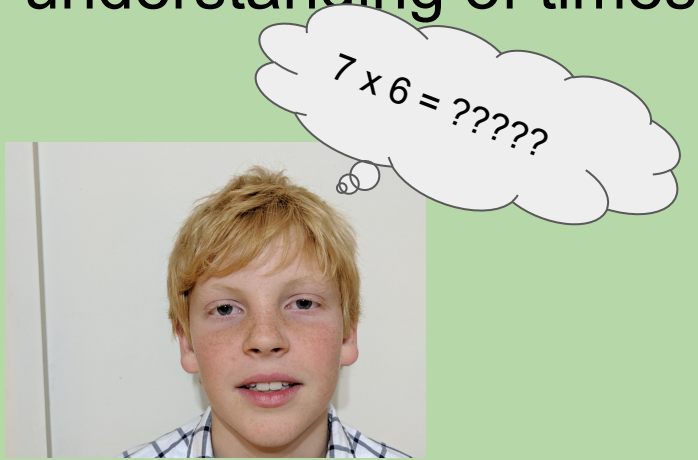
Times Tables

Help your students/child have a good understanding of times tables without rote learning.



Australian Curriculum Lessons

https://www.australiancurriculumlessons.com.au/

By Jen Graham

Note to parents/teachers:

The theory behind learning times tables has changed in the last generation. Just like we no longer rote learn words such as; at, cat, fat, sat we also no longer ask students to repeat their times tables.

Research has shown that students need a good grasp of number patterns and place value to help them mentally solve multiplication problems beyond just their times tables.

Students are no longer required to know up to their 12 times tables instead they need to be able to recall up to their 10 times tables. Knowing up to the 10 times tables will help them solve any multiplication equation.

Learning times tables by rote may mean they can accurately recall times tables but it also may mean they don't understand how they got the answer or are able to apply this knowledge to other maths problems.

I will take you through the order the times tables are taught from the Australian Curriculum.

Research articles (two of the many supporting the theory against rote learning)
http://theconversation.com/heres-how-to-get-kids-to-remember-times-tables-40471
https://hechingerreport.org/should-we-stop-making-kids-memorize-times-tables/

Australian Curriculum - Learning Outcomes relevant to Times Tables

	Number and Place Value	Number Patterns
Foundation	Connect number names, numerals and quantities, including zero, initially up to 10 and then beyond (ACMNA002 - Scootle)	Sort and classify familiar objects and explain the basis for these classifications. Copy, continue and create patterns with objects and drawings (ACMNA005 - Scootle)
Level One	Develop confidence with number sequences to and from 100 by ones from any starting point. Skip count by twos, fives and tens starting from zero (ACMNA012 - Scootle) Count collections to 100 by partitioning numbers using place value (ACMNA014 - Scootle)	Investigate and describe number patterns formed by skip-counting and patterns with objects (ACMNA018 - Scootle)
Level Two	Investigate number sequences, initially those increasing and decreasing by twos, threes, fives and tens from any starting point, then moving to other sequences (ACMNA026 - Scootle) Group, partition and rearrange collections up to 1000 in hundreds, tens and ones to facilitate more efficient counting (ACMNA028 - Scootle)	Describe patterns with numbers and identify missing elements (ACMNA035 - Scootle)

Understanding the Australian Curriculum - Foundation to Level Two

Students by the end of Level Two in order to grasp times tables should have a good understanding of:

- Numbers - it doesn't matter where you start from or what objects you are counting, the order of numbers stay the same. The number 3 always comes after the number 2.
- Pattern either numbers or shapes - are consistent and don't change halfway through (otherwise it is not a pattern)
- Skip count - 2s, 5s and 10s starting from zero
- Zero - is a number (extremely important)
- Partition numbers using place value - 23 can be expanded to 2 tens and 3 ones or 20 + 3

Don't rush through these initial developments in maths. A good understanding of place value and number patterns is crucial for a child to multiply mentally at a later stage.

