Rapscali's Tables

Starring Rapscali and her bear friend, Sebastian

Rapscali's Multiplication Tables

There is a general acceptance that students need to memorise their multiplication tables. After forty years teaching mathematics, I know that instant recall of tables is an essential background skill.

When working mathematically, students shouldn't sing-song or count through all the tables to get to the one they need. They must be able to recall any given table instantly.

The following is an approach using the mnemonic techniques known to be effective - story, images and characters. This is purely rote learning. It offers no understanding. It offers a rhythm and a game, a familiar sound and a clue.

Hence the creation of the ***Rapscali's Tables Game*** below. Students only compete with themselves.

My original intention was that students would create their own art folio of the stories using their own characters - their own rapscallions. I still think this is a valuable way to approach the task. Any multiplication tables which the students found hard after pretesting would be the ones for which they would create their personal art works.

However, much of the feedback was that parents and teachers would like to use my art as a game for their children or students. This way, the images could be used with much younger children to play the game, even when they are not yet ready to convert abstract concepts into stories themselves. It also enables older children to grab the image for the tables they don't know, rapidly and securely.

The set of 52 images available from my website (https://www.lynnekelly.com.au/the-memory-whisperer-shop/).

Rapscali's Tables Game

Method:

Take any image, one at a time. They need not be done in order. Nor need you do all of them at any given time. It is a game. It is to be fun.

The student creates a story from the clues in the images, using the number associations below. If they are creating their own images, they need to embed the clues in them. The use of two characters gives far more scope for stories. If students are using my rapscallions, they may prefer the faster names: ***Scali*** and ***Bas***.

The goal is instant recognition of the encoded table. And the fastest recall possible.

There are seven stages to the final goal: instant recall of the table without any reference to the image.

For some tables and some students, they will skip through the stages rapidly. Some will take more effort. On seeing the image, the student recalls the multiplications table at the highest stage they can manage - as quickly as possible - but with the rhythm of the equation.

The number associations

1 sun
2 shoe
3 tree
4 door
5 hive (with bees)
6 sticks
7 heaven (Students need to define heaven. Heaven is a puppy? A cloud in sky?)
8 gate
9 sign
10 hen
11 legs-11 - heaven is taken, and two legs look like 11. The best I could manage!
12 elves

14: more teens
15: lift teen
16: sick teen
18: late teen

20: plenty of …
30: dirty … (32 = dirty shoe, 36 = dirty sticks)
40: naughty … (42 = naughty shoe, 48 = naughty gate, 49 = naughty sign)
50: nifty … (56 – nifty sticks)
60: fix the … (63 = fix the tree, 64 = fix the door)
70: heavenly … (72 = heavenly shoe)
80: ate the … (81= ate the sun, 84 = ate the door)
90: mighty … (96 = mighty sticks
100: the undead (blame my students for that one) (121 = the undead in plenty of sun, 132 = the undead dirty a shoe, 144 = the undead at a naughty door)

EXAMPLE: 6 x 8 = 48

6	x	8	=	48
sticks		gate		naughty gate

Stage 1: Make up a story for the image using the number associations.

Response: Scali and Bas are picking up sticks. They rest at a farm gate. The gate is a naughty gate and suddenly knocks Scali over, her sticks flying everywhere. Bas thinks this is very funny.

Students can elaborate, adding reasons and background, while giving Scali and Bas personality. The degree of narrative involvement will depend on the teacher or parent, and the individual child.

Stage 2: **Just name the number associations. This puts the rhythm and sound in memory.**

Response: sticks gate naughty gate

Stage 3: **Name the number associations and the mathematical table.**

Response: sticks gate naughty gate 6 8 48

Stage 4: **Just name the mathematical table from the image.**

Response: 6 8 48

Stage 5: **Given the table, imagine the image and recite the table. No image is viewed other than in imagination.**

Response: 6 8 48

Stage 6: **Given the two numbers, respond with the product, without the image present.**

Question 6 8 - Response: 48

Stage 7: **Given the final product, find all the tables (the factors) which give that product.**

Question: 48 - Response: 4 12 48, 6 8 48

The final stage leads onto division, common factors and so many further concepts.

Students will eventually be so familiar with the sound and tables, they will no longer need to imagine the image. The multiplication table will be theirs for life.

And they will have had so much fun on the way!

Use the following grid as a score card, colour coding according to the student's stage for each table.

Start with the grid.

The starting point is 144 tables, represented by the familiar grid. Students will need to memorise images for less than half of these, and probably a lot less than that. It depends on their starting point.

