MATH UNIT

# Multiplication as equal groups

Grade 3 | 8 lessons | 8 × 30 minutes | 4 source books | 240 minutes in all

THE QUESTION THIS UNIT FOLLOWS

**What are the two numbers doing?**

## ABOUT THIS UNIT

Grade 3 can learn the facts long before it can say what a product is. This unit puts the meaning first and keeps it there: every equation is written beside an arrangement the children built, and children are asked, every time, which number counts the groups and which counts what is in one of them.

The unit turns one quantity into three pictures, so twenty-seven is nine groups of three and three groups of nine without a counter moving. It uses two independent routes to the same product as a way of catching errors. And it closes on the rule that has to be argued rather than counted, because zero groups leaves nothing to count.

## THE MATHEMATICAL ARC

Each lesson does one job the lesson before it made possible.

1. Equal groups: the word each is what makes them equal
2. One quantity, three pictures: groups, rows, and a quarter turn
3. Times or plus: one word decides
4. Four times as much, with the multiplier coming out of a measurement
5. The times column is one repeated move

| | |
|---|---|
| 6 | Two independent routes to one product |
| 7 | Side times side, fast, with the array to fall back on |
| 8 | Times a zero: test the rule, predict, and defend it |

## SOURCE BOOKS

Every lesson in this unit is already published under Math lessons. Nothing here asks you to teach anything you cannot open today.


**2 X 2 = Boo!**
2 lessons in this unit


**Multiplying Menace: The Revenge of Rumpelstiltskin**
3 lessons in this unit

**Multiply By Hand**
2 lessons in this unit


**What's Your Angle, Pythagoras? A Math Adventure**
1 lesson in this unit

## HOW TO USE THIS GUIDE

### Open the source lesson before you teach.

Each day names one lesson that already exists under Math lessons, with its book, its number and its title. This guide says what that lesson is doing in the sequence and what to collect from it; the lesson itself carries the steps, the printables and the answers.

### Thirty minutes a day.

Five minutes to connect to yesterday, the twenty-minute source lesson, five minutes to close on something you can see. A day that runs long should lose the close, never the core.

### Teach a lesson on its own if you need to.

Every day carries a one-sentence opening for a teacher who is using that lesson outside the sequence.

### Stop after a checkpoint.

The unit holds together if you stop after either checkpoint and come back to it. Stopping between a checkpoint and the next one leaves a lesson without the evidence it was built on.

---

**WHERE THIS FITS IN YOUR YEAR**

### When to teach it

Early in the multiplication year, before any facts are drilled. It runs for a fortnight and it makes the fact work afterwards worth doing.

### What students need first

Children can skip count by twos, fives and tens, and can count equal groups and say both numbers.

### What this unit develops

Multiplication as equal groups; the array and commutativity; distinguishing multiplication from addition in a sentence; a multiplier drawn from a situation; the times column as a repeated move; checking a product by a second route; square products; multiplying by zero.

### What it prepares them for

Division as sharing, the distributive strategies of Grade 4, and any later work where a word rather than a symbol names the operation.

---

**CURRICULUM CONNECTIONS**

> **None claimed.** The lessons in this unit carry their own standards classifications on their own pages, checked lesson by lesson. A unit-level expectation is a different claim, and none has been verified for this unit, so none is printed here. Use the placement guide above to site the unit in your year, and the individual lesson pages for the codes.

