Summer Math Grade(s) Completed: 3-4 Educator Guide for Units 1-5

Suggested Paper Color Code: Green Math Matters Code for Grade Band: Whale Icon

Summer Math Objectives: To review and reinforce the following Grade 3 skills.

Math Fluency for Third Grade:

- **NY-3.OA.7a -** Fluently solve single-digit multiplication and related divisions, using strategies such as the relationship between multiplication and division or properties of operations. e.g., Knowing that 8 × 5 = 40, one knows 40 ÷ 5 = 8**.**
- **NY-3.OA.7b** - Know from memory all products of two one-digit number.

Major Work for Third Grade: Multiplication and division of whole numbers and fractions – concepts, skills and problem solving.

NY-3.OA.4 – Determine the unknown whole number in a multiplication or division equation relating three whole numbers. e.g., determine the unknown number that makes the equation true in each of the equations 8 x ? = 48, 5 = __ ÷ 3, 6 x 6 = ?

NY-3.OA.1 – Interpret products of whole numbers. e.g., Interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. Describe a context in which a total number of objects can be expressed as 5 × 7.

NY-3.OA.3 – Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities. E.g., using drawings and equations with a symbol for the unknown number to represent the problem.

Note: This Next Generation standard uses a word problem chart in the CGI format, with one row for "Equal Groups" and a second row for "Arrays & Area."

NY-3.NF.3 - Explain equivalence of fractions and compare fractions by reasoning about their size.

NY-3.NF.3b – Recognize and generate equivalent fractions. e.g., 1/2 = 2/4; 4/6 = 2/3
Explain why the fractions are equivalent.

NY-3.NF.3d – Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons rely on the two fractions referring to the same whole. Record the results of comparisons with the symbols >, =, <, and justify the conclusions, e.g., by using a visual fraction model.

Summer Math Objectives: To review and reinforce the following Grade 4 skills.

NY-4.NF.6- Use decimal notation for fractions with denominators 10 or 100. e.g.,

- Rewrite 0.62 as 62/100 or 62/100 as 0.62.
- Describe a length as 0.62 meters.
- Locate 0.62 on a number line.

NYS Note: This is a Power Standard for Grade 4, but scheduled after the NYS Math Assessment, so is new to students.

Major Work for Grade 4: Multiplication and division of whole numbers and fractions – concepts, skills and problem solving.

NY-4.NBT.5 – Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

NY-4. NF.7 – Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, <, and justify the conclusions, e.g., by using a visual model.

NYS Note: This is a Power Standard for Grade 4, but scheduled after the NYS Math Assessment, so is new to students.

NY-4. NF.2 – Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as ½. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.

NY-4.MD.4 – Make a line plot to display a data set of measurements in fractions of a unit (1/2, ¼, 1/8). Solve problems involving addition and subtraction of fractions by using information present in line plots.

Educator Packets (one per unit):

- ***Target Number*** directions and bull's eye with numbers to select *(need a timer)*
- ***Family Fun*** Game Directions and Answer Key
- ***CGI*** Directions and Word Problems for grade band *(English and Spanish)*
- ***Snack Fraction*** of the week directions *(need: paper plate, napkin, plastic knife, snack of the week or substitute)*

Student Packets Bilingual English-Spanish (one per unit):

- ***Target Number*** bull's eye
- ***Family Fun*** cards for grade band
- ***CGI*** Graphic Organizer
- ***Snack Fraction*** Record Sheet
- ***Family Fun*** Game Board and "DIY" Game Pieces

Printing Note: Use a different color to print the packets for each grade level. This makes it easier for students in different grade bands to work together. Packets can be print two-sided.

Organization: Each Grade Band has the same four activities, organized in the same order, for each Unit. Students can do the same activity, but use the problems from their own packet.

In-Home Time Management: Students can work together on the Target Number and Family Fun Game. Students use the game cards from their separate Student Packets. The CGI word problems and Snack Fractions,

however, often require more focused attention to the individual grade bands.

