# Grade 4 Unit 2: Multi-Digit Arithmetic and Fraction Equivalence

Content Area: **Math**
Course(s): **Math Grade 4**
Time Period: **MP2**
Length: **45**
Status: **Published**

## NJSLS Math

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| 4.OA.A.1 | Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations. |
| 4.OA.A.2 | Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison. |
| 4.OA.A.3 | Solve multi-step word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. 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. |
| 4.OA.B.4 | Find all factor pairs for a whole number in the range 1–100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1–100 is prime or composite. |
| 4.NBT.B.4 | With accuracy and efficiency, add and subtract multi-digit whole numbers using the standard algorithm. |
| 4.NBT.B.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. |
| 4.NBT.B.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 model. |
| 4.NF.A.1 | Explain why a fraction □/□ is equivalent to a fraction (□ × □)/(□ × □) by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions. |
| 4.NF.A.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 1/2. 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. |

## Unit Focus

- Use the four operations with whole numbers to solve problems.
- Gain familiarity with factors and multiples.

- Extend understanding of fraction equivalence and ordering.

## Standards for Math Practice

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| MA.K-12.1 | Make sense of problems and persevere in solving them. |
| MA.K-12.2 | Reason abstractly and quantitatively. |
| MA.K-12.3 | Construct viable arguments and critique the reasoning of others. |
| MA.K-12.4 | Model with mathematics. |
| MA.K-12.5 | Use appropriate tools strategically. |
| MA.K-12.6 | Attend to precision. |
| MA.K-12.7 | Look for and make use of structure. |
| MA.K-12.8 | Look for and express regularity in repeated reasoning. |

## Critical Knowledge & Skills

| NJSLS Math | Suggested Math Practices | Critical Knowledge and Skills |
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| 4.OA.A.2 (**M**) Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison. | MP.1 Make sense of problems and persevere in solving them.<br><br>MP.4 Model with mathematics.<br><br>MP.5 Use appropriate tools strategically. | Concepts:<br>• No new concepts introduced.<br><br>Students will be able to:<br>• Multiply to solve word problems involving multiplicative comparison.<br>• Divide to solve word problems involving multiplicative comparison.<br>• Represent problems with drawings and equations, using a symbol for the unknown number.<br>• Distinguish word problems involving multiplicative comparison from those involving additive comparison.<br><br>Learning Goal 1: |

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| | | • Multiply and divide to solve word problems involving multiplicative comparisons and represent these problems with drawings and equations. |
| 4.OA.A.1 (**M**) Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 x 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations. | MP.2 Reason abstractly and quantitatively.<br><br>MP.4 Model with mathematics. | Concepts:<br>• Multiplication equations represent comparisons.<br>Students will be able to:<br>• Explain multiplication equations as comparisons.<br>• Write multiplication equations given word problems indicating multiplicative comparison.<br>Learning Goal 2:<br>• Write multiplication equations from word problems indicating multiplicative comparisons and describe multiplication equations as comparisons. |
| 4.NBT.B.5 (**M**) 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. | MP.7 Look for and make use of structure. | Concepts:<br>• No new concepts introduced.<br>Students will be able to:<br>• Multiply a whole number of up to four digits by a one-digit whole number using strategies based on place values.<br>• Multiply two two-digit numbers using strategies based on place value.<br>• Represent these operations with equations, rectangular |

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| | | arrays, and area models.<br>• Explain the calculation by referring to the model (equation, array, or area model).<br>Learning Goal 3:<br>• Multiply a whole number of up to four digits by a one-digit whole number and multiply two two-digit numbers; represent and explain calculations using equations, rectangular arrays, and area models. |
| 4.OA.A.3 (**M**) Solve multi-step word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. 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.<br> Climate Change Example: Students may, knowing that energy and fuels are derived from natural resources and that their uses affect the climate, use the four operations to solve multi-step word problems posed with whole numbers, having whole-number answers and that are based on energy, fuels, and natural resources. | MP.1 Make sense of problems and persevere in solving them.<br>MP.2 Reason abstractly and quantitatively.<br>MP.4 Model with mathematics.<br>MP.7 Look for and make use of structure. | Concepts:<br>• Proper use of the equal sign<br>• Improper use of the equal sign (e.g. 3 + 7 = 10 – 5 = 5 is incorrect)<br>Students will be able to:<br>• Solve multi-step word problems involving any of the four operations.<br>• Solve multi-step word problems involving interpretation (in context) of a remainder.<br>• Write equations to represent multi-step word problems, using a letter to represent the unknown quantity.<br>• Explain why an answer is reasonable.<br>• Use mental computation and estimation strategies to determine whether an answer is reasonable. |