## UNIT AT A GLANCE

| # | MATHEMATICAL MOVE | SOURCE LESSON | COLLECT |
|---|---|---|---|
| **1** | Equal groups: the word each is what makes them equal, and the two numbers do different jobs | 2 X 2 = Boo!<br>lesson 1, Three Scarecrows, Same Parts Each | Two builds with their equations, each number ringed and matched to what it counts. |
| **2** | One quantity, three pictures: groups, rows, and the same array turned a quarter turn | Multiplying Menace: The Revenge of Rumpelstiltskin<br>lesson 2, Twenty-Seven Pebbles: Groups, Rows, and an Equation | One array drawn on grid paper with a group of three ringed, and both equations written underneath. |
| **3** | Times or plus: one word decides what the river gets<br>*Checkpoint after this lesson* | Multiplying Menace: The Revenge of Rumpelstiltskin<br>lesson 6, Times or Plus: One Word Decides What the River Gets | A two-part mat holding both results at once, with each count said aloud. |
| **4** | Four times as much, with the multiplier coming out of a measurement | 2 X 2 = Boo!<br>lesson 5, Four Feet of Wings, Four Times the Cookies | The four-times column written out with the last two entries checked on the mats. |
| **5** | The times column is one repeated move, so a covered total can be recovered | Multiply By Hand<br>lesson 3, Nine more each time | A strip carrying ten bars of nine with the running total written at the end of each. |
| **6** | Two independent routes to one product, so an error in either can be caught<br>*Checkpoint after this lesson* | Multiply By Hand<br>lesson 2, Two routes to forty-five | A folded strip carrying the prediction, the procedure's answer and the adding answer side by side. |
| **7** | Side times side: the square products, fast, with the array to fall back on | What's Your Angle, Pythagoras? A Math Adventure<br>lesson 3, Side Times Side | Two standing squares of tiles and a pile of missed cards. |

| # | MATHEMATICAL MOVE | SOURCE LESSON | COLLECT |
|---|---|---|---|
| 8 | Times a zero: test the rule on three counts, predict one nobody built, and defend it | Multiplying Menace: The Revenge of Rumpelstiltskin lesson 4, Times a Zero: Arguing the Rule from the Mats | Three mats and three written equations, with what all three answers have in common said aloud. |

### UNIT VOCABULARY

Words students say, not words they are taught to define.

**each** The word that makes the groups equal, and the one children hunt for in a sentence.

**groups, in each** The two jobs the two numbers do.

**array** Equal groups pushed into rows, readable two ways.

**product** The total the arrangement holds.

### MATERIALS

## From the source lessons

Each day's materials are listed on that day's page below and on the source lesson itself. Nothing is duplicated here.

## New for this unit

- Checkpoint 1 page, one per child
- Checkpoint 2 page, one per child
- Performance task set: sixty counters, grid paper, five group mats and a card naming a group count and a group size, per pair
- Performance task page, one per child

ASSESSMENT PLAN

## Daily evidence

Keep the equation written beside the build from lesson 1, the two equations for one array from lesson 2, and the strip of running totals from lesson 5.

### Checkpoint 1, after lesson 3: Which number counts what?

Twenty-four counters arranged as four groups of six. The child writes the equation, rings the number that counts the groups, and rings the number that counts what is in one.

**Book-free.** Plain counters, no book.

**Look for.** 4 × 6 = 24 with both numbers correctly identified. A child who writes the equation and cannot point at the four groups has the notation without the meaning.

### Checkpoint 2, after lesson 6: Two routes

Six groups of seven. The child finds the product by counting the groups by sevens, then finds it a second way by adding, and says whether the two agree.

**Book-free.** Plain counters.

**Look for.** Forty-two both times, with the second route genuinely independent rather than a re-reading of the first.

## Culminating task: One arrangement, three pictures and two routes

Each pair is given a group count and a group size. They build the equal groups, count by the group size and write the equation, then slide the groups into rows to make an array and write the second equation for the same counters. They draw the array on grid paper with one group ringed. They then find the same product a second, independent way and say whether the two agree. Finally they write what the product would be if the number of groups were zero, and say how they know without building it.

**Collect.** The drawn and labelled array with both equations, the second route written out, and the zero prediction with its reason.

**What it assesses.** Equal groups, the array read two ways, an independent check, and the zero rule — the whole of what the unit built, with products inside one hundred.

