Andrew Brandt 9-17-22

The first thing that comes to mind is to solve the inputs for a value. There were three possible answers given for number one. Two of them did not work because there are only certain numbers that can be used.

$$(2 * 4) - (1 - 7)$$

$$5 + 2 * 1 - 6$$

$$(3 * 4)/6 - 1$$

Evaluating each of these equals 1.

Before I go any further, I need to look at the assumptions that I have just made.

1. The order of operations that is being used
2. the arrangement of the numbers

I am assuming the standard order of operations described in the PEMDAS acronym. Based on the inputs that did not work due to the limited numbers that can be used, I have come to assume that the arrangement of the

numbers does not matter as long as it equals the correct number.
If I assume that the key to open the door is making the numbers equal the door number, then the second door must equal 2

$$(3 * 4)/(6 * 1)$$

Once again, using the assumed order of operations, the numbers equal 2, corresponding to the door number With

the given information, we can check this one more time for the third door.

$$1 + (3 * 4)/6$$

This does in fact once again correspond to the door number. Now I want to review my rules for opening the door before I try to unlock the rest of the doors

1. Only the numbers 1,3,4 and 6 can be used
2. An operator must separate all the digits
3. No fractions
4. only +,*,/,- can be used

5. all of the four possible digits must be used

This seems good enough, but can these four digits really be arranged to equal numbers 1-32?

1 3 4 6 + − × /

4

(6 · 4) + (3 − 1)

5. (6 − 4) + (3 × 1)

6. (6 − 4) + (3 + 1)

7. (6 + 4) − (3 × 1)

8 (6 + 4) − (3 − 1)

9. (6 / 3) × 4 + 1

10. (3 + 1) × 4 − 6

11. (6 − 1) × 3 − 4

12. (6 / 3) × (4 × 1)

13 (6 / 3) × 4 + 1

14. (6 / 1) × 3 − 4

15 (4 − 1) × 3 + 6

16. (3 − 1) × 6 + 4

17. (6 − 1) × 4 − 3

18. (3 × 4) + 6 × 1

19. (6 − 1) × 3 + 4

20. (6 + 4) × 3 − 1

21. (6 / 1) × 4 − 3

22. (6 / 1) × 3 + 4

23. (6 − 1) × 4 + 3

24.

25 (6 + 1) × 4 − 3

26 6 × 4 + (3 − 1)

27 (6 / 1) × 4 + 3

28 6 × 4 + 3 + 1

29. $(6+4) \times 3 - 1$

30. $(6+4) \times (3 \times 1)$

31 $(6+4) \times 3 + 1$

32. $6 + (3-1) \times 4$

The general solution for these doors was mostly brute force. However, once a brute force solution is found, rearranging the numbers can yield many more solutions. Through this method, many solutions can be found in a short amount of time, but they will not be in order.

The brute force of the solution includes 4 possible numbers and 4 possible expressions. All four numbers must be used, but only 3 operators are used per solution. so it would be 4 factorial and 3 to the 4. I think this would yield a n to the n solution.