Australian Curriculum - Learning Progression

	Number and Place Value	Number and Place Value
Level Three	Apply place value to partition, rearrange and regroup numbers to at least 10 000 to assist calculations and solve problems (ACMNA053 - Scootle)	Recall multiplication facts of two, three, five and ten and related division facts (ACMNA056 - Scootle)
Level Four	Apply place value to partition, rearrange and regroup numbers to at least tens of thousands to assist calculations and solve problems (ACMNA073 - Scootle)	Investigate number sequences involving multiples of 3, 4, 6, 7, 8, and 9 (ACMNA074 - Scootle) Recall multiplication facts up to 10 × 10 and related division facts (ACMNA075 - Scootle)
Level Five	Identify and describe factors and multiples of whole numbers and use them to solve problems (ACMNA098 - Scootle)	Solve problems involving multiplication of large numbers by one- or two-digit numbers using efficient mental, written strategies and appropriate digital technologies (ACMNA100 - Scootle)

Two Times Tables

Your child should know how to skip count by 2s starting at 0 - 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20

They should understand skip counting is a number pattern and you are adding 2 each time is 2 + 2 + 2. Repeated addition of the number 2.

Once they have these two facts you can introduce the sign x as a means of either ‘groups of’ or ‘multiplication’.

Remember to go slowly so your child has a good understanding of what groups of or multiplication means.

Use counters (any object that looks similar) and ask them to find the answer to 5 x 2 =
5 groups of 2 which means 5 multiplied by 2

Show them that 5 groups of 2 is the same as the 2s number pattern 0, 2, 4, 6, 8, 10

You can use a number line to skip count

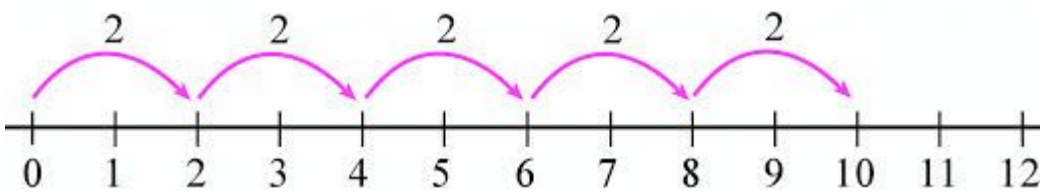
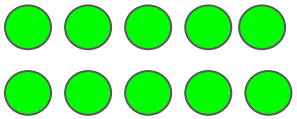


Image from homeschoolmath.net

An array



Use an array to show students that 5 x 2 is the same as 2 x 5. Do lots and lots of this to get a good understanding that the number of counters do not change whether the times table is 5 x 2 or 2 x 5.

Before continuing students should have a good understanding of:

- how multiplication can be reversed 5 x 2 = 2 x 5 (commutative law of multiplication)
- how to skip count on a number line
- how to use arrays to help find the answer
- multiplication is repeated addition 2 + 2+ 2 + 2 +2 or 5 + 5
- skip counting by 2s to 20 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20

Remember times tables is only taught to the 10 times tables.

If students have a good understanding of place value they will understand that multiplying by 12 is multiplying by 10 and multiplying by 2 and adding those two answers together.

Once they have this understanding they are able to multiply numbers with two or three digits.

Two Times Tables - Doubles

Introduce the concept of the word doubles. If you have double something you have two of them.

Show them that 5 doubled is two lots of 5. This will help them to understand multiplication equations such as 32 X 2 is just 32 doubled. It also will help know the 4 times table in future lessons.