## DAILY LESSON PAGES

### Lesson 1 Equal groups: the word each is what makes them equal, and the two numbers do different jobs

SKILL LESSON **2 X 2 = Boo! (/math-library/565.html)** · lesson 1, Three Scarecrows, Same Parts Each · Grade 3 · 20 minutes

Multiplication as equal groups

| | |
|---|---|
| I CAN | I can build equal groups and write what they say. |
| BIG IDEA | The word each is what makes the groups equal, and the two numbers in the equation do different jobs. |
| SUCCESS | The child rings each number in the equation and touches the thing it counts. |
| CONNECT \| 5 MIN | First lesson. Put three mats out with two counters on each and write 2 × 3 = 6 beside them. Ask which number is the mats. Take the answers and leave it open. |
| TAUGHT ON ITS OWN | Chapter three hands over the cleanest equal-groups picture in the book: three scarecrows, and every one of them gets the same parts. |
| SOURCE CORE \| 20 MIN | Pairs set out three mats, put two counters on every one so no mat has more than another, count by twos across the mats one touch per mat, and write the equation beside the build. |
| COLLECT | Two builds with their equations, each number ringed and matched to what it counts. |
| CLOSE \| 5 MIN | Pairs clear their mats and build the mouths, three teeth on each of the three mats, count by threes and write the second equation under the first, then say what stayed the same and what changed. |

**From the source lesson:** Round counters, 80 per pair; Paper group mats, five per pair; Small whiteboard and marker, one per student; Word cards: each, equal, groups, times

**Watch for:** Uneven mats. The word each is the whole lesson; check every mat before any counting starts.

## Lesson 2 One quantity, three pictures: groups, rows, and the same array turned a quarter turn

SKILL LESSON **Multiplying Menace: The Revenge of Rumpelstiltskin** (/math-library/94.html) · lesson 2, Twenty-Seven Pebbles: Groups, Rows, and an Equation · Grade 3 · 20 minutes

Equal groups shown as an array

| | |
|---|---|
| I CAN | I can show one quantity three ways. |
| BIG IDEA | Twenty-seven counters are nine groups of three and three groups of nine at the same time, and nothing has to move between the two sentences. |
| SUCCESS | The child says both sentences about the same counters without touching them. |
| CONNECT \| 5 MIN | Yesterday two numbers did two jobs. Today the same counters swap which number does which, and the total does not move. |
| TAUGHT ON ITS OWN | Peter does not guess the number he needs; he puts twenty-seven pebbles down in groups of three and the groups tell him nine. |
| SOURCE CORE \| 20 MIN | Pairs count twenty-seven counters and push them into groups of three, line the groups up as nine rows of three and count by threes, then turn the whole arrangement a quarter turn and count by nines. |
| COLLECT | One array drawn on grid paper with a group of three ringed, and both equations written underneath. |
| CLOSE \| 5 MIN | Pairs hand the drawing to a partner and have them point to the group that was ringed, then say both sentences about the same counters without moving anything. |

**From the source lesson:** Round counters, 30 per pair; Grid paper, one sheet per student; Pencil, one per student; Word cards: array, groups, row

**Watch for:** A child rebuilds the counters for the second sentence. Hold the array still; that is what makes the two sentences one fact.

## Lesson 3 Times or plus: one word decides what the river gets

MATH THROUGH THE READING **Multiplying Menace: The Revenge of Rumpelstiltskin (/math-library/94.html)** · lesson 6, Times or Plus: One Word Decides What the River Gets · Grade 3 · 20 minutes

Students build both results of a single word change, stepping stones times nine and stepping stones plus nine, and use the boy's own count to say which sentence puts the river back.

| | |
|---|---|
| **I CAN** | I can hear which operation the sentence wants. |
| **BIG IDEA** | The stick obeys words, and one of them turns three and nine into twenty-seven while the other turns them into twelve. |
| **SUCCESS** | Both builds stand on the mat and the child names the count that settles which sentence the book meant. |
| **CONNECT \| 5 MIN** | You can read an array two ways. Today one word in a sentence decides whether you are multiplying at all. |
| **TAUGHT ON ITS OWN** | The book says outright on its last page that the signal words are times and of, and in the river scene the whole repair rests on one of them. |
| **SOURCE CORE \| 20 MIN** | Pairs set three counters for the stones still in the water, build the book's sentence across the top of the mat as three groups of nine counted to twenty-seven, and the swapped sentence underneath as three counters and nine more counted to twelve. |
| **COLLECT** | A two-part mat holding both results at once, with each count said aloud. |
| **CLOSE \| 5 MIN** | Pairs say which sentence puts the river back, using the boy's own number, and then swap a word in the chicken sentence and write one line telling Peter which version he can actually fix. |

