

Learning to Multiply for “older” students...

This slide presentation features teaching directions to help teachers teach multiplication facts to youngsters in grades five and above who did not learn them earlier. The concept is based on the author’s experience with such students and the reasons why they failed to achieve mastery with their peers. These reasons include students who have insufficient practice and those for whom the task seems daunting. The process is fun for the teacher and engaging for the students.

Teaching multiplication facts to “older” students...

Teachers of mathematics in middle and high schools are frequently (nearly always) confronted with students who cannot multiply. These students have not learned the basic facts that are required to multiply and divide. Many know and understand the process and can use the algorithm but the process is too slow to be useful or is imbedded with errors. Both speed and accuracy are required of successful students in general and advanced mathematics.

Errors in fact (accuracy) lead to incorrect answers and low scores on assessments of multiplication but also of algebra, geometry, and any math application. Not only does it impede the learning of applications but it also saddles the students with low scores. While lower grades do not necessarily indicate the inability to “do math” students feel that they cannot; the lower expectation (by both student and teacher) leads to lack of confidence, dislike of math, poor attitudes, problem behavior, and students taking fewer math courses and lower level courses.

Lack of speed generates similar issues. Experience with both classroom work and with flash cards indicates that most students should be able to cite a fact within three seconds and many should be able to respond in two. The students we are concerned with often cite wrong answers or require eight or more seconds to find the correct response through the use of counting on from a fact they do know.

Reluctant and struggling students get to this situation because they have not had sufficient practice (not doing home or seat work). Many also take a defeatist attitude through previous lack of schooling success or the size of the task (100 facts).

To turn this history into success teachers need to encourage students (you **can** learn these facts) and provide plenty of practice. I have used this method with students with success and have taught it to many teachers who experience similar success. Nearly every upper elementary, middle, and high school teacher I encounter has these students. We all want success!

The process was developed for these students and refined over several iterations with these students. Basically teachers are purposeful in finding the target audience and being very positive in encouraging them that they can learn the facts;

also, encouraging students that learning math facts is important and will have a positive effect on math learning and grades.

The teacher purposefully shows the students that they already know many facts so the job is quite small. The job is also divided into small steps which assure success. Repetition, expectation, overkill, engagement, and multiple pedagogical strategies are tools of choice. The direction and implementation strategies are contained in the Power Point slides accompanying this writing. The recipe for success follows:

- Find the audience
- Encourage success ("you **can** learn these; I can help you; math is useful and fun")
- Set expectations ("three weeks, just give me three weeks...")
- Demonstrate student knowledge ("you can already do most of them")
- Give tools (count by twos, count by fives, use hands for nines)
- Start small ("Can you learn 4 this week?")
- Do everything to assure success (involve home, assess every day, repetition, ...)
- Celebrate success!

A very small number of students who use this method still cannot demonstrate success; these students may be more significantly impaired by cognitive or memory process in some way and need more direct support (access to a table or calculator use).

Download the Power Point and give it a try. If you have Promethean software or a Smart Board upload the Power point and expand it using that tool. As noted on the last frame, if this is helpful to you and your students pass it on. Perhaps send me an email... If not, hit the delete key (or x it out as the kids say) and try something else.

We at MRL are committed to student learning and appreciate your hard work for the students in your care.

Tom Roy, PhD

Teaching Multiplication Facts

to students who should have learned them earlier

- Students who have not learned the facts often see the job as "too big."
 "There are, gulp, 100 facts! I can't memorize 100 facts!"
- Demonstrate what they **do** know and then focus on a small part of the remaining facts.
- Do a few each week...

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Multiplication table (100 facts)

| X | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|----|----|----|----|----|----|----|----|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 2 | 0 | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 |
| 3 | 0 | 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 27 |
| 4 | 0 | 4 | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 36 |
| 5 | 0 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
| 6 | 0 | 6 | 12 | 18 | 24 | 30 | 36 | 42 | 48 | 54 |
| 7 | 0 | 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 | 63 |
| 8 | 0 | 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 72 |
| 9 | 0 | 9 | 18 | 27 | 36 | 45 | 54 | 63 | 72 | 81 |

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Do you know the zeros? (81 facts left)

| X | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|----|----|----|----|----|----|----|----|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 2 | 0 | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 |
| 3 | 0 | 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 27 |
| 4 | 0 | 4 | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 36 |
| 5 | 0 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
| 6 | 0 | 6 | 12 | 18 | 24 | 30 | 36 | 42 | 48 | 54 |
| 7 | 0 | 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 | 63 |
| 8 | 0 | 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 72 |
| 9 | 0 | 9 | 18 | 27 | 36 | 45 | 54 | 63 | 72 | 81 |

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How about the ones? (64 facts left)

| | | | | | | | | | | |
|---|---|---|----|----|----|----|----|----|----|----|
| X | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 2 | 0 | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 |
| 3 | 0 | 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 27 |
| 4 | 0 | 4 | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 36 |
| 5 | 0 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
| 6 | 0 | 6 | 12 | 18 | 24 | 30 | 36 | 42 | 48 | 54 |
| 7 | 0 | 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 | 63 |
| 8 | 0 | 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 72 |
| 9 | 0 | 9 | 18 | 27 | 36 | 45 | 54 | 63 | 72 | 81 |

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Can you do the twos? (49 facts left)

| | | | | | | | | | | |
|---|---|---|----|----|----|----|----|----|----|----|
| X | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 2 | 0 | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 |
| 3 | 0 | 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 27 |
| 4 | 0 | 4 | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 36 |
| 5 | 0 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
| 6 | 0 | 6 | 12 | 18 | 24 | 30 | 36 | 42 | 48 | 54 |
| 7 | 0 | 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 | 63 |
| 8 | 0 | 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 72 |
| 9 | 0 | 9 | 18 | 27 | 36 | 45 | 54 | 63 | 72 | 81 |

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Twos?

