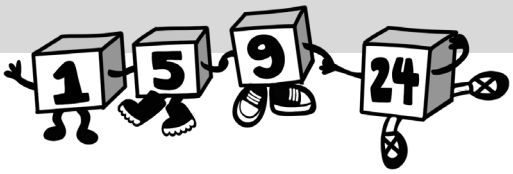
Maths 24



The Goal

Use the four given numbers to make **24**.

Rules

- use all four numbers exactly once
- one or more of the basic operations (+, –, ×, ÷) may be used, as well as brackets
- numbers can be used in any order

Example

Use these four numbers to make **24**: 2, 3, 4, 6

Possible solutions

$2 \times 6 + 3 \times 4 = 12 + 12 = 24$

$4 \times 6 \times (3 - 2) = 24 \times 1 = 24$

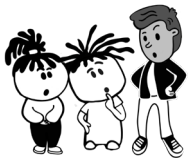
$4 \times 6 \div (3 - 2) = 24 \div 1 = 24$

$2 \times 4 \times (6 - 3) = 8 \times 3 = 24$

$3 \times 6 + 2 + 4 = 18 + 2 + 4 = 24$

$6 \div 2 \times 4 \times 2 = 3 \times 4 \times 2 = 24$

How to play in class



Whole-Class Version

Teacher displays four numbers on the board or projector

Option 1: learners each find as many solutions as they can within a given time

To check solutions, go around the class hearing one new solution from each learner until no one has a new solution to share, putting the solutions on the board, or divide up into pairs or groups and share solutions amongst each other.

Option 2: learners race to find a solution ... first correct explanation wins

This option requires learners to show their solution, explaining the order clearly and justifying brackets where relevant.

Variations

Teacher displays an "easy" and a "challenging" set of four numbers

Working individually, or in pairs

Variation 1: learners race to one solution for each option

Variation 2: learners race to find as many solutions as possible to each option within a limited time

Variation 3: allow learners to use powers, square roots, cube roots

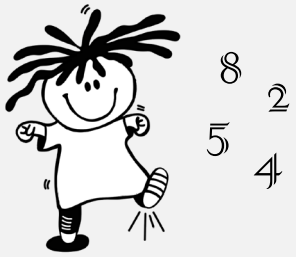
Suggestions

- start with easy examples, where brackets are not needed
- give two examples at the same time, one "easy" example and one "challenging"

24 Solver by David Wees is a link to an app that solves the problem for you.

It is helpful when solutions need to be checked quickly or when you create more questions.

Skills Developed when playing Maths 24



- number sense
- mental arithmetic
- strategic thinking
- order of operations
- flexibility with numbers

Maths 24 is especially powerful because learners stop asking "which operation do I use?" and start experimenting creatively with relationships between numbers.

Maths 24

These questions use single digit numbers.
No brackets are needed in the first 28 solutions.
The solutions for questions 29 to 56 are more challenging and require brackets.

