



Instructional Routines for Mathematics Intervention

The purpose of these mathematics instructional routines is to provide educators with materials to use when providing intervention to students who experience difficulty with mathematics. The routines address content included in the grades 2-8 Texas Essential Knowledge and Skills (TEKS). There are 23 modules that include routines and examples – each focused on different mathematical content. Each of the 23 modules include vocabulary cards and problem sets to use during instruction. These materials are intended to be implemented explicitly with the aim of improving mathematics outcomes for students.

Instructional Routines for Mathematics Intervention

MODULE 10

Concepts of Multiplication



Module 10: Concepts of Multiplication

Mathematics Routines

A. Important Vocabulary with Definitions

Term	Definition
area	The number of square units that covers a closed figure.
array	A set of objects, pictures, or numbers arranged in columns and rows.
equal groups	Groups with the same number of objects or items in each group.
equal sign	The symbol that tells you that two sides of an equation are the same, balanced, or equal.
factor	A number that you multiply with another number to get the product.
multiply/multiplication	The process of adding a number to itself a number of times.
multiplication sign	The symbol that tells you to multiply.
partial products	The product of parts of each factor.
product	The result of multiplying two or more factors.

B. Background Information

Students need to learn two concepts of multiplication: (1) multiplication as equal groups and (2) multiplication as comparison. Typically, students first learn about multiplying as equal groups. Then, students learn about multiplying as comparison.

Multiplication Fact

$$\begin{array}{r} 6 \\ \times 3 \\ \hline 18 \end{array}$$

← factor
← factor
← product

factors product

↙ ↘ ↘

$$2 \times 4 = 8$$

For learning the concepts of multiplication, we recommend using *mathematics facts*. We define a multiplication mathematics fact as single-digit factors multiplied for a single- or double-digit product. You may present multiplication facts vertically or horizontally.

Teacher To multiply, let's count the original set __ times. Watch me: __, __, __, ...
(Count sets by multiplying.)

Teacher The product is the last number we said. We counted to __. What's the product?
Students __.

Teacher How many altogether?
Students __.

Teacher Yes! There are __. So, __ times __ equals __. Let's say that together.
Students __ times __ equals __.

Teacher Let's say it together again.
Students __ times __ equals __.

Teacher So, if you have a set of __ and multiply that set __ times, the product is __. __ times __ equals __. Let's review. What's a factor?
Students One of the numbers multiplied in a multiplication problem.

Teacher What's a product?
Students The total when you multiply groups with an equal number in each group.

Teacher What does it mean to multiply by comparison?
Students To have a set and multiply the set a number of times.

Teacher How could you explain multiplying to a friend?
Students We started a set and counted the set a number of times on the number line. The product was the total.

Example

$$\begin{array}{r} 4 \\ \times 3 \\ \hline 12 \end{array}$$

Teacher Let's work on multiplication. Today, let's think about multiplication by comparison. What does it mean to compare?
Students To have a set and compare that set a number of times.

Teacher When we compare, we start with a set and multiply that set a number of times. Look at this problem.
(Show problem.)

Teacher First, I see a multiplication sign (point). The multiplication sign tells us to multiply. What does the multiplication sign mean?
Students To multiply.

Teacher Today we'll multiply by comparison, but there are other ways to multiply – like with equal groups. Let's start by getting out our number line. Let's do this together.
(Move number line to workspace.)

Teacher Our first factor is 4. What's our first factor?

Students 4.
Teacher **Our second factor is 3. What's our second factor?**
Students 3.
Teacher **That means we're going to multiply the set of four 3 times. What does our problem mean?**
Students Multiply the set of 4 3 times.
Teacher **Ready? Let's use the number line to count the set of four 3 times. I show one set of 4 (place finger on 4), a second set of 4 (place finger on 8), and a third set of 4 (place finger on 12). What's the last number we said?**
Students 12.
Teacher **The product is the last number we said. We counted 12. What's the product?**
Students 12.
Teacher **So, 4 times 3 equals 12. Let's say that together.**
Students 4 times 3 equals 12.
Teacher **Let's say it together again.**
Students 4 times 3 equals 12.
Teacher **So, if you have a set of 4 and multiply that set 3 times, the product is 12. 4 times 3 equals 12. Let's review. What's a factor?**
Students One of the numbers multiplied in a multiplication problem.
Teacher **What's a product?**
Students The total when you multiply groups with an equal number in each group.
Teacher **What does it mean to multiply by comparison?**
Students To have a set and multiply the set a number of times.
Teacher **How could you explain multiplying to a friend?**
Students We started 4 and multiplied four 3 times. 4 times 3 equals 12.