**From the source lesson:** Round counters, 40 per pair; Two-part mats, one per pair; Repair card with the chicken sentence, one per pair; Lined strip and pencil, one per student; The boy's two lines, printed large; The spell sentence with the swapped word beside it

**Watch for:** A child who reaches twenty-seven and stops. Both builds must be on the mat before

either is judged.

**Checkpoint after this lesson: Which number counts what?. The page is at the end of this guide.**

## Lesson 4 Four times as much, with the multiplier coming out of a measurement

SKILL LESSON **2 X 2 = Boo! (/math-library/565.html)** · lesson 5, Four Feet of Wings, Four Times the Cookies · Grade 3 · 20 minutes

Multiplying by four as four times as much

| | |
|---|---|
| **I CAN** | I can find the multiplier in a situation. |
| **BIG IDEA** | A multiplier does not always arrive as a number in an equation; here it comes out of two measured wingspans. |
| **SUCCESS** | The child says how many of the small wingspan fit along the big one before any cookie is counted. |
| **CONNECT \| 5 MIN** | Yesterday a word set the operation. Today the number itself has to be found, and it is lying in two measurements. |
| **TAUGHT ON ITS OWN** | Chapter four is the only place the book attaches its multiplier to a measurement: one foot of wings against four. |
| **SOURCE CORE \| 20 MIN** | Pairs lay one cube for the small bird's wings and a strip of four beside it, say how many of the small span fit along the big one, then build the matching cookie piles for one, two and three cookies and say what the big bird's pile does each time. |
| **COLLECT** | The four-times column written out with the last two entries checked on the mats. |
| **CLOSE \| 5 MIN** | Pairs read the book's own statement about multiplying by four and say whether their piles agreed with it every time, pointing at the two piles that show it best. |

**From the source lesson:** Round counters, 80 per pair; Connecting cubes, 40 per pair; Paper group mats, five per pair; Small whiteboard and marker, one per student; Word cards: each, equal, rule, times, wide

**Watch for:** A child adds four to the small pile instead of building four of it. Lay the strips against each other again before the cookies are built.

## Lesson 5 The times column is one repeated move, so a covered total can be recovered

SKILL LESSON **Multiply By Hand** (/math-library/437.html) · lesson 3, Nine more each time · Grade 3 · 20 minutes

Building the nine-times count as a running total

| | |
|---|---|
| I CAN | I can build the times column as one repeated move. |
| BIG IDEA | A times column is not ten separate facts; it is one move made again and again, so a covered total can be recovered from its neighbours. |
| SUCCESS | The child works out the covered total from the two beside it and says which two they used. |
| CONNECT \| 5 MIN | You have found a multiplier. Today one multiplier is used ten times running and the column that comes out has a shape. |
| TAUGHT ON ITS OWN | The book prints its nine-times count twice as a bare column and once as a running list, and states in words what the list is doing. |
| SOURCE CORE \| 20 MIN | Pairs snap bars of nine and lay them end to end down a strip, writing the running total at the end of each bar as it lands, and say each total aloud as it is written. |
| COLLECT | A strip carrying ten bars of nine with the running total written at the end of each. |
| CLOSE \| 5 MIN | Pairs cover one total in the middle with a card, work out what is under it using only the totals on either side, say which two they used and what they did with them, then lift the card. |

**From the source lesson:** Printed nine-times column card; Connecting cubes, ninety per pair; Long paper strip, one per pair; Small covering cards, one per pair; Word cards: total, again and again

