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

GRADE: 4	DOMAIN: Operations & Algebraic Thinking

CLUSTER: Use the four operations with whole numbers to solve problems.

Using their understanding of addition and subtraction properties, students connect them to multiplication and division. Students apply these skills as they solve multi-step problems. In problems that involve division, students must interpret and use remainders with respect to the context. Students put multiplicative comparison problems into context by using visual models to show the relationships between subjects being compared.

Grade Level Standard:

NY-4.OA.3 Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted.
NY-4.OA.3a Represent these problems using equations or expressions with a letter standing for the unknown quantity.
NY-4.OA.3b Assess the reasonableness of answers using mental computation and estimation strategies including rounding.
Note: Multistep problems need not be represented by a single expression or equation.

PERFORMANCE/KNOWLEDGE TARGETS
(measurable and observable)

- Identify which of the four operations will be used to solve multi-step word problems and accurately represent the problem with models, drawings and the corresponding equation(s).
- Use mental math strategies, properties of operations, relationships between operations, and estimation strategies to solve multi-step word problems.
- Use the context of a division problem to interpret the remainder and justify their interpretation.
- Verbally and in writing, provide evidence of reasonableness of answers using mental computation, properties of operations, relationships between operations, and 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-3.OA.8** Solve two-step word problems posed with whole numbers and having whole-number answers using the four operations. **NY-4.NBT.3** Use place value understanding to round multi-digit whole numbers to any place. **NY-4.NBT.6** Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

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.

While solving multi-step word problems, students do not need to write a single equation with two or more operations to represent the problem. Order of operations is not an expectation until Grade 5 (NY-5.OA.1). Students may break their solution path into multiple equations or expressions. Students should be identifying the role of the unknown when using variables in their equations/expressions.

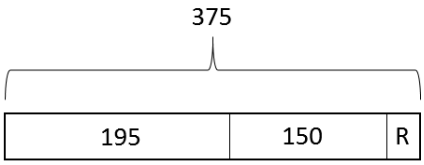
Example 1: Jonah's family is driving 375 to visit his grandparents. In the morning they travel 195 miles. After lunch they drove 150 miles. How many more miles does the family have left to travel?

195+150=345
375-345=30

M=miles traveled
M=195+150
M=345
R=miles that remain
R=375-345
R=30

Does the answer seem reasonable?

The morning number of miles traveled is close to 200. Total number of miles they have traveled so far would be close to 200+150 or 350 miles. The difference between 375 miles and 350 miles is 25 miles. The answer should be close to 25 miles.



Example 2: A baking company makes apple pies. What is the total number of apple pies the company can make using the following information?

- The baking company has 15 boxes of apples.
- Each box has 18 apples.
- The baking company uses 7 apples for each pie.

A=total number of apples
A=15 x 18

10 x 18 = 180
5 x 18 = 90

A=180 + 90
A=270

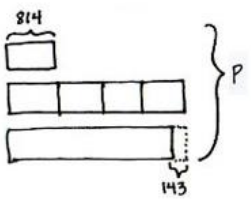
P=total number of apple pies made
P=270 ÷7
P=38 R 4
The bakers can make 38 apple pies. Even though there are 4 apples that remain, those 4 apples are not enough for an apple pie.

For problems that involve division and the interpretation of remainders, students need to utilize the context of the problem and determine whether they need to drop (round down) the remainder, or round up.

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: Below are some examples of multistep word problems. Additional word problems can be found in EngageNY Grade 4 Module 3, lessons 13 and 14.

- In one month, Charlie read 814 pages. In the same month, his mom read 4 times as many pages as Charlie, and that was 143 pages more than Charlie's dad read. What was the total number of pages read by Charlie and his parents?



Charlie and his parents read 7,183 pages in one month.

Solution A:

814 × 4 = 3256

3256 − 143 = 3113

3256 + 3113 + 814 = 7,183

P = 7,183

Solution B:

814 × 9 = 7326

212
7326 − 143 = 7,183

- Sarah bought a shirt on sale for $35. The original price of the shirt was 3 times that amount. Sarah also bought a pair of shoes on sale for $28. The original price of the shoes was 5 times that amount. Together, how much money did the shirt and shoes cost before they went on sale?
- The high school art teacher has 9 cases with 52 boxes of crayons in each case. The elementary school art teacher has 6 cases with 104 boxes of crayons in each case. How many total boxes of crayons do the teachers have altogether? Is your answer reasonable? Explain.

Example 4: The following task is taken from Illustrative Mathematics, Carnival Tickets , licensed under (CC BY-NC-SA 4.0) .

Every year a carnival comes to Hallie's town. The price of a ticket for a ride has gone up every year.

Year	Ticket Price
2008	$2.00
2009	$2.50
2010	$3.00
2011	$3.50
2012	$4.00

a. In 2008, Hallie's allowance was $9.00 a month. How many carnival tickets could she buy with one month's allowance?
b. If her allowance had stayed the same, $9.00 a month, how many carnival tickets could she buy in 2012?
c. In 2012, Hallie's allowance was $14.00 per month. How much did her monthly allowance increase between 2008 and 2012?
d. How much more did a carnival ticket cost in 2012 than it did in 2008?
e. Was Hallie able to buy more carnival tickets in 2008 or in 2012 with one month's allowance?
f. What would Hallie's allowance need to be in 2012 for her to be able to buy as many carnival tickets as she could in 2008?
g. What happens to your ability to buy things if prices increase and your allowance doesn't increase?