

MA.3.NSO.2.2

Overarching Standard: MA.3.NSO.2 *Add and subtract multi-digit whole numbers. Build an understanding of multiplication and division operations*

Benchmark of Focus

MA.3.NSO.2.2: Explore multiplication of two whole numbers with products from 0 to 144, and related division facts.

Benchmark Clarifications

Clarification 1: Instruction includes equal groups, arrays, area models and equations.

Clarification 2: Within the benchmark, it is the expectation that one problem can be represented in multiple ways and understanding how the different representations are related to each other.

Clarification 3: Factors and divisors are limited to up to 12

Related Benchmark/Horizontal Alignment

- MA.3.NSO.2.3
- MA.3.NSO.2.4
- MA.3.AR.2.1
- MA.3.AR.2.2
- MA.3.GR.2.2
- MA.3.GR.2.4

Vertical Alignment

Previous Benchmarks

- MA.2.AR.3.2

Next Benchmarks

- MA.4.NSO.2.1

Terms from the K-12 Glossary

- Area model
- Commutative property of multiplication
- Dividend
- Divisor
- Equation
- Expression
- Factors
- Rectangular array

Purpose and Instructional Strategies

The purpose of this benchmark is for students to build conceptual understanding of what multiplication is and how it relates to division. Because the expectation of this benchmark is at the explore level, instruction should focus on building understanding of multiplication and

division facts from 0 to 144 using manipulatives (e.g., counters), visual models (e.g., rectangular arrays, equal groups), discussions, estimation and drawings (e.g., rectangular arrays, equal groups) (MTR.2.1).

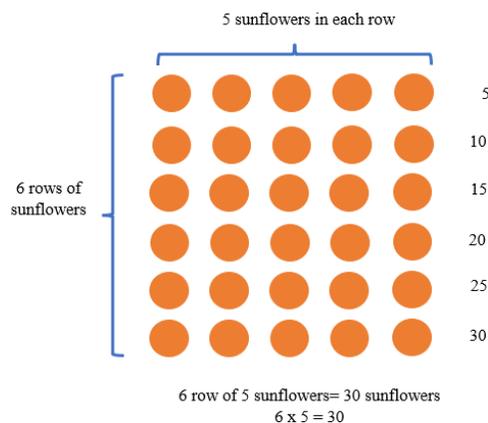
- Instruction should relate multiplication to repeated addition work that began in Grade 2. In Grade 2, students used repeated addition to find the total number of objects using rectangular arrays and equations (MA.2.AR.3.2).
 - Students should explore multiplication and division through word problems, writing expressions and drawing models that match the problems' contexts (MTR.2.1, MTR.3.1).
 - In division, students should see examples of sharing, or partitive division (where the number of groups are given and students determine the number in each group), as well as measurement, or quotative division (where the number in each group is given and students determine the number of groups).
 - Instruction should relate division facts to known multiplication facts (e.g., fact families). Fact families can be explored through arrays and equal groups (MTR.5.1).
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Common Misconceptions or Errors

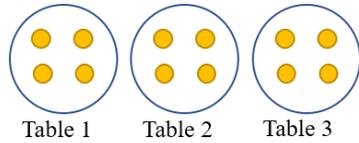
- Students may have difficulty relating word problems and real-world scenarios to models, expressions, and equations. For example, students may not differentiate the number of groups versus number in each group in multiplication, which then impacts their models, expressions, and equations.
 - Students may be confused by measurement (or quotative) division, when the amount in each group is given and the number of equal-sized groups is found.
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Strategies to Support Tiered Instruction

- Instruction includes demonstrating the use of counters, arrays and skip counting to model groups of objects, including the use of real-world scenarios to support students' understanding of the number of groups versus the size of each group. Students represent their models with equations to reinforce the concept of multiplication.
 - For example, a farmer is planting rows of sunflowers. He plants 6 rows with 5 sunflowers in each row. How many sunflowers does he plant?



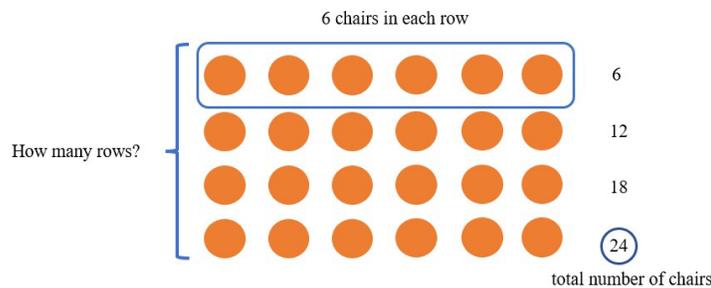
- For example, there are 3 tables in the library. There are 4 students sitting at each table. How many students are sitting at tables in the library?