A video which has a doubles song that students may like is https://www.youtube.com/watch?v=8jOzhiACB68

Image from Ghanjnsielem Primary School

Two Times Tables - Even Numbers

Look at the number pattern when counting by 2s beginning at zero - 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20

Ask students what they notice about the number in the ones place, 0, 2, 4, 6, 8, 0, 2, 4, 6, 8, 0

It is a pattern. If students are at the stage, explain to them that the two times tables all end in an even number. (Odd and even is a Level Three outcome in the Australian Curriculum)

Five Times Tables

Repeat the tasks with the five times tables that you completed with the two times tables

- Skip Counting to 50 by 5s
- Skip counting on a number line to 50
- Use repeated addition to explain each multiplication equation
- Use arrays to show that 5 x 6 = 6 x 5

Five Times Tables - Number Patterns

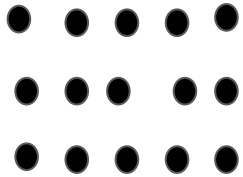
Ask students to write the fives skip counting pattern. What do they notice?

0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50

This is an important part of the 5 times tables as we know if a number is multiplied by 5 the ones value must be a 0 or a 5.

The next slide helps students with the different strategies listed above. They will find their preferred method.
Once they have an understanding of times tables they will become quicker at mentally recalling the answer.

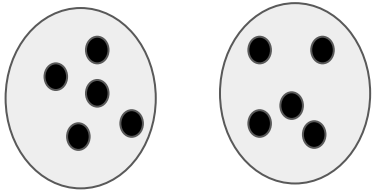
Array



Word Problem

The farmer had 3 paddocks. In each paddock was 5 sheep. How many sheep did he have altogether?

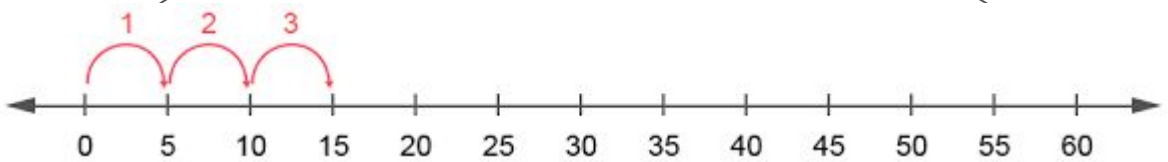
Picture of Groups

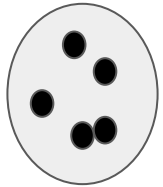


Equation

3 x 5 =

Number Line





Repeated Addition

5 + 5 + 5 =

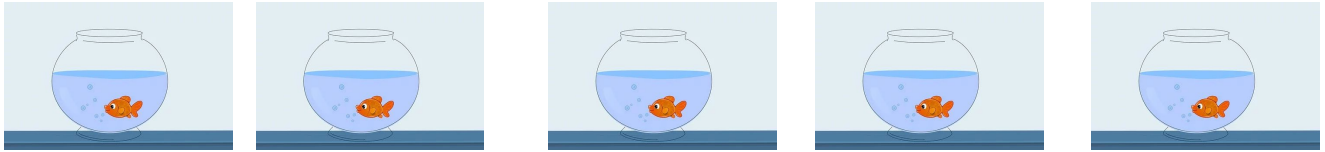
10 Times Tables

*Although this may be the easiest one for students to automatically recall - it is the one which needs the greatest understanding. If they have a good grasp of the ten times tables they will be able to mentally complete other 2 digit multiplication equations such as 42 x 2

*Remind students that the number 10 has a 1 in the tens place and a 0 in the ones place. It can be written as 10 + 0 Remember this is preparing for multiplying other 2 digit numbers

*Go through the 0 times table with them. If I had 5 friends and I gave them 0 lollies each how many would they have altogether? 5 x 0 = 0
It is important for students to realise that 0 is a number as is will play a great importance when they are multiplying numbers such as 306 x 5 =

Now go through the 1 times tables. If Tom had 5 fish bowls and he put 1 fish in each bowl how many fish would he have altogether? Remember to draw diagrams/pictures if that helps your students learn.



Ensure they understand both of the 1 and 0 times tables before continuing.