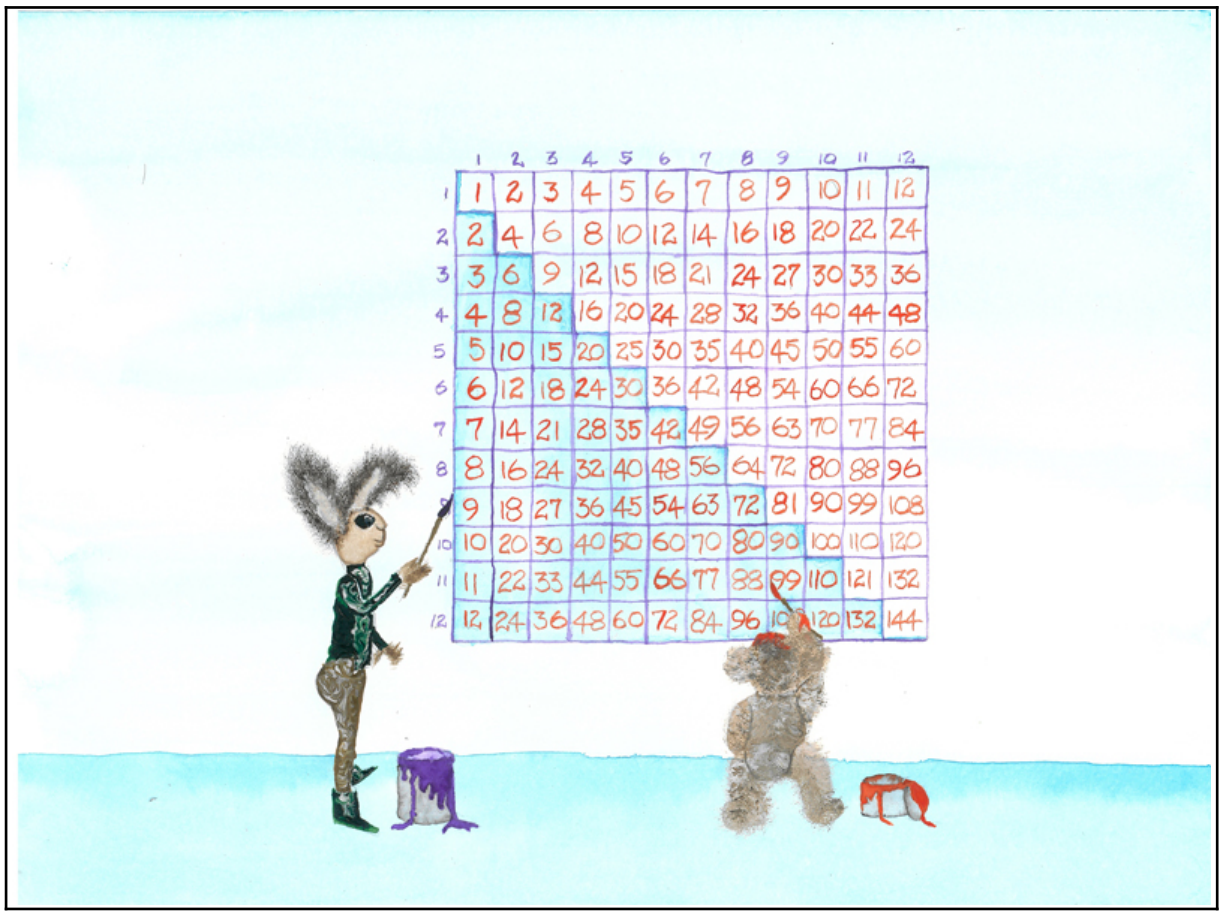
The first step is to pre-test and colour in the square for any tables which the student already knows instantly. In the rest of the document, I shall assume that the students don't know a single table.

	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

For each table that they don't know instantly, they will need a story. To make a memorable story, they can use their own characters, what I call in *Memory Craft*: their rapscallions. Or they can use my set of images.

My main character is Rapscali, a sort of human-like rabbit doll who I have at home. She has a companion, a bear named Sebastian. Rapscali and Sebastian act out the tables in the stories. But I call them Scali and Bas.

Using a student's own rapscallion makes the stories much more memorable for them and should be encouraged if you are just working towards the few remaining tables a student finds difficult. It brings in a personal and therefore emotional connection.



Rapscali (left) and Sebastian create the grid, shading all the tables they will never need to memorise because of the commutative law. This is encouraging!

Why use images and stories?