3 groups of 4 students = 12 students

$$3 \times 4 = 12$$

- Instruction includes demonstrating the use of counters and arrays to model division problems where the amount in each group is given and the number of equal-sized groups is found. The teacher provides real-world scenarios to represent the number of objects in each group and the number of groups. Students form a group based on the context of the problem continuing to form groups of that size until the total is reached. Students can skip count to keep track of how many counters they have used, representing their models with equations to reinforce the concept of division.
 - For example, Renee is setting up chairs in the library. She is placing 24 chairs into rows. If she places 6 chairs in each row, how many rows of chairs will she have?

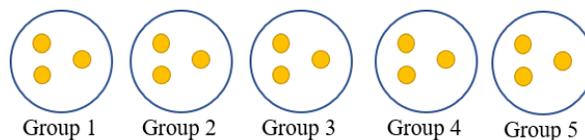


24 chairs divided into rows of 6

$$24 \div 6 = 4$$

There are 4 rows of chairs.

- For example, there are 15 students working on an art project. The art teacher divides them into groups of 3 students to work on the project. How many groups are there?



15 students divided into groups of 3

$$15 \div 3 = 5$$

There are 5 groups of students.

Questions to ask students:

How is multiplication and division related?

- Students should be able to explain that multiplication and division are the inverse or opposite operations of one another. You can use multiplication facts to solve division problems. Together they make a fact family like addition and subtraction facts do.

How can your multiplication facts help you when you divide?

- Students should be able to explicitly model or show that when two factors are multiplied, they equal the given quotient of a division fact. They can relate a pictorial model of an array or equal groups to show division and multiplication. If the problem is 15 divided by 3 a student will make 3 groups and add one mark in each until they get to 15. When their model is done it will resemble an equal group model for multiplication. They can use that labeling to help foster that connection.

What do the factors represent in the models you make when multiplying?

- Students should be able to identify that the first factor in a multiplication expression is the number of groups or rows (for equal groups or an array) the second factor tell you about the number in each group or in each row.

What multiplication fact can be used to help you solve 144 divided by 12?

- Students should be able to solve using equal groups or an array model and with labeling identify the multiplication fact of $12 \times 12 = 144$

Sarah has a book shelf with 8 shelves. She puts 4 dolls on each shelf. How many dolls does Sarah have on each shelf? Use a model to prove your thinking.

- Sample answer that demonstrates understanding: The students correctly creates an array, equal groups or area model to model their thinking and solves to find that Sarah has 32 dolls.

Instructional Tasks

Instructional Task 1

Tina has 4 shelves on her bookshelf. Each row has 6 books. How many books are on Tina's bookshelf in all? Draw a model and write an equation to represent your answer.

Instructional Items

Instructional Item 1

A total of 56 chairs are in the cafeteria for an assembly. The principal arranges the chairs into 8 rows with the same number of chairs in each. Which equation shows the quotient as the number of chairs that will be in each row?

- $56 \div 8 = 7$
- $56 \div 8 = 48$
- $56 \div 8 = 64$
- $56 \div 8 = 6$

Achievement Level Descriptors

Benchmark	Context	Assessment Limits
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<p>MA.3.NSO.2.4 Multiply two whole numbers from 0 to 12 and divide using related facts with procedural reliability. Example: The product of 5 and 6 is 30. Example: The quotient of 27 and 9 is 3. Clarification 1: Instruction focuses on helping a student choose a method they can use reliably.</p> <p>Also Assesses</p> <p>MA.3.NSO.2.2 Explore multiplication of two whole numbers with products from 0 to 144, and related division facts. Clarification 1: Instruction includes equal groups, arrays, area models and equations. Clarification 2: Within the benchmark, it is the expectation that one problem can be represented in multiple ways and understanding how the different representations are related to each other. Clarification 3: Factors and divisors are limited to up to 12.</p>		Mathematical	Items assessing MA.3.NSO.2.2 must include a model.
ALD 2	ALD 3	ALD 4	ALD 5
explores multiplication of two single-digit whole numbers (using factors of 1, 2, or 5) and related division facts. multiplies and divides factors of 1, 2, or 5.	explores multiplication of two whole numbers with products from 0 to 100 and related division facts. multiplies and divides numbers with factors up to and including 10.	explores multiplication of two whole numbers with products from 0 to 144 and related division facts. multiplies two whole numbers from 0 to 12 and divides using related facts with procedural reliability.	multiplies two whole numbers from 0 to 12 and divides using related facts with procedural reliability; and identifies and corrects an error in an equation.

Additional Resources:

[CPALMS Resource](#)

[Who Wants To Be a Math Millionaire](#)

Resources/Tasks to Support Your Child at Home:

[Communitive Property with Multiplication](#)

[Division Intro](#)

[Multiplication Intro](#)

[Relating Multiplication Facts to Division](#)