Key Skills: Multiplication and Division Practice

Meets the following National Standards:

NCTM National Council of Teachers of Mathematics Standards and Focal Points:

Principles and Standards for School Mathematics

GRADES 3 - 5

Number and Operations

- Understand numbers, ways of representing numbers, relationships among numbers, and number systems
  - understand the place-value structure of the base-ten number system and be able to represent and compare whole numbers and decimals;
- Understand meanings of operations and how they relate to one another
  - understand various meanings of multiplication and division;
  - understand the effects of multiplying and dividing whole numbers;
  - identify and use relationships between operations, such as division as the inverse of multiplication, to solve problems;
  - understand and use properties of operations, such as the distributivity of multiplication over addition;
- Compute fluently and make reasonable estimates
  - develop fluency with basic number combinations for multiplication and division and use these combinations to mentally compute related problems, such as 30x50;
  - develop fluency in multiplying and dividing whole numbers;
  - select appropriate methods and tools for computing with whole numbers from among mental computation, estimation, calculators, and paper and pencil according to the context and nature of the computation and use the selected method or tools;

GRADES 6 - 8

Number and Operations

- Understand numbers, ways of representing numbers, relationships among numbers, and number systems
  - work flexibly with fractions, decimals, and percents to solve problems;
- Understand meanings of operations and how they relate to one another
  - understand the meaning and effects of arithmetic operations with fractions, decimals, and integers;
- Compute fluently and make reasonable estimates
  - select appropriate methods and tools for computing with fractions and decimals from among mental computation, estimation, calculators or computers, and paper and pencil, depending on the situation, and apply the selected methods;

GRADES PRE-K - 12

Problem Solving

- Instructional programs from pre-kindergarten through grade 12 should enable all students to—
  - build new mathematical knowledge through problem solving;
  - solve problems that arise in mathematics and in other contexts;
  - apply and adapt a variety of appropriate strategies to solve problems;
  - monitor and reflect on the process of mathematical problem solving;

Connections

- Instructional programs from pre-kindergarten through grade 12 should enable all students to—
  - recognize and use connections among mathematical ideas;
  - understand how mathematical ideas interconnect and build on one another to produce a coherent whole;
  - recognize and apply mathematics in contexts outside of mathematics;

Key Skills: Multiplication and Division Meets the following National Standards:

NCTM National Council of Teachers of Mathematics Standards and Focal Points:

Curriculum Focal Points

GRADE 3
Number and Operations and Algebra: Developing understandings of multiplication and division and strategies for basic multiplication facts and related division facts.
Students understand the meanings of multiplication and division of whole numbers through the use of representations (e.g., equal-sized groups, arrays, area models, and equal "jumps" on number lines for multiplication, and successive subtraction, partitioning, and sharing for division). They use properties of addition and multiplication (e.g., commutativity, associativity, and the distributive property) to multiply whole numbers and apply increasingly sophisticated strategies based on these properties to solve multiplication and division problems involving basic facts. By comparing a variety of solution strategies, students relate multiplication and division as inverse operations.

GRADE 4
Number and Operations and Algebra: Developing quick recall of multiplication facts and related division facts and fluency with whole number multiplication.
Students use understandings of multiplication to develop quick recall of the basic multiplication facts and related division facts. They apply their understanding of models for multiplication (i.e., equal sized groups, arrays, area models, equal intervals on the number line), place value, and properties of operations (in particular, the distributive property) as they develop, discuss, and use efficient, accurate, and generalizable methods to multiply multidigit whole numbers. They select appropriate methods and apply them accurately to estimate products or calculate them mentally, depending on the context and numbers involved. They develop fluency with efficient procedures, including the standard algorithm, for multiplying whole numbers, understand why the procedures work (on the basis of place value and properties of operations), and use them to solve problems.

Number and Operations: Developing an understanding of decimals, including the connections between fractions and decimals.
Students understand decimal notation as an extension of the base-ten system of writing whole numbers that is useful for representing more numbers, including numbers between 0 and 1, between 1 and 2, and so on. Students relate their understanding of fractions to reading and writing decimals that are greater than or less than 1, identifying equivalent decimals, comparing and ordering decimals, and estimating decimal or fractional amounts in problem solving. They connect equivalent fractions and decimals by comparing models to symbols and locating equivalent symbols on the number line.

GRADE 5
Number and Operations and Algebra: Developing an understanding of and fluency with division of whole numbers.
Students apply their understanding of models for division, place value, properties, and the relationship of division to multiplication as they develop, discuss, and use efficient, accurate, and generalizable procedures to find quotients involving multidigit dividends. They select appropriate methods and apply them accurately to estimate quotients or calculate them mentally, depending on the context and numbers involved. They develop fluency with efficient procedures, including the standard algorithm, for dividing whole numbers, understand why the procedures work (on the basis of place value and properties of operations), and use them to solve problems. They consider the context in which a problem is situated to select the most useful form of the quotient for the solution, and they interpret it appropriately.

GRADE 6
Number and Operations: Developing an understanding of and fluency with multiplication and division of fractions and decimals.
Students use the meanings of fractions, multiplication and division, and the inverse relationship between multiplication and division to make sense of procedures for multiplying and dividing fractions and explain why they work. They use the relationship between decimals and fractions, as well as the relationship between finite decimals and whole numbers (i.e., a finite decimal multiplied by an appropriate power of 10 is a whole number), to understand and explain the procedures for multiplying and dividing decimals. Students use common procedures to multiply and divide fractions and decimals efficiently and accurately. They multiply and divide fractions and decimals to solve problems, including multistep problems and problems involving measurement.

Key Skills: Multiplication and Division Meets the following National Standards:

ISTE National Educational Technology Standards for Students (NETS)

TECHNOLOGY FOUNDATION STANDARDS FOR STUDENTS

1. Basic operations and concepts
   - Students demonstrate a sound understanding of the nature and operation of technology systems.
   - Students are proficient in the use of technology.
2. Social, ethical, and human issues
   - Students practice responsible use of technology systems, information, and software.
   - Students develop positive attitudes toward technology uses that support lifelong learning, collaboration, personal pursuits, and productivity.
3. Technology productivity tools
   - Students use technology tools to enhance learning, increase productivity, and promote creativity.

PERFORMANCE INDICATORS FOR TECHNOLOGY—LITERATE STUDENTS

Prior to completion of Grade 5, students will:

1. Use keyboards and other common input and output devices (including adaptive devices when necessary) efficiently and effectively. (1)
4. Use general purpose productivity tools and peripherals to support personal productivity, remediate skill deficits, and facilitate learning throughout the curriculum. (3)
8. Use technology resources (e.g., calculators, data collection probes, videos, educational software) for problem solving, self-directed learning, and extended learning activities. (5, 6)

Prior to completion of Grade 8, students will:

4. Use content-specific tools, software, and simulations (e.g., environmental probes, graphing calculators, exploratory environments, Web tools) to support learning and research. (3, 5)