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| | | Learning Goal 4:<br>• Write and solve each equation (including any of the four operations) in order to solve multi-step word problems, using a letter to represent the unknown; interpret remainders in context and assess the reasonableness of answers using mental computation with estimation strategies. |
| 4.NBT.B.4 (**M**) With accuracy and efficiency, add and subtract multi-digit whole numbers using the standard algorithm. | MP.7 Look for and make use of structure.<br><br>MP.8 Look for and express regularity in repeated reasoning. | Concepts:<br>• No new concepts introduced.<br><br>Students will be able to:<br>• Add multi-digit whole numbers using the standard algorithm with accuracy and efficiency.<br>• Subtract multi-digit whole numbers using the standard algorithm with accuracy and efficiency.<br><br>Learning Goal 5:<br>• Add and subtract multi-digit whole numbers using the standard algorithm with accuracy and efficiency. |
| 4.NBT.B.6 (**M**) 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. | MP.7 Look for and make use of structure.<br><br>MP.8 Look for and express regularity in repeated reasoning. | Concepts:<br>• No new concepts introduced.<br><br>Students will be able to:<br>• Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors using strategies |

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| | | based on place value, the properties of operations, and the relationship between multiplication and division.<br>• Represent these operations with equations, rectangular arrays, and area models.<br>• Explain the calculation by referring to the model (equation, array, or area model).<br>Learning Goal 6:<br>• Divide a whole number of up to four-digits by a one-digit divisor; represent and explain the calculation using equations, rectangular arrays, and area models. |
| 4.OA.B.4 (**S**) Find all factor pairs for a whole number in the range 1–100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1–100 is prime or composite. | MP.2 Reason abstractly and quantitatively.<br>MP.7 Look for and make use of structure.<br>MP.8 Look for and express regularity in repeated reasoning. | Concepts:<br>• Whole numbers are a multiple of each of its factors.<br>• Prime numbers do not have factors other than 1 and the number itself.<br>Students will be able to:<br>• Find all factor pairs for any whole number (between 1 and 100).<br>• Given a one-digit number, determine whether a given whole number (between 1 and 100) is a multiple of the one-digit number.<br>• Determine whether a given whole number (between 1 and 100) is prime or |

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| | | composite.<br><br>Learning Goal 7:<br><br>• Find all factor pairs for a whole number up to 100 and determine whether it is a multiple of a given 1-digit whole number and whether it is prime or composite. |
| 4.NF.A.1 (**M**) Explain why a fraction a/b is equivalent to a fraction (nxa)/(nxb) by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions. | MP.1 Make sense of problems and persevere in solving them.<br><br>MP.4 Model with mathematics.<br><br>MP.5 Use appropriate tools strategically.<br><br>MP.6 Attend to precision.<br><br>MP.7 Look for and make use of structure. | Concepts:<br><br>• Equivalent fractions are the same size while the number and size of the parts differ.<br><br>Students will be able to:<br><br>• Explain, using visual fraction models, why two fractions are equivalent.<br><br>• Generate equivalent fractions, using fraction a/b as equivalent to fraction nxa/nxb.<br><br>Learning Goal 8:<br><br>• Recognize and generate equivalent fractions and explain why they are equivalent using visual fraction models. |
| 4.NF.A.2 (**M**) 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 1/2. 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. | MP.1 Make sense of problems and persevere in solving them.<br><br>MP.4 Model with mathematics.<br><br>MP.5 Use appropriate tools strategically. | Concepts:<br><br>• Fractions may only be compared when the two fractions refer to the same whole.<br><br>• Common numerators.<br><br>• Common denominators.<br><br>Students will able to: |

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| | MP.6 Attend to precision.<br><br>MP.7 Look for and make use of structure. | • Create common denominators in order to compare two fractions.<br><br>• Create common numerators in order to compare two fractions.<br><br>• Compare two fractions with different numerators and different denominators by comparing to a benchmark fraction.<br><br>• Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.<br><br>Learning Goal 9:<br><br>• Compare two fractions with different numerators or different denominators, recording comparison with >, =, or <, and justifying the conclusion using visual fraction models. |

## School/District Formative Assessment Plan

- Topic 6-1 through 6-6 Quick Check (found in Savvas Realize)
- Topic 7-1 through 7-5 Quick Check (found in Savvas Realize)
- Topic 8-1 through 8-7 Quick Check (found in Savvas Realize)

## School/District Summative Assessment Plan

- Topic 6 Assessment
- Topic 7 Assessment

- Topic 8 Assessment

## Benchmark & Alternative Assessments

- STAR Renaissance
- LinkIt Benchmarks
- Performance Task (found in Savvas Realize)