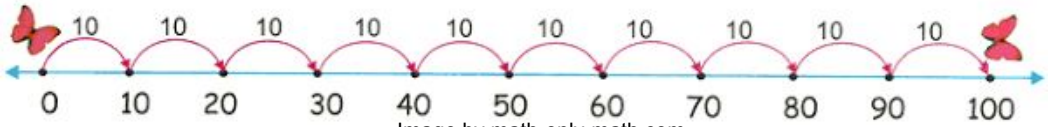


Image by math-only-math.com

Skip Counting to find the answer (4 x 10)

- Now begin the 10 times tables using skip counting by 10s to begin with - 0, 10, 20, 30, 40
- Number lines, arrays, groups can be used to help

Place Value to find the answer (4 x 10)

- 10 can be partitioned as 1 ten and 0 ones
- Let's multiply by the 0 ones first 4 x 0 = 0 So there will be a 0 in the ones place
- Now multiply 1 ten x 4 = 4 tens

Tens place

Ones place

$$\begin{array}{r} 10 \\ \times\ \ 4 \\ \hline 40 \end{array}$$

The set out is just to help explain - you don't need to set this out for students at this stage.

REVISE

Students should have a good understanding of the 0, 1, 2, 5, 10 times tables. And be beginning to automatically recall the answers and explain how to work out the answers by number line, skip counting, place value, arrays and groups (diagrams/pictures).

Continually practise **skip counting** and **partitioning numbers** in expanded notation (43 = 4 tens + 3 ones = 40 + 3)

Make up flash cards with the above tables for them to begin to automatically recall now they have a good understanding of how to solve the equations.

A great website for free flash cards anjd other multiplication resources
https://www.sparklebox.co.uk/previews/10176-10200/sb10190-multiplication-flash-cards.html

(Check you are clicking on the correct ‘download’ button once you are in the Sparklebox website.)

Times Tables

0x0=	1x0=	2x0=	3x0=	4x0=	5x0=	6x0=	7x0=
0x1=	1x1=	2x1=	3X1=	4X1=	5X1=	6X1=	7X1=
0X2=	1X2=	2X2=	3X2=	4X2=	5X2=	6X2=	7X2=
0X3=	1X3=	2X3=	3X3=	4X3=	5X3=	6X3=	7X3=
0X4=	1X4=	2X4=	3X4=	4X4=	5X4=	6X4=	7X4=
0X5=	1X5=	2X5=	3X5=	4X5=	5X5=	6X5=	7X5=
0X6=	1X6=	2X6=	3X6=	4X6=	5X6=	6X6=	7X6=
0X7=	1X7=	2X7=	3X7=	4X7=	5X7=	6X7=	7X7=
0X8=	1X8=	2X8=	3X8=	4X8=	5X8=	6X8=	7X8=
0X9=	1X9=	2X9=	3X9=	4X9=	5X9=	6X9=	7X9=
0X10=	1X10=	2X10=	3X10=	4X10=	5X10=	6X10=	7X10=

8X0=	9X0=	10X0=
8X1=	9X1=	10X1=
8X2=	9X2=	10X2=
8X3=	9X3=	10X3=
8X4=	9X4=	10X4=
8X5=	9X5=	10X5=
8X6=	9X6=	10X6=
8X7=	9X7=	10X7=
8X8=	9X8=	10X8=
8X9=	9X9=	10X9=
8X10=	9X10=	10X10=

Highlighted are the times tables the students should be beginning to automatically recall from previous lessons and with continued practice.

Three Times Tables

Repeat the tasks with the three times tables that you completed with the two and five times tables

- Skip Counting to 30 by 3s
- Skip counting on a number line to 30
- Use repeated addition to explain each multiplication equation
- Use arrays to show that 3x 6 = 6 x 3

Create lots of word problems using the three times tables to help them transfer the knowledge they have learnt in to real problems.

