

Box Brevity

Solutions



Two Math Cats

1. Orange and Grey, like many cats, love boxes. However, Orange will only play in boxes that are between 11 and 21 ft^3 . On the other hand, Grey will only sleep in boxes between 6 and 16 ft^3 . Help them determine whether or not they will want to sleep in these boxes.

Box	Dimensions (ft)	Volume (ft^3)	Orange	Grey
1	1 x 2 x 3	6	no	no
2	2 x 2 x 3	12	yes	yes
3	1.5 x 5 x 2	9	no	yes
4	3 x 3 x 2	18	yes	no

Orange and Grey should get box number 2.

2. Orange and Grey are playing with a 1 x 1 x 2 box when they suddenly feel the urge to do some math. Help the cats calculate how many times greater the box's volume will be if all the sides are multiplied by:

- 2 The 1 x 1 x 2 becomes 2 x 2 x 4, or 16. It will be **8** times larger.
- 3 The 1 x 1 x 2 becomes 3 x 3 x 6, or 54. It will be **27** times larger.
- 5 The 1 x 1 x 2 becomes 5 x 5 x 10, or 250. It will be **125** times larger.
- 2.5 The 1 x 1 x 2 becomes 2.5 x 2.5 x 5, or 31.25. It will be **15.125** times larger.

Do you notice a pattern?

If each side is multiplied by a number n , the total volume will be n^3 times larger.

3. Orange and Grey are doing a number challenge. One cat will come up with a volume, and the other will come up with the dimensions for such a box. For a correct solution, each side must be an integer greater than 1. Help them find some dimensions!

Goal Volume	Possible* Dimensions	Goal Volume	Possible* Dimensions
24	2 x 2 x 6, 2 x 3 x 4	125	5 x 5 x 5
36	2 x 3 x 6, 3 x 3 x 4	210	3 x 7 x 10, 2 x 7 x 15
48	2 x 2 x 12, 3 x 4 x 4	231	3 x 7 x 11
60	3 x 4 x 5, 2 x 2 x 15	343	7 x 7 x 7
100	4 x 5 x 5, 2 x 5 x 10	1001	7 x 11 x 13

**Other solutions may exist*