Playing with the story slows things down and requires the student to engage with each single multiplication table as an individual entity. Art is far more memorable than written words. Art with a story is the most memorable of all.

Students will need some way of storing their drawings, or their copies of mine - a scrap book or plastic insert sheets. Each drawing and story they engage with then gets added to their book ready for revision. For some tables, they will rarely need a revision. For others it will be more often.

As they get to know each story image, their recall will become faster and faster until the image becomes redundant and they simply know the table. That table will then be known for the rest of their lives. With time, they may forget the image completely. The time commitment is worth it - plus they practice a variety of creative skills.

The more the students have fun with the illustrations, the more the rule stays with them. If they rush them, the experience will be less effective.

When testing the system, there were students who liked to do a quick sketch, and that seemed enough for them. There were others who wanted to do a drawing and write out the story. Others wanted to makeup a story from my images. As long as they write the table in the usual format, then individuality rules!

This may seem much more time consuming than simply repeating the tables until they are known. For a few students with naturally good memories, that will be the case. But for the majority of students who will never know their tables well through repetition, this is a far more effective method. And more fun!

Students should colour in the tables on the grid as they learn them. You can use a colour scheme to represent what stage of the ***Rapscali's Tables Game*** they have reached for each table.

A suggested order for learning the tables

Stage 1: the commutative Law

6 x 8 = 8 x 6. Mirror images are just the same.

A picture of two rapscallions in a mirror will show that Rapscallion1 x Rapscallion2 = Rapscallion2 x Rapscallion1 because the mirror image will reverse the order of the rapscallions.

This can be painted using a mirror image. Using a real mirror and two rapscallions will help students visualise it.

Reverse the numbers, still the same answer

3 x 7 = 7 x 3 6 x 2 = 2 x 6 8 x 3 = 3 x 8 11 x 4 = 4 x 11

5 x 4 = 4 x 5 9 x 5 = 5 x 9 12 x 9 = 9 x 12 6 x 8 = 8 x 6

Everything below the diagonal can be coloured in because students won't ever need to memorise them. If the table story doesn't come to mind, try always putting the smaller number first.

Students can even see the pattern. Every square diagonally opposite across the leading diagonal is the same. This is a really encouraging way to start, because 144 tables to be learned just became only 78.

The grid becomes

	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

That's 66 tables which don't need to be memorised!

Tally: 66 deleted. 78 to go.

Stage 2: multiply by 1.

Multiplying by 1 means no change. I would be surprised if any students need this, but just in case, the number association for 1 is sun. The student can draw a rapscallion in the sun, the story line giving the same rapscallion. Nothing under the sun changes.

This one drawing gives all the tables in the first row and column.

12 more done!

Tally: 78 done. 66 to go.

	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
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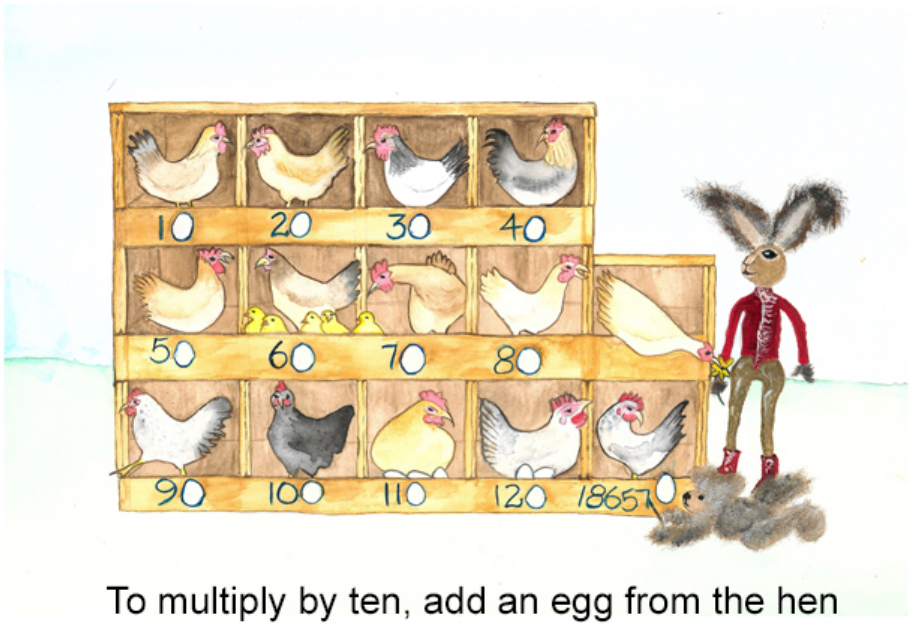
12	12	24	36	48	60	72	84	96	108	120	132	144

Stage 3: multiply by 10

The number association for ten is hen. When the rapscallion multiplies by 10, the hen lays an egg next to the number.