	Numbers	Possible Solutions		Numbers	Possible Solutions
1	1, 1, 4, 6	$1 \times 1 \times 4 \times 6$	29	1, 2, 5, 8	$(5 + 1) \times 8 \div 2$
2	1, 2, 2, 6	$6 \times 2 \times 2 \times 1$	30	1, 2, 6, 8	$8 \times (6 - 2 - 1)$
3	1, 2, 3, 4	$1 \times 2 \times 3 \times 4$	31	1, 2, 7, 7	$(7 \times 7 - 1) \div 2$
4	1, 2, 7, 9	$2 \times 7 + 1 + 9$	32	1, 4, 5, 8	$(1 + 5) \times (8 - 4)$
5	1, 3, 4, 5	$1 + 3 + 4 \times 5$	33	1, 4, 6, 6	$6 \times (4 - 1) + 6$
6	1, 3, 6, 6	$6 \times 3 + 6 \times 1$	34	2, 2, 4, 4	$2 \times (2 \times 4 + 4)$
7	1, 3, 6, 7	$3 \times 6 + 7 - 1$	35	2, 3, 5, 9	$2 \times 3 \times (9 - 5)$
8	1, 5, 5, 6	$6 \times 5 - 5 - 1$	36	2, 3, 8, 8	$3 \times (2 \times 8 - 8)$
9	1, 7, 8, 9	$1 \times 7 + 8 + 9$	37	2, 4, 5, 8	$8 \times (5 + 2 - 4)$
10	2, 2, 5, 7	$2 \times 5 + 2 \times 7$	38	2, 4, 6, 8	$6 \times 8 \div (4 \div 2)$
11	2, 3, 3, 9	$2 \times 9 + 3 + 3$	39	2, 5, 6, 6	$(2 \times 5 - 6) \times 6$
12	2, 3, 5, 6	$2 \times 3 \times 5 - 6$	40	2, 5, 6, 8	$8 \times (6 + 2 - 5)$
13	2, 3, 5, 8	$2 \times 8 + 3 + 5$	41	2, 7, 8, 9	$2 \times (7 + 9) - 8$
14	2, 4, 7, 8	$8 \times 7 \div 2 - 4$	42	3, 3, 4, 8	$8 \times 3 \times (4 - 3)$
15	2, 5, 7, 9	$5 \times 7 - 9 - 2$	43	3, 3, 5, 9	$(3 + 3) \times (9 - 5)$
16	2, 6, 7, 9	$2 + 6 + 7 + 9$	44	3, 3, 6, 6	$3 \times (6 \div 3 + 6)$
17	2, 6, 8, 9	$8 \times 9 \div 6 \times 2$	45	3, 3, 6, 8	$8 \times (3 \times 3 - 6)$
18	3, 3, 3, 3	$3 \times 3 \times 3 - 3$	46	3, 3, 8, 9	$8 \times (9 - 3 - 3)$
19	3, 3, 3, 8	$3 \times 8 + 3 - 3$	47	3, 4, 5, 6	$6 \times (5 + 3 - 4)$
20	3, 3, 4, 4	$3 \times 4 + 3 \times 4$	48	3, 4, 7, 8	$4 \times (7 - 3) + 8$
21	3, 4, 4, 8	$3 \times 4 + 4 + 8$	49	3, 4, 8, 9	$(9 - 3) \times (8 - 4)$
22	3, 5, 7, 8	$3 \times 7 + 8 - 5$	50	3, 5, 6, 7	$3 \times (7 + 6 - 5)$
23	3, 5, 7, 9	$3 + 5 + 7 + 9$	51	3, 5, 6, 9	$9 \times (5 - 3) + 6$
24	3, 5, 8, 8	$3 + 5 + 8 + 8$	52	3, 5, 8, 9	$9 \times (8 - 5) - 3$
25	4, 4, 4, 4	$4 + 4 + 4 \times 4$	53	4, 5, 6, 6	$6 \times 4 \times (6 - 5)$
26	4, 5, 5, 6	$4 \times 6 + 5 - 5$	54	4, 6, 6, 9	$9 \times (6 - 4) + 6$
27	4, 6, 6, 8	$4 + 6 + 6 + 8$	55	5, 6, 6, 8	$(8 - 5) \times 6 + 6$
28	5, 5, 5, 5	$5 \times 5 - 5 \div 5$	56	5, 6, 8, 9	$(6 + 9) \div 5 \times 8$

Maths 24

These questions use at least one two-digit number.