**Watch for:** A child recalls the fact rather than using the neighbours. Cover a total they do not know and ask again.

## Lesson 6 Two independent routes to one product, so an error in either can be caught

**SKILL LESSON** **Multiply By Hand (/math-library/437.html)** · lesson 2, Two routes to forty-five · Grade 3 · 20 minutes

Checking a product by adding equal groups

| | |
|---|---|
| **I CAN** | I can check a product a second way. |
| **BIG IDEA** | A student who can reach one product by two independent routes has a way to catch an error in either. |
| **SUCCESS** | Both routes are written on the strip and the child can say why they agree. |
| **CONNECT \| 5 MIN** | Yesterday the column let you recover a total. Today one product is reached twice by two different methods. |
| **TAUGHT ON ITS OWN** | The book poses one unfinished problem and then instructs the reader to answer it twice, first by the finger procedure and then by adding five nines. |
| **SOURCE CORE \| 20 MIN** | Pairs write a prediction, get the answer by curling down the fifth finger and reading the two counts, then build five equal piles of nine counters and add them with a running total said aloud. |
| **COLLECT** | A folded strip carrying the prediction, the procedure's answer and the adding answer side by side. |
| **CLOSE \| 5 MIN** | Pairs put the two answers side by side, say whether they match, and say in one sentence why the two routes give the same number, pointing at the five piles. |

**From the source lesson:** Folded prediction strip; Pencil and recording strip; Both hands; Counters, forty-five per pair; Five paper plates or pile mats; Word cards: sets of, multiply, check

**Watch for:** A child reads the second answer off the first. Build the five piles physically; the point is that the routes are independent.

**Checkpoint after this lesson: Two routes. The page is at the end of this guide.**

## Lesson 7 Side times side: the square products, fast, with the array to fall back on

SKILL LESSON **What's Your Angle, Pythagoras? A Math Adventure (/math-library/97.html)** · lesson 3, Side Times Side · Grade 3 · 20 minutes
Multiplying a one-digit number by itself

| | |
|---|---|
| **I CAN** | I can say the square products quickly. |
| **BIG IDEA** | Fluency here means the product arrives whole, with the array behind it for anything that does not. |
| **SUCCESS** | Cards that were missed are rebuilt as squares of tiles and then answered again. |
| **CONNECT \| 5 MIN** | You have two ways to reach a product. Today a small set of products has to arrive without either of them. |
| **TAUGHT ON ITS OWN** | On the voyage home Pythagoras states his rule in his own words: the length of a side, times itself, is the number of tiles in the whole square. |
| **SOURCE CORE \| 20 MIN** | Pairs build a three-square and a four-square from tiles and count each by rows, say both products with eyes shut and check against the tiles, then sprint the nine square-product cards in mixed order, setting missed cards aside. |
| **COLLECT** | Two standing squares of tiles and a pile of missed cards. |
| **CLOSE \| 5 MIN** | Each missed card is rebuilt as a square of tiles, counted by rows, said aloud, and returned to the deck, and the miss pile is run once more. |

**From the source lesson:** Square tiles, 60 per pair; A build mat with one marked corner; A deck of nine square-product cards per pair, 1 times 1 through 9 times 9; Word cards: squared, times

**Watch for:** A child who rebuilds every card. Speed with meaning is the aim; rebuild only what was missed.

## Lesson 8 Times a zero: test the rule on three counts, predict one nobody built, and defend it

SKILL LESSON **Multiplying Menace: The Revenge of Rumpelstiltskin** (/math-library/94.html) · lesson 4, Times a Zero: Arguing the Rule from the Mats · Grade 3 · 20 minutes
Multiplying by zero

