FACTORS AND MULTIPLES GAME

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

This is a game for one or two players.

The first player chooses a positive even number that is less than 50 and crosses it out on the 100 square grid.

The second player chooses a number to cross out. The number must be a factor or multiple of the previous number.

Players continue to take it in turns to cross out numbers, at each stage choosing a number that is a factor or multiple of the number just crossed out by the other player.

The first person who is unable to cross out a number loses.

For one player, or as a class competition, follow the same rules and see who can make the longest chain of numbers.

HELP

Use a smaller number board, for example and 8 by 8 board showing 1– 64. This makes the mental calculations much easier, without watering down the mathematics. Using 2 different colours will help you to show the difference between factors and multiples.

NEXT

Switch the challenge from winning the game to covering as many numbers as possible. You can again work in pairs trying to find the longest sequence of numbers that can be crossed out.

Can more than half the numbers be crossed out?

This challenge could run for an extended period. The longest sequence can be displayed on a noticeboard and the class can be challenged to improve on it; any improved sequences can be added to the noticeboard.

Explain why your choice of numbers is good.

It is possible to get a chain of 74 numbers?

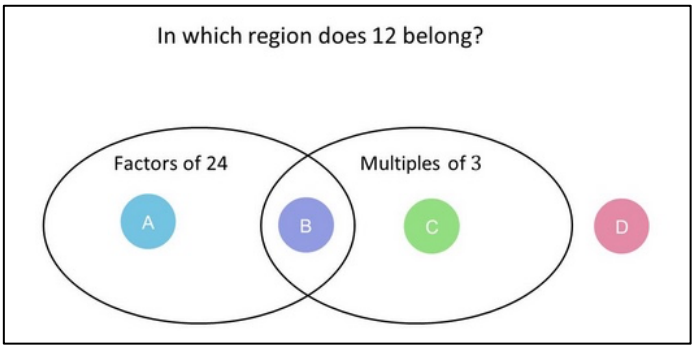
Can your class find one 74 numbers long or longer?

NOTES FOR TEACHERS

Diagnostic Assessment This should take about 5–10 minutes.

Write the question on the board, say to the class:

"Put up 1 finger if you think the answer is A, 2 fingers for B, 3 for C and 4 for D".



1. Notice how the learners responded. Ask a learner who gave answer A to explain why he or she gave that answer and DO NOT say whether it is right or wrong but simply thank the learner for giving the answer.
2. It is important for learners to explain the reason for their answer to help them think mathematically and practise oral communication
3. Then do the same for answers B, C and D. Try to make sure that learners listen to these reasons and try to decide if their own answer was right or wrong.
4. **Ask the class again to vote for the right answer by putting up 1, 2, 3 or 4 fingers. Notice if there is a change and who gave right and wrong answers.**
5. The concept is needed for the lesson so explain the right answer or give a remedial task.

The correct answer is **B** because 12 is a factor of 24 and also a multiple of 3.

https://diagnosticquestions.com

Why do this activity?

This activity can replace standard practice exercises on finding factors and multiples. In order to play strategically, learners must start to think of numbers in terms of their factors, utilising primes and squares to develop winning moves.

Learning objectives

In doing this activity students will have an opportunity to develop number sense and a deeper understanding of factors and multiples.

Generic competences

In doing this activity students will have an opportunity to:

- develop logical and strategic thinking skills;
- be creative and innovative and apply knowledge and skills.

Suggestions for Teaching

Start with the Diagnostic Quiz and ask a few more questions to remind the learners of the basic properties of factors and multiples.

To introduce the rules, play the game as a class, on the board, then dedicate the last 15 minutes of each lesson for a week, to playing in pairs. When learners have finished a game, they could play the next game against someone they've not yet played. At the end of each game, ask pairs to analyse why the last few moves led to its end - working out better moves that could have been made to avoid losing.

To start with you could choose not to mention the initial rule that restricts the starting number to a positive even number that is less than 50. Wait until learners discover that the first player can win after just three numbers have been crossed out before discussing the need to restrict the initial number.

Encourage learners to consider the probable next few moves. Game strategies form a natural context for developing deductive logic.

The lesson could focus on accuracy of calculation - with teacher interventions to get learners sharing their mental strategies.

Switch the challenge from winning the game to covering as many numbers as possible. Learners can again work in pairs trying to find the longest sequence of numbers that can be crossed out. Can more than half the numbers be crossed out?

This challenge could run for an extended period. The longest sequence can be displayed on a noticeboard and learners can be challenged to improve on it; any improved sequences can be added to the noticeboard. Ask learners to explain why their choice of numbers is good. It is possible to get a chain of 74 numbers. Can your class find one that long or longer?

Key questions

- Do you have any winning strategies?
- Are there any numbers you shouldn't go to?

Follow up

Patterns of multiples: https://aiminghigh.aimssec.ac.za/years-5-8-multiple-patterns/

Finding prime numbers: https://aiminghigh.aimssec.ac.za/years-6-9-prime-sieve/

Multiples and cog wheels: https://aiminghigh.aimssec.ac.za/years-6-10-turning-cogs/

Special properties of multiples of 37:
https://aiminghigh.aimssec.ac.za/years-4-to-7-magic-of-37/

Multiply 3 numbers for the volume of a cuboid:
https://aiminghigh.aimssec.ac.za/years-6-to-8-same-volume/

Patterns of certain multiples of 9:
https://aiminghigh.aimssec.ac.za/years-6-9-times-nine/

About multiples: https://aiminghigh.aimssec.ac.za/years-6-10-minimising-output/