



MULTIPLICATION CHALLENGE

Use the digits 1 to 6, only once, in the six boxes to make the multiplication correct.

$$\begin{array}{r} \square \square \\ \square \\ \hline \square \square \square \end{array} \times$$

How many ways can you do this?

How can you be sure?

HELP

How are you going to solve this problem?

Are you going to use trial and error to solve this problem?

Can you think of a systematic way of finding the answer(s)? Remember you can only use the numbers 1 to 6 once.

Thinking systematically means you have a plan to look at all the possibilities in an ordered way.

For example, you might start with the two digit numbers that begin with the number 1.

11, 12, 13, 14, 15, 16

Already we can see that 11, is not possible, as you can only use the digit 1 once. Now what digits will we multiply these numbers with?

Remember the answer must be a three-digit number.

If I multiply each of these numbers by the largest number 6, what do I find?

I cannot multiply 16 by 6 as I can only use the number 6 once.

The other numbers multiplied by 6 have answer with two digits. We need the answer to have three digits so none of these numbers are possible.

Now thinking systematically, list all of the numbers that could start with 2.

21, 22(**no-only allowed one 2**), 23, 24, 25, 26

Now remember the answer must result in a three-digit number and you are only allowed to

use the digits 1 to 6 once.

Good luck, I'm sure you can solve this problem.

NEXT

Congratulations you have solved the problem.

Now I want you to write down how you checked that you had all the possible solutions.

Imagine you have to explain to the other learners how to solve the problem systematically.

How did you do this?

You could look at the help section which introduces the idea of finding the answer(s) systematically.

Some of the other learners may be finding this quite difficult. How would you explain to them the systematic approach you used to find the answer(s).

NOTES FOR TEACHERS

SOLUTION

Possible two digits numbers

11, 12, 13, 14, 15, 16

21, ~~22~~, 23, 24, 25, 26

31, 32, 33, 34, 35, 36

41, 42, 43, 44, 45, 46

51, 52, 53, 54, 55, 56

61, 62, 63, 64, 65, 66

— These numbers are not possible as you can only use the digits 1 to 6 once.

— These numbers are not possible as they only have a two-digit answer when they are multiplied by the biggest digit 6.

For the remaining numbers;

Check that the answer has three digits

Check that the digits are not repeated between 1 and 6 in the sum or in the answer.

Check that the answer does not contain zero or a digit larger than 6.

For example, $51 \times 1 = 51$ —

$51 \times 2 = 102$ —

$51 \times 3 = 153$ —

$51 \times 4 = 204$ —

$51 \times 5 = 505$ —

$51 \times 6 = 256$ —

You should find that the only solution is $54 \times 3 = 162$

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 fingers for C and 4 fingers for D”.

Which digit can go in the box to make the calculation correct?

$$\begin{array}{r} \begin{array}{|c|c|} \hline 7 & \square \\ \hline \end{array} & \times \\ \begin{array}{|c|} \hline 5 \\ \hline \end{array} & \\ \hline \begin{array}{|c|c|c|} \hline 3 & 6 & 5 \\ \hline \end{array} & \end{array}$$

- A. 1
- B. 3
- C. 5
- D. 7

1. Notice how the learners respond. Ask a learner who gave answer A to explain why he or she gave that answer. 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 reasons for their answers. Putting thoughts into words may help them to gain better understanding and improve their communication skills.
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. Again ask the class 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. If the concept is needed for the lesson to follow, explain the right answer or give a remedial task.

The correct answer is B.

Possible misconceptions:

C. and D. Either learners did not understand the question or they do not understand multiplication beyond the first column.

Why do this activity?

This activity encourages learners to think of a systematic approach to check all the possible permutations and hence find the solution to the problem. It also encourages learners to think through their approach by asking them to explain to their fellow learners how they solved the problem.

Learning objectives

In doing this activity students will have an opportunity to:

- Practice multiplication skills;
- Develop a systematic approach to solving a problem;
- Explain their systematic approach to fellow learners.

Generic competences

In doing this activity students will have an opportunity to:
think mathematically, reason logically and give explanations;
work in a team, collaborate and work with a partner or group;
communicate in writing, speaking and listening.

Follow up

Target Multiplication

<https://aiminghigh.aimssec.ac.za/years-4-7-target-multiplication/>

Spot the Mistake <https://aiminghigh.aimssec.ac.za/years-4-7-spot-the-mistake/>

Two by Two Puzzle <https://aiminghigh.aimssec.ac.za/years-4-7-two-by-two-puzzle/>

MD <https://aiminghigh.aimssec.ac.za/years-4-7-md/>

Check-It Game with multiplication and division

<https://aiminghigh.aimssec.ac.za/years-4-to-10-checkit-game/>



Go to the **AIMSSEC AIMING HIGH** website for lesson ideas, solutions and curriculum links: <http://aiminghigh.aimssec.ac.za>

Subscribe to the **MATHS TOYS YouTube Channel**

<https://www.youtube.com/c/mathstoys>

Download the whole AIMSSEC collection of resources to use offline with the **AIMSSEC App** see <https://aimssec.app> or find it on Google Play.