D. Problems for Use During Instruction

[See Module 10 Problem Sets.](#)

E. Vocabulary Cards for Use During Instruction

[See Module 10 Vocabulary Cards.](#)

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Module 10:

Concepts of Multiplication

Problem Sets

- A. Single-digit multiplication facts (60)

$$\begin{array}{r} \times \quad 10 \\ \hline \end{array}$$

$$\begin{array}{r} 5 \\ \times 4 \\ \hline \end{array}$$

$$\begin{array}{r} 7 \\ \times 5 \\ \hline \end{array}$$

$$\begin{array}{r} \times \quad 2 \\ 1 \\ \hline \end{array}$$

$$\begin{array}{r} 7 \\ \times 6 \\ \hline \end{array}$$

$$\begin{array}{r} 4 \\ \times 2 \\ \hline \end{array}$$

$$\begin{array}{r} \times \quad 9 \\ 8 \\ \hline \end{array}$$

$$\begin{array}{r} \times \quad 3 \\ \hline 3 \end{array}$$

$$\begin{array}{r} 7 \\ \times 9 \\ \hline \end{array}$$

$$\begin{array}{r} \\ 4 \\ \times 5 \\ \hline \end{array}$$

$$\begin{array}{r} \times \quad 9 \\ \hline \end{array}$$

$$\begin{array}{r} \times \quad 2 \\ 6 \\ \hline \end{array}$$

$$\begin{array}{r} 7 \\ \times 8 \\ \hline \end{array}$$

$$\begin{array}{r} \times \quad 4 \\ \hline 4 \end{array}$$

$$\begin{array}{r} \times \quad 5 \\ 8 \\ \hline \end{array}$$

$$\begin{array}{r} \times \quad 4 \\ 7 \\ \hline \end{array}$$

$$\begin{array}{r} 3 \\ \times 4 \\ \hline \end{array}$$

$$\begin{array}{r} \times \quad 3 \\ 2 \\ \hline \end{array}$$

$$\begin{array}{r} 4 \\ \times 3 \\ \hline \end{array}$$

$$\begin{array}{r} \times \quad 9 \\ \hline \quad 6 \end{array}$$

$$\begin{array}{r} \times \quad 8 \\ 5 \\ \hline \end{array}$$

$$\begin{array}{r} \times \quad 3 \\ \hline 0 \end{array}$$

$$\begin{array}{r} \times \quad 6 \\ 4 \\ \hline \end{array}$$

$$\begin{array}{r} \times 8 \\ 7 \\ \hline \end{array}$$

$$\begin{array}{r} \times \quad 5 \\ 3 \\ \hline \end{array}$$

$$\begin{array}{r} \times \quad 7 \\ \hline 7 \end{array}$$

$$\begin{array}{r} \times \quad 0 \\ 5 \\ \hline \end{array}$$

$$\begin{array}{r} \times \quad 2 \\ 0 \\ \hline \end{array}$$

$$\begin{array}{r} 7 \\ \times 4 \\ \hline \end{array}$$

$$\begin{array}{r} \times \quad 3 \\ 1 \\ \hline \end{array}$$

$$\begin{array}{r} \times \quad 9 \\ 7 \\ \hline \end{array}$$

$$\begin{array}{r} 4 \\ \times 1 \\ \hline \end{array}$$

$$\begin{array}{r} \times \quad 5 \\ 2 \\ \hline \end{array}$$

$$\begin{array}{r} \times \quad 6 \\ \hline 6 \end{array}$$

$$\begin{array}{r} 0 \\ \times 1 \\ \hline \end{array}$$

$$\begin{array}{r} \times \quad 6 \\ 5 \\ \hline \end{array}$$

$$\begin{array}{r} \times \quad 8 \\ 6 \\ \hline \end{array}$$

$$\begin{array}{r} \times \quad 0 \\ 7 \\ \hline \end{array}$$

$$\begin{array}{r} \times \quad 14 \\ \hline \end{array}$$