| | |
|---|---|
| I CAN | I can say what times zero gives, and why. |
| BIG IDEA | Zero groups of anything leaves nothing on the table, and the rule is defended from the mats rather than recited. |
| SUCCESS | The child predicts a product they never built and can say how they knew. |
| CONNECT \| 5 MIN | You can say your square products fast. Today a rule arrives that no amount of counting would ever give you. |
| TAUGHT ON ITS OWN | The rhyme at the end states the rule flatly, and the last pages of the story spend themselves proving it. |
| SOURCE CORE \| 20 MIN | Pairs set out three counts from the story on three mats, run the spell on each by making zero groups of that count, count what is left on the table and write the three equations one under the other. |
| COLLECT | Three mats and three written equations, with what all three answers have in common said aloud. |
| CLOSE \| 5 MIN | Without touching a counter, each child writes what one hundred times zero gives and then predicts a number their partner chooses, then defends the rule with the mats while the partner tries a number that might break it. |

**From the source lesson:** Round counters, 20 per pair; Group mats, five per pair; Small whiteboard and marker, one per student; Word cards: none, times

**Watch for:** A child says zero because they were told. Ask them to point at what zero groups looks like on the mat.

CULMINATING PERFORMANCE TASK

## One arrangement, three pictures and two routes

Each pair is given a group count and a group size. They build the equal groups, count by the group size and write the equation, then slide the groups into rows to make an array and write the second equation for the same counters. They draw the array on grid paper with one group ringed. They then find the same product a second, independent way and say whether the two agree. Finally they write what the product would be if the number of groups were zero, and say how they know without building it.

**Collect.** The drawn and labelled array with both equations, the second route written out, and the zero prediction with its reason.

**What it assesses.** Equal groups, the array read two ways, an independent check, and the zero rule — the whole of what the unit built, with products inside one hundred.

TEACHER KEY AND RUBRIC

## Key

- Checkpoint 1: 4 × 6 = 24; four counts the groups, six counts what is in one.
- Checkpoint 2: forty-two by both routes.
- Task: set group counts and sizes whose product is under one hundred, and work both equations yourself. The zero answer is always zero, and the reason must be about zero groups rather than about a rule that was recited.

## Rubric

| STRAND | SECURE LOOKS LIKE | DEVELOPING | NOT YET |
|---|---|---|---|
| **Representation** | The array is drawn one square per counter with one group ringed, and both equations sit under it. | Does it with the arrangement in front of them. | Produces an answer without the arrangement or the reason. |
| **Calculation** | The product is right and the second route reaches it independently. | Does it with the arrangement in front of them. | Produces an answer without the arrangement or the reason. |
| **Meaning** | The child can say which number counts the groups and which counts what is in one. | Does it with the arrangement in front of them. | Produces an answer without the arrangement or the reason. |
| **Explanation** | The zero prediction is defended by what zero groups looks like, not by a remembered rule. | Does it with the arrangement in front of them. | Produces an answer without the arrangement or the reason. |

**PRINT-READY STUDENT PAGES**

CHECKPOINT 1 · GRADE 3

## Which number counts what?

Name Date

Here are twenty-four counters in four groups of six. Write the equation. Ring the number that counts the groups. Ring the number that counts what is in one group.

CHECKPOINT 2 · GRADE 3

## Two routes

Name Date

Six groups of seven. Find the product by counting the groups by sevens. Now find it a second way by adding. Do the two agree?

CULMINATING TASK · GRADE 3

## One arrangement, three pictures and two routes

Name Date

Build the equal groups on your card and write the equation. Now slide the groups into rows to make an array and write the second equation for the very same counters. Draw the array on grid paper and ring one group. Find the product a second way and say whether it agrees. Last, write what the answer would be if there were zero groups, and say how you know without building it.

### TEACHER PLANNING AND HANDOFF

- Children who could not name the two jobs in checkpoint 1 need lesson 1 again before the fact work.
- Lesson 8 is the only place in the unit where a rule is argued rather than built; if the class is going on to properties of operations, that is the lesson to build from.
- The equal-groups opener in Multiplying Menace duplicates lesson 1 and is deliberately unused; it is a good extra practice session if the class needs one.

TumbleTA · Tumbleweed Press Inc. · Unit built 2026-09-02 from lessons published under Math lessons.