# Unpacked South Dakota State Mathematics Standards

*Purpose:* In order for students to have the best chance of success, standards, assessment, curriculum resources, and instruction must be aligned in focus, coherence, and rigor. Unpacked standards documents are intended to help align instruction to the focus, coherence, and rigor of the South Dakota State Mathematics Standards. The standards have been organized in clusters as they are not so much built from topics, but rather woven out of progressions. Not all content in a given grade is emphasized equally in the mathematics standards. Some clusters require greater emphasis than others based on the depth of the ideas, the time that they take to master, and/or their importance to future mathematics or the demands of college and career readiness. To say that some things have greater emphasis is not to say that anything in the standards can safely be neglected in instruction. Neglecting standards will leave gaps in student skill and understanding and may leave students unprepared for the challenges of a later grade.

| Domain: Operations and Algebraic Thinking | Grade Level: 4 |
| --- | --- |

**4.OA.C Cluster: Gain familiarity with factors and multiples**

This cluster extends the understanding of multiplication and division to thinking about these operations in terms of composing and decomposing numbers into factors. Understanding of multiples and factors will be important for this cluster. Learners understand that prime numbers have exactly one factor pair and composite numbers have more than one factor pair.

**\*\*This is a SUPPORTING cluster.** *Students should spend the large majority of their time (65-85%) on the major work of the grade.* **Supporting** *work and, where appropriate, additional work should be connected to and engage students in the major work of the grade.*

**4.OA.4** – Using whole numbers in the range 1–100.
   a.   Find all factor pairs for a given whole number.
   b.   Recognize that a whole number is a multiple of each of its factors.
   c.   Determine whether a given whole number is a multiple of each of a given one-digit number.
   d.   Determine whether a given whole number is prime or composite.

**Aspects of Rigor:** (Conceptual, Procedural, and/or Application)

| *Conceptual Understanding* | *Procedural Fluency* | *Application* |
| --- | --- | --- |
| Understand any whole number is a multiple of each of its factors **(4.OA.4a)** | Identify all factor pairs in the range 1-100 **(4.OA.4a)** | |
| Understand factors and multiples **(4.OA.4b) (4.OA.4c)** | Identify a number as a factor or multiple **(4.OA.4b) (4.OA.4c)** | |
| Understand the difference between a prime and composite number **(4.OA.4d)** | Identify if numbers are prime or composite **(4.OA.4d)** | |

**Enacting the Mathematical Practices - Evidence of Students Engaging in the Practices**

1. **Make sense of problems and persevere in solving them.**
2. **Reason abstractly and quantitatively.**
   - Learners extend their work with multiplication and division facts to focusing on finding factors and multiples of numbers less than 100.
3. **Construct viable arguments and critique the reasoning of others.**
   - Learners construct arguments based on patterns they have found such as, "Why is 45 composite and 47 is prime".
4. **Model with mathematics.**

- Learners extend their knowledge of basic facts by constructing arrays for numbers beyond the basic facts.
5. **Use appropriate tools strategically.**
   - Learners can use graph paper, 100s chart, square tiles, counters, number lines, cubes, and other tools to model understanding.
6. **Attend to precision.**
   - Once learners understand factors and multiplies they build on this understanding by defining and identifying prime and composite numbers.
7. **Look for and make use of structure.**
   - Use patterns to make generalizations such as, "All even numbers other than two are composite because they will have more than two factors".
8. **Look for and express regularity in repeated reasoning.**
   - Using models and fact reasoning with the distributive property will help them find the factors that are not basic facts.

## Vertical and Horizontal Coherence and Learning Progressions

| *Previous Learning Connections* | *Current Learning Connections* | *Future Learning Connections* |
|---|---|---|
| Learners determine unknown whole numbers in multiplication and division equations.**(3.OA.4)** <br><br> Learners understand the relationship between multiplication and division. **(3.OA.6)** <br><br> Learners fluently multiply and divide within 100. **(3.OA.7)** <br><br> Learners identify and explain arithmetic patterns in multiplication and addition tables. **(3.OA.9)** | Learners will multiply a whole number of up to four digits by a one-digit whole number and multiply two two-digit numbers. **(4.NBT.5)** <br><br> Learners find whole-number quotients with up to four-digit divisors and one-digit dividends. **(4.NBT.6)** <br><br> Learners understand a fraction with a numerator greater than one is a multiple of a unit fraction ($\frac{5}{6} = 5 \times \frac{1}{6}$). **(4.NF.4a)** | Find the greatest common factor and least common multiple of two whole numbers.**(6.NS.4)** |

## Vocabulary *(Key Terms Used by Teachers and Students in this Cluster):*

- Composite
- Difference
- Division
- Equation
- Factor
- Multiple
- Multiplication
- Pattern
- Prime number
- Product
- Quotient
- Rule
- Sum
- Term (of a sequence)
- Unknown

## *Relevance, Explanations, and Examples:*

Fourth grade is the first time multiples, factors, prime, and composite terminology is used. The numbers 0 and 1 are neither prime nor composite. A prime number is a number greater than 1 that has only 2 factors, 1 and itself. Composite numbers have more than 2 factors.

The number 12 can be made into several different rectangular arrays (1 × 12, 3 × 4, 6 × 2) and is therefore a composite number.
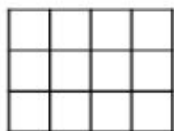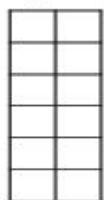
The number 7 can only be made into one rectangular array and is therefore a prime number.
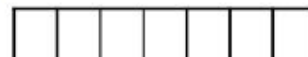
## Achievement Level Descriptors

### *Cluster:* **Gain familiarity with factors and multiples**

| *Concepts and Procedures* | |
|---|---|
| | **Level 1:** Students should be able to recognize that a whole number is a multiple of each of its factors. |
| | **Level 2:** Students should be able to find factor pairs for whole numbers in the range of 1–100 that are multiples of 2 or 5 and determine whether a given whole number in the range of 1–100 is a multiple of a given one-digit number. |
| | **Level 3:** Students should be able to find all factor pairs for whole numbers in the range of 1–100 and determine whether a given whole number in the range of 1–100 is prime or composite. |
| | **Level 4:** |