	Numbers	Possible Solutions		Numbers	Possible Solutions
1	1, 5, 7, 13	$(13 - 7) \times (5 - 1)$	31	3, 12, 18, 48	$(18 \div 3) \times (48 \div 12)$
2	2, 2, 3, 18	$18 \div 3 \times 2 \times 2$	32	4, 4, 5, 25	$25 \div 5 \times 4 + 4$
3	2, 3, 4, 10	$10 + 2 + 3 \times 4$	33	4, 4, 10, 10	$(10 \times 10 - 4) \div 4$
4	2, 3, 4, 12	$12 \div 3 \times (2 + 4)$	34	4, 5, 7, 12	$12 \times (4 + 5 - 7)$
5	2, 3, 4, 16	$16 \div 4 \times 2 \times 3$	35	4, 5, 7, 28	$28 \div 7 \times 5 + 4$
6	2, 3, 6, 12	$(12 - 3) \times 2 + 6$	36	4, 5, 8, 32	$5 \times (32 \div 8) + 4$
7	2, 3, 8, 12	$12 \div 3 \times (8 - 2)$	37	4, 5, 8, 40	$40 \div 5 \times 4 - 8$
8	2, 3, 10, 10	$2 \times (10 - 3) + 10$	38	4, 5, 9, 12	$12 \div 4 \times 5 + 9$
9	2, 4, 12, 16	$(16 - 12) \times (2 + 4)$	39	4, 5, 12, 40	$40 \div (4 \times 5) \times 12$
10	2, 4, 12, 42	$42 \div 2 + 12 \div 4$	40	4, 6, 8, 48	$48 \div (8 + 4) \times 6$
11	2, 5, 8, 11	$(11 - 5) \times 8 \div 2$	41	4, 6, 9, 72	$6 \times (72 \div 9 - 4)$
12	2, 5, 10, 10	$10 \div 5 \times (2 + 10)$	42	4, 6, 12, 36	$12 \times (36 \div 6 - 4)$
13	2, 6, 7, 10	$6 \times (2 \times 7 - 10)$	43	4, 8, 12, 16	$(16 - 8) \div 4 \times 12$
14	2, 6, 7, 42	$(6 - 2) \times (42 \div 7)$	44	4, 9, 10, 36	$36 \div 9 \times (10 - 4)$
15	2, 6, 7, 56	$56 \div 7 \times 6 \div 2$	45	4, 9, 12, 72	$(12 \div 4) \times (72 \div 9)$
16	2, 6, 7, 63	$63 \div 7 \times 2 + 6$	46	5, 6, 18, 40	$(40 \div 5) \times (18 \div 6)$
17	2, 6, 11, 99	$99 \div 11 \times 2 + 6$	47	5, 6, 19, 55	$55 \div (5 + 6) + 19$
18	2, 6, 15, 66	$66 \div 6 + 15 - 2$	48	5, 7, 11, 11	$(11 - 7) \times (11 - 5)$
19	3, 4, 4, 10	$4 \times (10 - 3) - 4$	49	5, 8, 12, 32	$8 \times (12 - 5) - 32$
20	3, 4, 6, 48	$6 \times (48 \div (3 \times 4))$	50	5, 9, 11, 36	$(11 - 5) \times (36 \div 9)$
21	3, 4, 6, 72	$3 \times 4 + 72 \div 6$	51	6, 7, 8, 21	$8 \times (6 - 21 \div 7)$
22	3, 4, 12, 42	$4 \times (42 - 12 \times 3)$	52	6, 8, 8, 32	$32 \div (8 - 6) + 8$
23	3, 4, 12, 48	$3 \times (48 \div 12 + 4)$	53	6, 8, 12, 16	$12 \div 6 \times 16 - 8$
24	3, 5, 12, 30	$12 \times (30 \div (3 \times 5))$	54	6, 8, 12, 24	$8 + 12 + 24 \div 6$
25	3, 6, 8, 36	$36 \div 3 \times (8 - 6)$	55	6, 8, 12, 32	$(12 - 6) \times (32 \div 8)$
26	3, 6, 12, 18	$18 \div (3 + 6) \times 12$	56	6, 8, 12, 40	$40 - 8 \times (12 \div 6)$
27	3, 6, 12, 22	$(12 - 6) \div 3 + 22$	57	6, 8, 18, 21	$21 + (18 + 6) \div 8$
28	3, 6, 12, 24	$3 \times (6 + 24 \div 12)$	58	6, 8, 18, 36	$8 \times (36 \div (18 - 6))$
29	3, 9, 12, 72	$72 \div (9 - 3) + 12$	59	7, 12, 21, 96	$(21 \div 7) \times (96 \div 12)$
30	3, 11, 18, 44	$(18 \div 3) \times (44 \div 11)$	60	8, 9, 12, 16	$(12 - 9) \times (16 - 8)$