

Operations and Algebraic Thinking: Grade 3

Stage 1 Desired Results

ESTABLISHED GOALS:

Competencies:

- ***Students will demonstrate the ability to solve arithmetic and algebraic problems by utilizing effective strategies and applying properties of operations to multi-digit whole integers.***
- ***Students will demonstrate the ability to model operations by utilizing objects, drawings, and equations.***

Content Standards:

- 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. For example, describe a context in which a total number of objects can be expressed as 5×7 .
- 3.OA.2 Interpret whole-number quotients of whole numbers, e.g., interpret $56 \div 8$ as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. For example, describe a context in which a number of shares or a number of groups can be expressed as $56 \div 8$.
- 3.OA.3 Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.
- 3.OA.4 Determine the unknown whole number in a multiplication or division equation relating three whole numbers. For example, determine the unknown number that makes the equation true in each of the equations $8 \times ? = 48$, $5 = _ \div 3$, $6 \times 6 = ?$
- 3.OA.5 Apply properties of operations as strategies to multiply and divide. Examples: If $6 \times 4 = 24$ is known, then $4 \times 6 = 24$ is also known. (Commutative property of multiplication.) $3 \times 5 \times 2$ can be found by $3 \times 5 = 15$, then $15 \times 2 = 30$, or by $5 \times 2 = 10$, then $3 \times 10 = 30$. (Associative property of multiplication.) Knowing that $8 \times 5 = 40$ and $8 \times 2 = 16$, one can find 8×7 as $8 \times (5 + 2) = (8 \times 5) + (8 \times 2) = 40 + 16 = 56$. (Distributive property.)
- 3.OA.6 Understand division as an unknown-factor problem. For example, find $32 \div 8$ by finding the number that makes 32 when multiplied by 8.
- 3.OA.7 Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that $8 \times 5 = 40$, one knows $40 \div 5 = 8$) or properties of

Transfer

Students will be able to independently use their learning to solve arithmetic and algebraic problems, with fluency.

Meaning

ENDURING UNDERSTANDINGS

Students will understand that...

- mathematical operations are used in solving problems in which a new value is produced from one or more values.
- algebraic thinking involves choosing, combining, and applying effective strategies for answering quantitative questions.

ESSENTIAL QUESTIONS

- ***How do you know what to do and when to do it?***

Acquisition

Students will know...

- that multiplication and division are inverse operations.
- that multiplication is repeated addition.
- their multiplication facts (0-9) with automaticity.
- the algorithms for solving multiplication and division problems.
- which key words in a word problem tell them which operation to use.

Students will be skilled at...

- interpreting a multiplication fact as the sum of equal groups (repeated addition).
- multiplication facts (0-9) with automaticity.
- describing the total number of objects in a rectangular array using multiplication.
- multiplying any two numbers with a product within 100 with ease.
- applying the commutative, associative and distributive properties to decompose, regroup, and/or reorder factors to make it easier to multiply two or more factors.
- explaining division as a set of objects partitioned into an equal number of shares.
- identifying parts of division equations.
- explaining the relationship between multiplication and division.
- interpreting quotients in division.
- turning a division problem into a multiplication problem with an unknown factor.
- dividing whole numbers that do not result in remainders for dividends within 100.

vocabulary:

multiplication, division, dividend, divisor, quotient, factor, product, commutative property, associative property, distributive property, order of operations

operations. By the end of Grade 3, know from memory all products of two one-digit numbers. 3.OA.8 Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. 3.OA.9 Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends. - MP1 Make sense of problems and persevere in solving them. - MP2 Reason abstractly and quantitatively. - MP7 Look for and make use of structure.		- determining when to multiply and divide in word problems. - representing multiplication and division word problems using drawings, and equations with unknowns in all positions. - determining the unknown number in multiplication and division problems. - solving word problems involving equal groups, arrays, and measurements quantities using drawings and equations. - deciding if answers are reasonable using mental math and estimation strategies including rounding. - choosing the correct operation to perform the first computation, and then choosing the correct operation to perform the second computation in order to solve two-step word problems. - writing equations using a letter for the unknown number. - identifying and describing arithmetic patterns in number charts, addition tables, and multiplication tables. - explaining arithmetic patterns using properties of operations.
Content Area Literacy Standards		21st Century Skills
not applicable		<i>solve problems</i> <i>reason effectively</i>

Stage 2 - Evidence

Evaluative Criteria	Assessment Evidence
	PERFORMANCE TASK(S):
	OTHER EVIDENCE:

Stage 3 – Learning Plan

Summary of Key Learning Events and Instruction

<i>Language Arts Integration</i>	<i>Mathematics Integration</i>
• 1.OA.1 Use	not applicable
<i>Technology Integration</i>	<i>District Materials</i>
• 1.OA.1 Use	