1. Charlie kicked 3 goals in footy. Each goal is worth 6 points. How many points did he score altogether? (3 x 6 =)
2. Tommy made cupcakes. There were 8 cupcakes in each row. There were 3 rows. How many cupcakes did Tommy make? (3 x 8 =)
3. Sarah collected shells from the beach. She put 4 shells in each bucket. She had 3 buckets. How many shells did she collect altogether? (4 x 3 =)

Four Times Tables

By now students should be understanding the skills needed to solve a multiplication equation and be able to automatically recall their tables facts, 0, 1, 2, 5 and 10. Now we use these skills to help solve the remaining tables facts.

We can now help them to learn some tricks on how to remember tables once they get in to the higher digits.
Remember in the two times tables we talked about doubles and how it will be important during the Four Times Tables.

Four is just <u>Two Doubled</u>

2 x 3 = 6	therefore	4 x 3 = 12 (6 doubled)
2 x 4 = 8	therefore	4 x 4 = 16 (8 doubled)
2 x 5 = 10	therefore	4 x 5 = 20 (10 doubled)
2 x 6 = 12	therefore	4 x 6 = 24 (12 doubled)
2 x 7 = 14	therefore	4 x 7 = 28 (14 doubled)

Remind students that when doubling we can double the tens then double the ones and add them together. Encourage them to try to solve these mentally once explained on paper.

4 x 8 is not easily doubled therefore if they know the answer of 4 x 7 = 28 (using doubles) then remind them that repeated addition means they just need to add another 4 to the answer. So, 4 x 7 = 28 plus another 4 = 32 SO 4 x 8 = 32

4 x 9 (leave until 9 times tables for now)

Six Times Tables

Six Times Tables they already know

0 x 6 = 1 x 6 = 2 x 6= 3 x 6= 4 x 6= 5 x 6 = 10 x 6 =

***REPEATED ADDITION - Remind your students/child that tables is repeated addition. Look back at the past slides to remind them.

* By now students should be able to automatically recall the 5 x tables
* Remind them how we worked out what 5 x 7 = 5 + 5 + 5 + 5 + 5 + 5 + 5 = 35
*Remind them of the arrays and how 5 x 7 has the same answer as 7 x 5

So if we know that 5 x 7 = 35 (5 groups of 7) we only need to add another 7 to know the answer to 6 x 7=
35 + another 7 = 42 therefore 6 x 7 = 42

So if we know that 5 x 8 = 40 (5 groups of 8) we only need to add another 8 to know the answer to 6 x 8=
40 + another 8 = 48 therefore 6 x 8 = 48

So if we know that 5 x 9 = 45 (5 groups of 9) we only need to add another 9 to know the answer to 6 x 9=
45 + another 9 = 54 therefore 6 x 9 = 54

So if we know that 5 x 6 = 30 (5 groups of 6) we only need to add another 6 to know the answer to 6 x 6=
30+ another 6 = 36 therefore 6 x 6 = 36

Nine Times Tables

This is similar to the idea behind the six times tables except you will use the 10 times tables to help.

So far students should know automatically the following
0 x 9 = 1 x 9 = 2 x 9= 3 x 9= 5 x 9= 10 x 9 =
And they may be able to mentally work out 4 x 9 and 6 x 9 from previous information.

Remember repeated addition - if we look at the ten times tables the nines are just one less repeated addition

10 x 4 = 40	therefore	9 x 4 = 40 - 4 = 36
10 x 6 = 60	therefore	9 x 6 = 60 - 6 = 54
10 x 7 = 70	therefore	9 x 7 = 70 - 7 = 63
10 x 8 = 80	therefore	9 x 8 = 80 - 8 = 72
10 x 9 = 90	therefore	9 x 9 = 90 - 9 = 91

There are many other ways that you may have seen to remember the nine times tables, however make sure they are still keeping with the general understanding of how we work out multiplication equations i.e. place value, number patterns, skip counting, arrays, number lines, repeated addition

