



South Africa's leading Mathematics publisher

How to use the multiplication grid

Introduction

Gagne, an educational psychologist stated that “multiplication facts must be learned, mastered and automatised.” Teachers agree that the automatic recall of multiplication time tables is best developed through drill and practice.

If learners do not master time tables it can result in an unwillingness to attempt mathematical questions that can lead to mathematical anxiety with serious negative consequences (Ashcraft 2009).

Many learners have difficulty recalling multiplication facts, and need other techniques rather than rote memorisation to master the skills. The multiplication grid is a helpful resource to learn the multiplication tables. Learners will have an "ah-ha!" moments when they recognise patterns on the grid.

Terminology

Row; horizontal

Column; vertical

Product; answer of a multiplication calculation

Factor; can divide into the number without leaving a remainder

Square numbers; 1; 4; 9; 16; 25; 36; 49; 64; 81; 100

Commutative property; when two numbers are multiplied together, the product is the same regardless of the order of the multiplicands. For example $8 \times 3 = 3 \times 8$

Multiplication is repeated addition: $4 \times 3 = 4 + 4 + 4$

$$= 12$$

How to use the multiplication grid

Patterns in the multiplication tables

Multiplication patterns help learners to remember the tables and can be used to verify the *products*. Learners will be fascinated with the patterns on the grids.

Multiples of two

- The multiples of two are even and always end in 0; 2; 4; 6 or 8.
- Two times a number is doubling.

Example

$$2 \times 4 = 8 \text{ (double 4)}$$

$$2 \times 7 = 14 \text{ (double 7)}$$

Multiples of three

- Every alternate number is an even number (3; **6**; 9; **12**; 15; **18**; 21; **24**; 27; **30**).

Multiples of four

- Multiplication by 4 does not end with 1; 3; 5; 7 or 9.
- In the units column it ends with 0; 2; 4; 8.
- Trick: Double the number and then double it again!

Example

$$7 \times 4 = \text{Double } 7 = 14 \rightarrow \text{double } 14 = 28 \\ = 28$$

Multiples of five

- Trick: It's halving of 10 times.
Use ten times table (just add a zero) and divide by two.

Example

$$5 \times 8 = \text{half of } 10 \times 8 \\ = \frac{1}{2} \text{ of } 80 \\ = 40$$

Multiples of six

- $6 \times 7 = 42$ Dinner for 6 at 7 o'clock in 42 Street.

Multiples of eight

- Trick: Double, double and double again.

Example

$$7 \times 8$$

Double 7 = 14 → double 14 = 28 → double 28 = 56.

$$56 = 7 \times 8$$

Multiples of nine

- The sum of the *product's* digits is 9.

Example

$$27 \rightarrow 2 + 7 = 9$$

- The tens digit is 1 less than the other *factor*.
- Note how the *units* place goes down: 9; 8; 7; 6; ...

A the same time, the *tens* place goes up: 1; 2; 3;...

Use this pattern to prompt your memory:
the tens place will be 1 less than what you are multiplying by.

Example

$$9 \times 7$$

One less than 7, so the tens place is **6**, and then remember **63**.

Use your fingers

- ✓ Hold your hands in front of you with your fingers spread out.
- ✓ For 9 X 3 bend your third finger down from the left.
- ✓ You have 2 fingers in front of the bent finger and 7 after the bent finger.
- ✓ The answer must be 27.

Conclusion

If a learner does not know their times tables it slows down their progress in Mathematics.

A variety of structured activities will enable learners to visualise the mathematical patterns on the multiplication grids that will promote memorization.

Some activities to do with your learners:

Square numbers

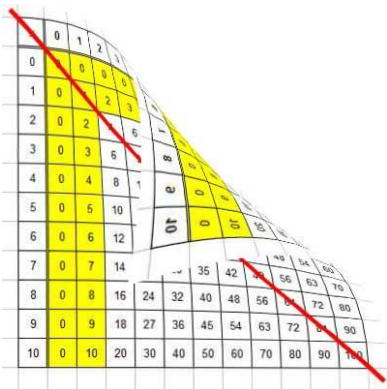
Memorise the square numbers (where you multiply a number by itself):

	1	2	3	4	5	6	7	8	9	10
1	1									
2		4								
3			9		15					
4				16		24				
5			15		25		35			
6				24		36		48		
7					35		49		63	
8						48		64		
9							63		81	
10										100

What patterns do they notice around the square numbers?

There is a line of symmetry (fold- line) in the multiplication grid.

It is on the diagonal with the square numbers.



Note the tables are repeated due to the commutative property of multiplication.

Note that $8 \times 6 = 48$ is the same as $6 \times 8 = 48$

Half of the multiplication grid is a mirror image of the other.

Multiples on a 10 x10 grid

Shade the multiples by using skip counting.

Multiplication pattern of 2 on the number grid

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	36	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

The multiples of two make a vertical bar or straight line pattern in every second column.

Multiplication pattern of 3 on the number grid

0	1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59
60	61	62	63	64	65	66	67	68	69
70	71	72	73	74	75	76	77	78	79
80	81	82	83	84	85	86	87	88	89
90	91	92	93	94	95	96	97	98	99

The slanting pattern increase and decrease in the tens and units column.

Multiplication pattern of 4 on the number grid

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

The multiples of four make a bar pattern.

Multiplication pattern of 5 on the number grid

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

The multiples of five make a vertical bar that ends in 0 or 5.

Multiplication pattern of 6 on the number grid

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

The multiples of six make a vertical bar or straight line pattern in every second column.

Multiplication pattern of 7 on the number grid

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Look that the units in the slanting diagonal are increasing by 1.

Multiplication pattern of 8 on the number grid

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Look at the pattern of 0; 8; 6; 4; 2 in the unit digit.

Multiplication pattern of 9 on the number grid

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

The slanting diagonal follows a pattern of 1;2;3;4;5;6;7;8;9;0 in the ten value.