- Count by twos if necessary:
- 2X6; 2-4-6-8-10-12; 2X6 are 12

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Can you count by fives? (36 facts left)

| | | | | | | | | | | |
|---|---|---|----|----|----|----|----|----|----|----|
| X | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 2 | 0 | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 |
| 3 | 0 | 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 27 |
| 4 | 0 | 4 | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 36 |
| 5 | 0 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
| 6 | 0 | 6 | 12 | 18 | 24 | 30 | 36 | 42 | 48 | 54 |
| 7 | 0 | 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 | 63 |
| 8 | 0 | 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 72 |
| 9 | 0 | 9 | 18 | 27 | 36 | 45 | 54 | 63 | 72 | 81 |

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I will give you the nines! (25 facts left)

| | | | | | | | | | | |
|---|---|---|----|----|----|----|----|----|----|----|
| X | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 2 | 0 | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 |
| 3 | 0 | 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 27 |
| 4 | 0 | 4 | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 36 |
| 5 | 0 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
| 6 | 0 | 6 | 12 | 18 | 24 | 30 | 36 | 42 | 48 | 54 |
| 7 | 0 | 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 | 63 |
| 8 | 0 | 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 72 |
| 9 | 0 | 9 | 18 | 27 | 36 | 45 | 54 | 63 | 72 | 81 |

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Give them the nines...

The nines are easy as you can raise both hands with fingers and thumbs out; for 9X3 lower the **third** finger and the result is found by counting the fingers on either side of the lowered finger (2 on the left and 7 on the right (27)).

It works with any finger (thumbs included)...

We know that if a youngster uses this frequently (s)he will learn the nines.

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Can you learn 4 this week?

| | | | | | | | | | | |
|---|---|---|----|----|----|----|----|----|----|----|
| X | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 2 | 0 | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 |
| 3 | 0 | 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 27 |
| 4 | 0 | 4 | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 36 |
| 5 | 0 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
| 6 | 0 | 6 | 12 | 18 | 24 | 30 | 36 | 42 | 48 | 54 |
| 7 | 0 | 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 | 63 |
| 8 | 0 | 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 72 |
| 9 | 0 | 9 | 18 | 27 | 36 | 45 | 54 | 63 | 72 | 81 |

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During the week you go crazy on these four---

- Stress that there are really only three (because 3×4 is the same as 4×3)
- Send them home
- Call home to get someone to drill every day
- Form a study group to drill during the day
- Test (with a grade) every day
- Use them several times daily (in all subjects)
- Post small posters of these four on the desk, around the room, in the hall, in the rest room...
- Celebrate success!

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OK, can you learn 6 in one week?

| | | | | | | | | | | |
|---|---|---|----|----|----|----|----|----|----|----|
| X | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 2 | 0 | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 |
| 3 | 0 | 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 27 |
| 4 | 0 | 4 | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 36 |
| 5 | 0 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
| 6 | 0 | 6 | 12 | 18 | 24 | 30 | 36 | 42 | 48 | 54 |
| 7 | 0 | 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 | 63 |
| 8 | 0 | 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 72 |
| 9 | 0 | 9 | 18 | 27 | 36 | 45 | 54 | 63 | 72 | 81 |

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During week two you go crazy on these six...

- Send them home
- Call home to get someone to drill every day
- Form a study group to drill in class daily
- Make the point that 6X4 and 8X3 are both 24
- Test (with a grade) every day
- Post them everywhere...
- Use them several times daily (in all subjects)
- Celebrate success!

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Hey we learned these already!!!

| X | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|----|----|----|----|----|----|----|----|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 2 | 0 | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 |
| 3 | 0 | 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 27 |
| 4 | 0 | 4 | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 36 |
| 5 | 0 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
| 6 | 0 | 6 | 12 | 18 | 24 | 30 | 36 | 42 | 48 | 54 |
| 7 | 0 | 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 | 63 |
| 8 | 0 | 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 72 |
| 9 | 0 | 9 | 18 | 27 | 36 | 45 | 54 | 63 | 72 | 81 |

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OK, only nine left...

| X | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|----|----|----|----|----|----|----|----|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 2 | 0 | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 |
| 3 | 0 | 3 | 6 | 9 | 12 | 15 | 18 | 21 | 24 | 27 |
| 4 | 0 | 4 | 8 | 12 | 16 | 20 | 24 | 28 | 32 | 36 |
| 5 | 0 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
| 6 | 0 | 6 | 12 | 18 | 24 | 30 | 36 | 42 | 48 | 54 |
| 7 | 0 | 7 | 14 | 21 | 28 | 35 | 42 | 49 | 56 | 63 |
| 8 | 0 | 8 | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 72 |
| 9 | 0 | 9 | 18 | 27 | 36 | 45 | 54 | 63 | 72 | 81 |

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During week three you go crazy on these nine...

- But it's really only seven because 6X9 is 9X6 and 8X9 is 9X8...
- Send them home
- Call home to get someone to drill every day
- Use the rhyme 6X8 are 48
- Post them...
- Form a study group to drill in class daily
- Test (with a grade) every day
- Use them several times daily (in all subjects)
- Celebrate success!

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And then...

If middle school students still don't know them a learning disability may be involved:

- Tape a chart on the desk to use at all times (including during assessments)

If high school students are still having difficulty:

- Issue a calculator and teach him (her) to use it...

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Pass it on...

- If this has been helpful to you, share it with another teacher, parent, or student.

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