Summer School Time Management:

1. Warm up each day with Target Number.
2. Create a Daily Routine with the Family Fun game cards. Each row provides practice for different math skills. Select one card from each row. Pose the problems to students. Have the students fold paper into fourths, and then use each fourth to solve the problem and hold up for you to check. Use three to four each day. (Differentiate for students in different grade bands, so everyone is solving problems, but different problems.)
3. Use the full Cognitive Guided Instruction protocol for the CGI word problems, two times a week.
    a. All students work on the same problem.
    b. Teacher walks between students, quietly asking individuals to explain the strategy/process they are using. This gives students a chance to self-correct.
    c. When most are done, ask two to three volunteers to share their process. First, they draw on the board, and then they explain.
    d. As the instructor, you are looking for students who use different strategies (i.e. drawing pictures, using tallies, adding on, etc.)
    e. Eventually, use this time for a class discussion about strategies that take more time or less time.
4. Let students play the actual Family Fun game at least once a week.
5. Utilize the extra teaching lessons posted on the website for this grade to fill gaps in learning.
6. Summer School Instructors can bring in extra activities to support the student practice in their math fluency and major works.

GETTING STARTED:

Distribute Student Packets so each student receives the grade band for the grade they completed in June. The packets have a symbol instead of the grade number so Educators can differentiate the math level for students as appropriate.

WARM UP: TARGET NUMBER Directions

The Educator gives students one number. Students have one minutes to write down as many different ways to represent the number. Everyone takes turns sharing what he or she wrote.

Key Points:

- Students are able to write solutions from their own math knowledge.

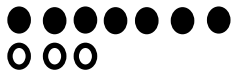
- Educators can work in examples related to the student's required math fluency and major works in math.
- The goal is for students to find ***multiple and different (correct) responses*** rather than limiting students to one correct strategy.

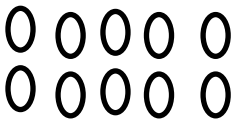
Process:

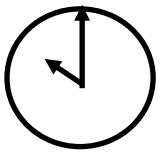
1. Select the Target Number for today. Students can write the number on their Bull's Eye.
    a. All target numbers are fair to use with students in grades 1 through 8. All ages can start with the numbers 12 and 15. After these, you will need to give students in grades 1 to 8 the higher numbers, and use numbers 20 and under for any Kindergarten (rising First Grade) students in the group.
2. The task is to represent the target number in different ways in one minute. Do a couple samples with students before starting the timer.
3. Set the timer for one minute.
4. Educators play along, and write examples to share related to the students' required math fluencies:
5. At the end of the minute, students give ONE example at a time, going around the group a couple of times until all DIFFERENT responses are used. Students need to give **different** ways to represent the number. Writing, "7 + 3" is different from writing, "3 + 7". Drawing 7 circles and 3 circles is different from writing, "7 + 3."

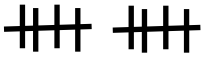
Examples of some different ways to represent the number 10:

7 + 3	10 + 0	17 – 7	2 x 5	100 / 10
3 + 7	0 + 0	ten	5 x 2	10/1









One dozen eggs minus 2 | 2 + 2 + 2 + 2 + 2 | | 100 - 90

FAMILY FUN GAME

All ages of students play the game together. On their turn, students use the game cards from their own packet to solve math problems at their own level.

Key Points:

- Unit 1 introduces the game and some of the Math Matters skills.
- Units 2 through 5 provide students practice all of the core math skills, except fractions, throughout the summer.