Times Tables

0x0=	1x0=	2x0=	3x0=	4x0=	5x0=	6x0=	7x0=
0x1=	1x1=	2x1=	3X1=	4X1=	5X1=	6X1=	7X1=
0X2=	1X2=	2X2=	3X2=	4X2=	5X2=	6X2=	7X2=
0X3=	1X3=	2X3=	3X3=	4X3=	5X3=	6X3=	7X3=
0X4=	1X4=	2X4=	3X4=	4X4=	5X4=	6X4=	7X4=
0X5=	1X5=	2X5=	3X5=	4X5=	5X5=	6X5=	7X5=
0X6=	1X6=	2X6=	3X6=	4X6=	5X6=	6X6=	7X6=
0X7=	1X7=	2X7=	3X7=	4X7=	5X7=	6X7=	7X7=
0X8=	1X8=	2X8=	3X8=	4X8=	5X8=	6X8=	7X8=
0X9=	1X9=	2X9=	3X9=	4X9=	5X9=	6X9=	7X9=
0X10=	1X10=	2X10=	3X10=	4X10=	5X10=	6X10=	7X10=

8X0=	9X0=	10X0=
8X1=	9X1=	10X1=
8X2=	9X2=	10X2=
8X3=	9X3=	10X3=
8X4=	9X4=	10X4=
8X5=	9X5=	10X5=
8X6=	9X6=	10X6=
8X7=	9X7=	10X7=
8X8=	9X8=	10X8=
8X9=	9X9=	10X9=
8X10=	9X10=	10X10=

Highlighted are the times tables the students should be beginning to automatically recall from previous lessons and with their continued practice.

7 Times Tables **8 Times Tables**

As you can see from the previous slide there are only three times tables left

7 x 7 8 x 7 (7 x 8) 8 x 8

These are three which you may want to put on flash cards and blu tack on to a door frame. Each time your child walks through the door ask them to say the answer.

We know that rote learning may be easier for some students than the process I have given, however for students to work on multiplication facts that use 2 or 3 digit numbers in future years, a strong understanding of the times tables to 10 is needed.

Times Tables

0x0=	1x0=	2x0=	3x0=	4x0=	5x0=	6x0=	7x0=
0x1=	1x1=	2x1=	3X1=	4X1=	5X1=	6X1=	7X1=
0X2=	1X2=	2X2=	3X2=	4X2=	5X2=	6X2=	7X2=
0X3=	1X3=	2X3=	3X3=	4X3=	5X3=	6X3=	7X3=
0X4=	1X4=	2X4=	3X4=	4X4=	5X4=	6X4=	7X4=
0X5=	1X5=	2X5=	3X5=	4X5=	5X5=	6X5=	7X5=
0X6=	1X6=	2X6=	3X6=	4X6=	5X6=	6X6=	7X6=
0X7=	1X7=	2X7=	3X7=	4X7=	5X7=	6X7=	7X7=
0X8=	1X8=	2X8=	3X8=	4X8=	5X8=	6X8=	7X8=
0X9=	1X9=	2X9=	3X9=	4X9=	5X9=	6X9=	7X9=
0X10=	1X10=	2X10=	3X10=	4X10=	5X10=	6X10=	7X10=

8X0=	9X0=	10X0=
8X1=	9X1=	10X1=
8X2=	9X2=	10X2=
8X3=	9X3=	10X3=
8X4=	9X4=	10X4=
8X5=	9X5=	10X5=
8X6=	9X6=	10X6=
8X7=	9X7=	10X7=
8X8=	9X8=	10X8=
8X9=	9X9=	10X9=
8X10=	9X10=	10X10=

Thank You for persisting with this approach. It will definitely pay off for your child/students in later years.

There are many times tables apps and online games which help students to practise recalling the answers once they have a good understanding of multiplication.

Jen Graham