I have drawn this with a set of nesting boxes with hens laying eggs, and Sebastian painting the numbers to show this works for every single number, no matter how big. The eggs make 0s after the nesting box number, changing it from a 7, say, to 70.



The multiples of 10 which have not yet been coloured can now be done.

	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

That's 11 more done!

Tally: 89 done. 55 to go.

Stage 4: multiply by 11

When the Rapscallion multiplies by 11, he or she checks their own legs and matches them - or whatever story they like which simply gives a repeated number. So the drawing becomes the rapscallion x legs-11. They can draw lots of double numbers: 22 and 33 and 44 and 55 and 66 and 77 and 88 and 99 and … [we need to stop there and do 11 x 11 and 11 x 12 later].

	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
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11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

That's 8 more done!

Tally: 97 done. 47 to go.

Stage 5: Multiply by 2.

Most student can double, or count by 2s easily. It is more important to get to the harder tables. So let them count by 2s here if you prefer to get to the harder ones. There will be an additional section picking up 2s and 5s at the end.

	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
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10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

That's 9 more done (or put off until later)!

Tally: 106 done. 38 to go.

Stage 6: multiply by 5

Again, we will later revisit 5s and do them by memory. Students can count by 5 - it is another table they seem to find easy anyway. Again, revisit at the end because we want to get to the hard ones.

	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	48
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

8 more done (or left until later)!

Tally: 114 done. 30 to go.

Stage 7. The remaining 28 squares

These squares occur when the threes, fours, sixes, sevens, eights and twelves interact with each other. Plus there are the two pesky 11s: 11x11 and 11 x 12.

These tables each need a story and a drawing to offer a visual reminder of the table.

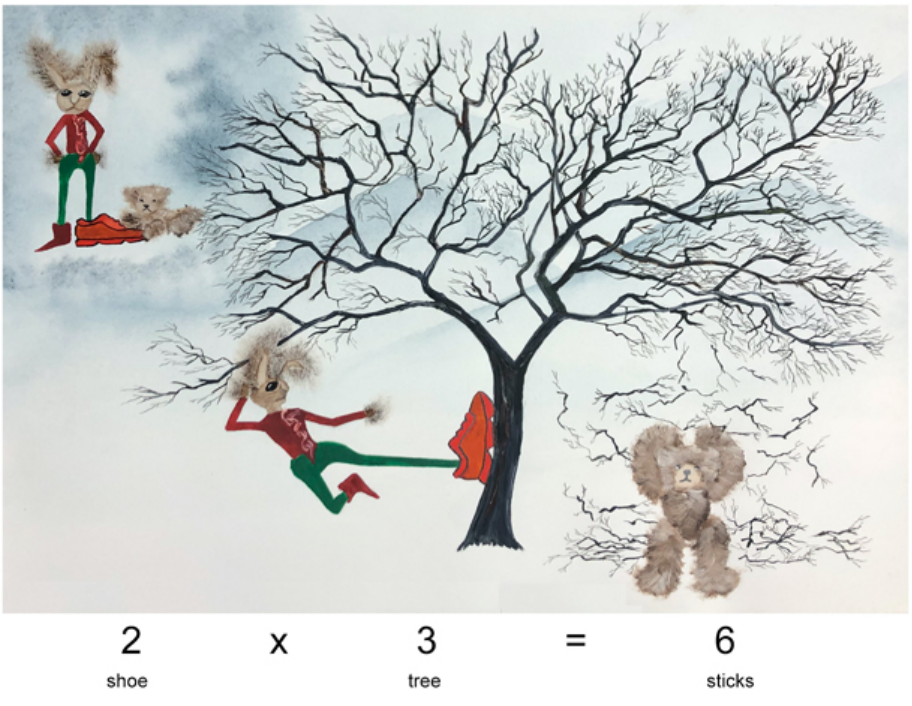
The number associations at the start of the document provide the keys to the stories. The rest is up to the imaginations and the creativity of the students.

That's 28 more done!

Tally: 144 done (sort of): none to go … except maybe the 2s and 5s.

Stage 8. Add 2s and 5s

If the students can't do the 2s and 5s quickly enough, then they should do the remaining 2s and 5s that they don't know.



Many students spend years of primary school and never master their tables. Rapscali and Sebastian are here to help!