Process:

1. Each Student Packet has its own Family Fun Game Cards, allowing each student to participate together with students who have different skills to practice.
2. Do not cut the cards apart to play the game. Starting with Lesson 2, the three cards in each row will usually practice the same skill.
3. Instead of students drawing a card, students select a problem from their packets. Students can select problems in the order they choose, BUT ask students to solve one problem from each row, before repeating from the row, so they practice each skill.
    a. Many students will read ahead, solving problems, to find the "easiest" ones while waiting for their next turn.
4. Game Directions are on the game board. Game boards are at the end of each Student Packet, so they are easy to pull off and use.
5. The best way to move around the board is to use dice. The Student Packets have a "Do It Yourself (DIY)" version to toss a small wad of paper onto a board of numbers.

CGI CHARTS

CGI is the **C**ognitive **G**uided **I**nstruction for primary students to solve math word problems. With a few changes, this chart is in New York State's Next Generations Learning Standards for Grade 3 and Grade 4 for use with multiplication and division word problems involving Equal Groups and Arrays and Area Problems.

Key Points:

- In the Educator Packets, the multiplication/division terms on the (English) CGI Chart have been updated to represent the Next Generation terminology changes.
    - The "Compare" row of addition/subtraction problems remains for use to practice addition and subtraction during the summer.
- The CGI process allows students to solve the problem in a way they understand, instead of the "right" way.
- Provides the Educator insight about the student's math knowledge.
- Asks students to explain their solution process before asking for an answer.
- When there is a group of peers, the emphasis is on finding different solution paths, rather than one correct method.
- Eventually this can lead to a real discussion: Does a student's method work for him or her? Has the student seen another method they are ready to try?

Process:

1. ***Select one word problem.*** The easiest wording to understand is in the top, left corner of the CGI Chart. The wording is more difficult as you move left and down.
    a. Start students with the simplest word problems.

b. If a student struggles, stick with these for the summer so the student becomes secure. If students are confident, move to questions to the left, or down, to increase their understanding.
c. FYI -The word problems with a STAR on the CGI Chart are the problem-types targeted on the Grade 3 Assessment. ★ The word problems with a TRIANGLE are targeted on the Grade 4 Assessment. ▲

2. Have manipulatives and paper/pencil available for students to choose either medium for solving the problem.
3. ***Read the problem to students once***. **Note:** Each problem has three sets of numbers for you to choose from to fill in the blanks. Use the set that works best for the student(s).
4. ***Use the Graphic Organizer*** to help students organize their notes and strategies.
5. ***Read the problem again, and then teach students to take notes.*** (As students demonstrate confidence, shift to giving students a chance to take their own notes.)
    a. Prompt students with questions, and model writing notes. Use the Graphic Organizer.
    b. Sample questions: What does the problem tell us first? *[Carlos had 4 sets of pennies]* How can we write? *[C = 4 sets (or a drawing)]*
    c. What happens next? *[There are 6 pennies in each set.]* How can we write? *[set = 6 pennies]*
    d. What question do we have to answer? *[How many pennies did he have in all?]* How can we write this? *[How many pennies?]*
6. Give students time to solve. *(If struggling, prompt with, "What number does the problem start with?" Do you want to draw this or use manipulatives to recreate it? Then what happens?)*
7. Ask students to explain their process before asking them for an answer. This allows students time to self-correct and gives the Educator a clue about how the student is thinking.
8. At the end, look at the final answer together, to decide if it solves the problem. How would you say the answer in a sentence? *[Carlos has 24 pennies in all.]*

Summer School Note: How to extend this to the full CGI process.
Walk around the group, quietly asking individuals to explain their process to you. When students seem stuck, prompt by re-asking them about their notes.

Take time to ask two to three volunteers to copy their process on a white board or large piece of construction paper. Then ask the students to explain their procedures. When selecting volunteers, it is a good idea to look for different strategies that are successful, not just the "best" method. The variety of examples and explanations will give all students a stronger understanding about math works.

Planning Note: In the original design, the word problems in the CGI Chart used the characters and events from one particular book, listed at the top of the chart. The class spent three days rereading and using the characters and plot from the one book.
While not as rich an experience for students who are not immersed in the particular story, the word problems still serve as good examples for the variety of one-step word problems.