## Focus Mathematical Concepts

Pre-requisite skills

- Use multiplication and division within 100 to solve word problems in situations involving: equal groups, arrays and measurement quantities (3.OA.A.3).
- Use drawings and equations with a symbol for the unknown number to represent multiplication and division word problems within 100 (3.OA.A.3)
- Interpret products of whole numbers in terms of the number of groups and objects (3.OA.A.1).
- Multiply and divide within 100 using strategies such as the relationship between multiplication and division, or properties of operations (working towards accuracy and efficiency) (3.OA.C.7).
- Add within 1000 with accuracy and efficiency using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction (3.NBT.A.2).
- Multiply and divide within 100 using strategies such as: relationship between multiplication and division or properties of operations (working towards accuracy and efficiency) (3.NBT.A.3).
- Solve simple two-step word problems using the four operations (3.OA.D.8).
- Represent two-step word problems using equations with a letter standing for the unknown quantity (3.OA.D.8).
- Assess the reasonableness of answers in two-step word problems using mental computation and estimation strategies including rounding (3.OA.D.8).
- Subtract within 1000 with accuracy and efficiency using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction (3.NBT.A.2).
- Compare fractions by reasoning about their size (3.NF.A.3).

- Two fractions are equivalent (equal) if they are the same size, or the same point on a number line (3.NF.A.3).
- Recognize and generate simple equivalent fractions (3.NF.A.3).
- Explain why two fractions are equivalent by using a visual fraction model (3.NF.A.3).
- Express whole numbers as fractions (3.NF.A.3).
- Recognize fractions that are equivalent to whole numbers (3.NF.A.3).
- Compare two fractions with the same numerator or the same denominator by reasoning about their size (3.NF.A.3).

Common Misconceptions

- Students see multiplication and division as discrete and separate operations. Their conception of the operations do not include the fact that they are linked as inverse operations.
- Students know how to multiply and divide, but not when.
- Students misapply the procedure for multiplying multi digit numbers by ignoring place value.
- Students misapply the procedure for regrouping.
- Students confuse key words in multi-step word problems.

Number Fluency

- 4.NBT.B.4 Add and subtract within 1,000,000.

## District/School Tasks

- Pick A Project (found in Savvas Realize)
- Performance Tasks (found in Savvas Realize)

## District/School Primary, Supplemental and Intervention Resources

- Envisions by Savvas (P)
- STAR Renaissance (S)
- Freckle Math (S)
- Connecting Math Concepts (I)
- Corrective Math (I)

## Instructional Best Practices/Open Educational Resources

Illustrative Mathematics

Desmos

Numeracy Tasks

Building Thinking Classrooms Tasks

Open Middle Math Tasks

Resources from Dr. Eric Milou

## Career Readiness, Life Literacies & Key Skills

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| 9.1.5.CR.1 | Compare various ways to give back and relate them to your strengths, interests, and other personal factors. |
| 9.2.5.CAP.3 | Identify qualifications needed to pursue traditional and non-traditional careers and occupations. |
| 9.2.5.CAP.4 | Explain the reasons why some jobs and careers require specific training, skills, and certification (e.g., life guards, child care, medicine, education) and examples of these requirements. |
| 9.4.5.CT.1 | Identify and gather relevant data that will aid in the problem-solving process (e.g., 2.1.5.EH.4, 4-ESS3-1, 6.3.5.CivicsPD.2). |
| 9.4.5.CT.3 | Describe how digital tools and technology may be used to solve problems. |
| 9.4.5.CT.4 | Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3). |
| 9.4.5.IML.2 | Create a visual representation to organize information about a problem or issue (e.g., 4.MD.B.4, 8.1.5.DA.3). |
| 9.4.5.IML.3 | Represent the same data in multiple visual formats in order to tell a story about the data. |
| 9.4.5.TL.2 | Sort and filter data in a spreadsheet to analyze findings. |

## Computer Science & Design Thinking

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| 8.1.5.DA.1 | Collect, organize, and display data in order to highlight relationships or support a claim. |
| 8.1.5.DA.2 | Compare the amount of storage space required for different types of data. |

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| 8.1.5.DA.3 | Organize and present collected data visually to communicate insights gained from different views of the data. |
| 8.1.5.DA.4 | Organize and present climate change data visually to highlight relationships or support a claim. |
| 8.1.5.DA.5 | Propose cause and effect relationships, predict outcomes, or communicate ideas using data. |

## Interdisciplinary Connections

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| 4-PS3-4 | Apply scientific ideas to design, test, and refine a device that converts energy from one form to another. |
| RI.CR.4.1 | Refer to details and examples as textual evidence when explaining what an informational text says explicitly and make relevant connections when drawing inferences from the text. |
| W.WR.4.5 | Conduct short research projects that use multiple reference sources (print and non-print) and build knowledge through investigation of different aspects of a topic. |
| W.SE.4.6 | Gather relevant information from multiple print and digital sources; take notes, prioritize and categorize information; provide a list of sources. |
| 4-ESS3-1 | Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment. |
| 4-ESS3-2 | Generate and compare multiple solutions to reduce the impacts of natural Earth processes and climate change have on humans. |