$$\begin{array}{r} \times \quad 2 \\ 3 \\ \hline \end{array}$$

$$\begin{array}{r} \times \quad 8 \\ 8 \\ \hline \end{array}$$

$$\begin{array}{r} \times 5 \\ 5 \\ \hline \end{array}$$

$$\begin{array}{r} 4 \\ \times 8 \\ \hline \end{array}$$

$$\begin{array}{r} \times \quad 5 \\ 9 \\ \hline \end{array}$$

$$\begin{array}{r} 3 \\ \times 6 \\ \hline \end{array}$$

$$\begin{array}{r} \times \quad 1 \\ 2 \\ \hline \end{array}$$

$$\begin{array}{r} 0 \\ \times 9 \\ \hline \end{array}$$

$$\begin{array}{r} \times \quad 6 \\ 3 \\ \hline \end{array}$$

$$\begin{array}{r} \times \quad 8 \\ 4 \\ \hline \end{array}$$

$$\begin{array}{r} \times \quad 3 \\ 5 \\ \hline \end{array}$$

$$\begin{array}{r} \times \quad 6 \\ 7 \\ \hline \end{array}$$

$$\begin{array}{r} \times \quad 2 \\ \hline 2 \end{array}$$

$$\begin{array}{r} \times \quad 8 \\ 9 \\ \hline \end{array}$$

$$\begin{array}{r} \times \\ 15 \\ \hline \end{array}$$

$$\begin{array}{r} \times \quad 2 \\ 4 \\ \hline \end{array}$$

$$\begin{array}{r} 0 \\ \times 0 \\ \hline \end{array}$$

$$\begin{array}{r} \times \quad 6 \\ 9 \\ \hline \end{array}$$

$$\begin{array}{r} \times \quad 6 \\ 8 \\ \hline \end{array}$$

$$\begin{array}{r} \times \quad 1 \\ \hline 1 \end{array}$$

$$\begin{array}{r} \times \quad 5 \\ 6 \\ \hline \end{array}$$

Module 10: **Concepts of Multiplication**

Vocabulary Cards

area

array

equal groups

equal sign

factor

multiply/multiplication

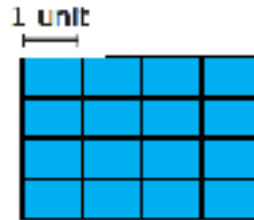
multiplication sign

partial products

product

area

The number of square units that covers a closed figure.



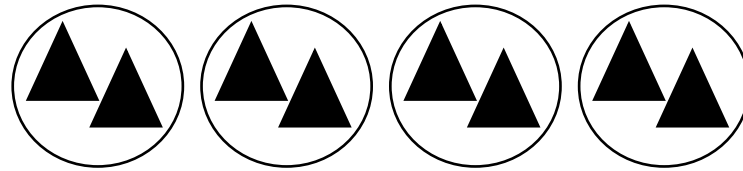
array

A set of objects, pictures, or numbers arranged in columns and rows.



equal groups

Groups with the same number of objects or items in each group.



equal sign

The symbol that tells you that two sides of an equation are the same, balanced, or equal.

$$2 \times 8 = 16$$

= is the equal sign

factor

A number you multiply with another number to get the product.

$$2 \times 8 = 16$$

2 and **8** are the **factors**

multiply/multiplication

The process of adding a number to itself a number of times.

$$4 \times 2 = 8$$



multiplication sign

The symbol that tells you to multiply.

$$2 \times 8 = 16$$

\times is the **multiplication sign**

partial products

The product of parts of each factor.

$$\begin{array}{r} 13 \\ \times 45 \\ \hline 400 \text{ (} 40 \times 10 \text{)} \\ 120 \text{ (} 40 \times 3 \text{)} \\ 50 \text{ (} 10 \times 5 \text{)} \\ + 15 \text{ (} 5 \times 3 \text{)} \\ \hline 585 \end{array}$$

product

The result of multiplying two or more factors.

$$2 \times 8 = 16$$

16 is the **product**