SNACK FRACTIONS

Students separate a snack into a fractional portion. Then eat.

Key Points:

- Equal portions matter when sharing real food
- All students use the same snack food
- Using the record sheet helps students transfer from the real to the symbolic

The Math Matters In-Home curriculum uses the following snacks:

- Unit 1 = String Cheese
- Unit 2 = Cup of Trail Mix
- Unit 3 = 6 pieces Beef Jerky
- Unit 4 = 100 calorie snack bags
- Unit 5 = 4 Graham Crackers and Nutella

Planning Note: Substitute snacks as needed to travel in cars and to fit the budget. If possible, have the substitute snack match the shape or number of the original, so the Fraction Record sheet still makes sense. For example, substituting something rectangular, like a breakfast bar, for the string cheese, or substituting a package with 6 cheese cracker sandwiches for the 6 pieces of beef jerky.

Summer School Note: The original Math Matters Summer School curriculum suggested the following snacks:

- Unit 1 = Apple, ice cream sandwich, string cheese
- Unit 2 = Guacamole and carrots, trail mix, cherry tomatoes and cheese
- Unit 3 = Dill pickle, beef jerky, raisin bread and banana
- Unit 4 = Fruit kabob, 100 calorie snack bag, graham cracker and peanut butter (check for allergies to peanut butter)
- Unit 5 = Laughing Cow cheese wedges, graham crackers and Nutella and strawberries (check for allergies to Nutella), bagels and cream cheese
- Unit 6 = Turkey wrap, personal pan pizza

Process:

- ***Use the Snack Fraction guidance*** in the Teacher Packet and Snack Fraction Record sheet in the Student Packet

Alternative Process:

- ***Single student:*** splits the food in the fractional amount practicing (half, fourth, third, etc.) and Migrant Educator discusses with student – are they fair shares? Are some portions larger/smaller? Have the student draw and write the fractional portion of a whole.
- ***Partners:*** each has whole food. Each splits the food in the fractional amount practicing (half, fourth, third, etc.) but the partner picks the portion (half, 2/4, 3/6) first. Have the students draw and write the fractional portion of a whole.

Recipe Note:
Trail Mix: (mix equal parts of each of the following)

- Peanuts, M&M's, Fish crackers (check for allergies to peanuts); or
- Chex Corn Cereal, Cheerios, dried fruit

(Optional) SUMMER ASSESSMENTS

Formal Summer Assessments

The formal Summer Assessments are based on the grade that a student completed. A student who completed Second Grade in June, but might be considered a (rising) Third Grader in the summer, should take the Summer Assessments for Grade 2. The questions are based on end-of-year mastery to maintain core math skills over the summer.

Note: Grades 3 and 4 receive the instruction together, but the students are assessed with different a pre-/post-tests. Each has different supplies to support the student.

- **Grade 3** uses a single whale-icon to code the papers students can see.
  - ***No extra supplies suggested for Grade 3.***
- **Grade 4** uses two whale-icons to code the papers students can see.
  - ***Extra Supplies: Base 10 blocks are recommended for Grade 4 students to be able to use.***

Next Generation Modifications: These assessments started as the Math Matters pre-tests and post-tests in English and Spanish. The assessments are now modified to align with the *New York State Next Generation Mathematics Learning Standards.*

- In the Grade 3 (one whale-icon) Assessments, the Summer Math version was reformatted for better readability.
- In the Grade 4 (two whale-icon) Assessments, the Summer Math materials are substantially changed as follows:

- comparing two decimals at a time, instead of the three or more used by Math Matters;
- comparing two fractions at a time instead of the three mixed fractions used by Math Matters;
- plotting fractions (1/2, ¼, 1/8) on a number line instead of the mix of decimals and fractions used by Math Matters;
- removed the non-grade-4 question to read decimals in expanded format; and
- added a multiplication word problem.

Informal Assessments

Educators can observe if a student is able to complete the problems or not. When gaps in knowledge are observed, Educators can re-teach to those skills, to close the gaps in learning. When a student can complete a skill on his or her own, it is important for the student to continue practicing the skill in order to avoid summer loss.

CLOSING THE GAPS

Use this section for ideas when a student struggles with a particular skill.

Get curious and ask yourself:

- *Does the student just need a reminder and more practice?*
- *Does the student need a full lesson to re-introduce the skill?*
- *Does the student need to use simpler numbers, or start with a simpler skill?*

Options for closing the gaps:

- Plan to utilize your own examples during next week's "Target Number" to support this skill. At the beginning of Family Fun, use one of the game's examples to review the skill before playing the game.
- Review the Skill Lessons posted on the website for this grade band, to teach/ reteach the Summer Math skill.

Math Matters Note: These lessons were written for a classroom, and are called "TV Lessons" because they were also scripts and videotaped during Math Matters. For example, each lesson has a speaking part for a "pirate" character. You will need to preview the following lessons so you can adapt the script to your students and situation.

NY-3.OA.3 – Introduction to Using Array for Multiplication with one-digit numbers

- Supplies for each Student
  - 1 piece of construction paper
  - 6 portion cups

- 30 counters (lesson uses 30 units from a base ten set)
- Use construction paper to draw the rest of arrays

NY-3.OA.7a – Using Fact Families and Area Models to Understand Division

- Lesson asks students to look at a word wall and vocabulary word "division." You can modify to tell students the lesson will work with division.
- Supplies for each Student
  - 1 copy of the graph paper in the lesson

NY-4.NBT.5 – Introduction to Building Array of Two-Digit Numbers using Base 10 Blocks

- This is the math behind the short cuts to multiplying two-digit numbers.
- Supplies for each Student
  - Base Ten – (1) hundred flat
  - Base Ten – (10) tens
  - Base Ten – (20) units
  - (can substitute with graph paper and colored pencils)

NY-4.NBT.5 – More Practice Building Arrays of Two-Digit Numbers using Base 10 Blocks

- The lesson shows the connection between the model and multiplying the numbers.
- Supplies for each Student
  - Base Ten – (1) hundred flat
  - Base Ten – (13) tens
  - Base Ten – (41) units
  - Graph Paper
  - (can substitute using graph paper and colored pencils for the Base Ten blocks)

NYS Next Generation Expectations for Grade 3 and Grade 4
Multiplication and Division

	Unknown Product $a \times b = ?$	Group Size Unknown ("How many in each group?" Division) $a \times ? = p$ and $p \div a = ?$	Number of Groups Unknown ("How many groups?" Division) $? \times b = p$ and $p \div b = ?$
Equal Groups	There are a bags with b plums in each bag. How many plums are there in all? *Measurement example:* You need a lengths of string, each b inches long. How much string will you need altogether?	If p plums are shared equally into a bags, then how many plums will be in each bag? *Measurement example:* You have p inches of string, which you will cut into a equal pieces. How long will each piece of string be?	If p plums are to be packed b to a bag, then how many bags are needed? *Measurement example:* You have p inches of string, which you will cut into pieces that are b inches long. How many pieces of string will you have?
Arrays & Area	There are a rows of apples with b apples in each row. How many apples are there? *Area example*: What is the area of an a cm by b cm rectangle?	If p apples are arranged into a equal rows, how many apples will be in each row? *Area example*: A rectangle has area p square centimeters. If it is a cm long, what is its width?	If p apples are arranged into equal rows of b apples, how many rows will there be? *Area example*: A rectangle has area p square centimeters. If it is b cm wide, what is its length?

Array problems can also be stated in terms of columns, exchanging the order of a and b, so that the same array is described. For example: There are b columns of apples with a apples in each column. How many apples are there?