students mental schema to understand the above time number line. With small amounts of practice, all students will be adept understanding AM and PM in a day with a correct time. **Note:** Trains and planes use military time, so there is not confusion between AM and PM clock times. Hence, 10:30 AM (i.e. 10:30) is not confused with 10:30 PM 22:30 (i.e. 22:30).

62. **Common Time Units that Students Should Know.** This type of numeracy the author commonly refers to as "*Walking around Knowledge*" which means students should know this information at all times. This type of important information can be quickly reviewed each day until students demonstrate mastery. Add examples of each to associate physical meaning (e.g. *It is Johnny's birthday today. How many **days** does Johnny have to wait until he is exactly 1 year older?)*
Time Units Children Should Memorize With Associated Meaning: 24 hours in a day, **365** days in a year, _about_ **30** days in a month, **12** months in a year (plus naming the months in order), **7** days in one week (plus naming all the days in order), **60** minutes in one hour and **60** seconds in **1** minute. **Note:** Many teachers distinguish between a 5-day school week and a seven-day week, so students discern the difference.

63. **Multiplication with Objects and Repetitive Adding.** Students should know that multiplication is a quick way to add. Hence, equal grouped objects or a number line with equal jumps can be shown and students name or write the multiplication equation. A teacher can also provide an equation with equal addends and students write the multiplication problem (e.g. 5 + 5 + 5 + 5 = 4 x 5 = 20). Use small numbers, so students can easily compute the math, mentally (2 x 2; 2 x 3; 4 x 3; etc.). Use the

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Amara Skill Support Resource Packet, so teacher preparation time is reduced. This numeracy focal area will assist second grade students understanding the physical meaning of multiplication. **Note:** If a student is struggling in this exercise, it may be due to a lack of the student's multiples or skip counting proficiency. Examples below:

Multiplication is a fast way to add.

Fill in the missing numbers.

$3 \times 1 = \_\_\_$

$\_\_\_ + \_\_\_ + \_\_\_ = \_\_\_$

0 1 2 3 4 5 6

$2 \times 5 = \_\_\_$

$\_\_\_ + \_\_\_ = \_\_\_$
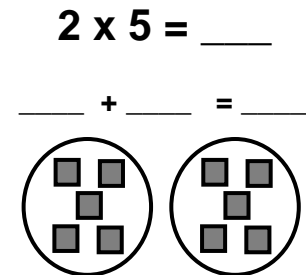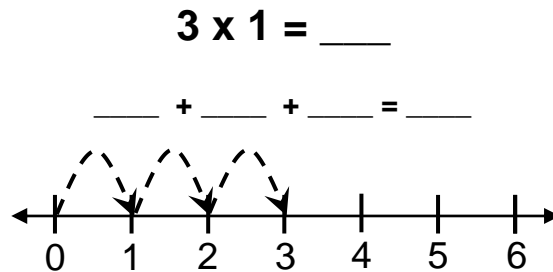
64. **Add Skills at the discretion of classroom teacher based on professional judgement and experience.**

Author's Note: A daily spaced repetition session should require between 5 to 12 minutes of time. However, some teachers vary this time depending upon the skill and circumstances in their classrooms. It is important to note that the teacher must be highly organized in order to move quickly through the process and maintain student engagement. It is highly recommended that the teacher use a diagnostic medium in these sessions. For example, students that struggle academically should be seated in the classroom so the teacher can readily observe their work and accuracy. As those students master the skills, then the teacher knows to replace the mastered skill with a new one. The teacher can also work with those few students either individually or in a small group to ensure that they master the skill at a later time in the class or day. ***A teacher's objective must be mastery of grade level math skills by ALL students or a numeracy gap will foment and widen in later grades***.

Additionally, a couple weeks later, for instance, the teacher can **spiral review** to previously presented math skills and guarantee with absolute certitude --- that all students have indeed mastered grade level or prior grade level skill(s). *Application mathematics* in the arithmetic elementary grades are generally given in the form of a short 'story' or 'word' problem. These word problems are nothing more than a combination of discrete arithmetic skills listed in this document. If those arithmetic skills are mastered, there is a high probability that students will not be overwhelmed and easily solve arithmetic application problems correctly.

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