SKIP THE TRAPS · SOLVE THE SCALABLES

THE QUESTION | DIGIT ARRANGEMENT

Using 2, 2, 3, 3, 3 as digits, how many distinct numbers greater than 30000 can be formed?

Permutations with Repeats | Conditions on Digits | