New York State Next Generation Mathematics Learning Standards Unpacking Document (DRAFT)

GRADE: 3	DOMAIN: Operations & Algebraic Thinking

CLUSTER: Solve problems involving the four operations and identify and extend patterns in arithmetic.

Students apply the tools, representations and conceptual understandings of the four operations to solve multi-step word problems and develop their algebraic language by using a letter for the unknown quantity in expressions or equations. Students will estimate during the problem-solving process, and then revisit their estimate, checking for reasonableness. Students will utilize structure and repeated reasoning when identifying and extending numerical patterns that are related to operations.

Grade Level Standard:

NY-3.OA.8 Solve two-step word problems posed with whole numbers and having whole number answers using the four operations.
NY-3.OA.8a Represent these problems using equations or expressions with a letter standing for the unknown quantity.
NY-3.OA.8b Assess the reasonableness of answers using mental computation and estimation strategies including rounding.
Note: Two-step problems need not be represented by a single expression or equation.

PERFORMANCE/KNOWLEDGE TARGETS
(measurable and observable)

- Solve two-step word problems using the four operations.
- Write an expression/equation to represent a multiplication or division word problem with a symbol for the unknown.
- Check solutions for a given problem using estimation strategies.

ASPECTS OF RIGOR

Procedural Conceptual Application

MATHEMATICAL PRACTICES	1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.
FOUNDATIONAL UNDERSTANDING	**NY-2.OA.1a** Use addition and subtraction within 100 to solve one-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions. **NY-2.OA.1b** Use addition and subtraction within 100 to develop an understanding of solving two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions. **NY-3.OA.3** Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities. **NY-3.NBT.2** Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

The following pages contain EXAMPLES to support current instruction of the content standard and may be used at the discretion of the teacher and adapted to best serve the needs of the learners in the classroom.

Addition and subtraction should include numbers within 1,000 and multiplication and division should include single-digit factors and products less than 100. Two-step word problems could also involve multiplying single-digit factors and multiples of 10.

Example 1: Progression of the Two-step Word Problem

Allison usually eats 3 meals a day. How many meals does she eat in a normal week?

Students can utilize an array to visually show 7 groups of 3.

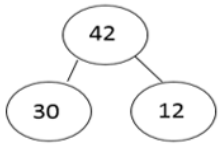
M	M	M
M	M	M
M	M	M
M	M	M
M	M	M
M	M	M
M	M	M

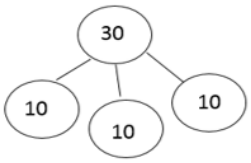
7 groups (days) of 3 (meals) $M = 7 \times 3$ where M is the number of meals Allison eats in a week.
$7 \times 3 = 21$ meals
$M = 7 \times 3$
$M = 21$
On Friday, Allison skipped breakfast. How many meals did she eat for the week?
$21 - 1 = 20$ meals for the week.
$M = 21 - 1$
$M = 20$
Students can break problem solving process down into two manageable steps/equations.
$7 \times 3 = 21$
$21 - 1 = 20$

Extension:
Students may choose to write the equation $M=7 \times 3 - 1$.
$7 \times 3 - 1$ is a valid expression, however order of operations is **not an expectation** at this grade-level.

Example 2:

Jody baked 42 cookies. She set aside 12 cookies to save for her family. The rest of the cookies she put on 3 trays for a school party. Each tray had the same number of cookies on it. How many cookies were on each tray?



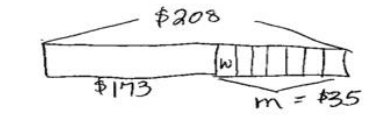


C=42 – 12
C=30 cookies to divide evenly after saving 12 for her family.
T=30 ÷ 3
T=10 cookies on each tray
Extension: Student could write T = (42-12) ÷ 3, where T represents the number of cookies to be put on each tray, but order of operations is **not a grade-level expectation**.

The following pages contain EXAMPLES to support current instruction of the content standard and may be used at the discretion of the teacher and adapted to best serve the needs of the learners in the classroom.

Example 3:

Joe has $173 in the bank. He earns the same amount of money each week for the next 7 weeks and puts this money in the bank. Now, Joe has $208 in the bank. How much money does Joe earn each week?



m= number of dollars Joe put in bank
$208 - $173 = m
m= $35
w= number of dollars earned each week
$35 ÷ 7= w
w= $5

Students should check to see if their answer makes sense.

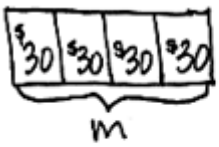
Is it reasonable that Joe earns $5 a week?

$5 a week for 7 weeks is $35 and that's about $40.

$173 is about $170 and $40 + $170 is $210, which is close to $208.

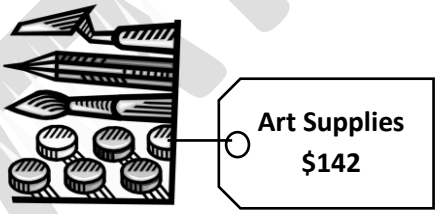
Example 4:

Lupe saves $30 each month for 4 months. Does she have enough money to buy the art supplies below? Explain why or why not.



4 x $30 = m
m= $120

$142 - $120 = $22



Lupe does not have enough money. She saved $120, but she needs $142. She will need $22 more in order to buy the art supplies.

Additional two-step word problems can be found in lesson 21 of EngageNY Grade 3 Module 1, and lessons 18 and 21 of EngageNY Grade 3 Module 3.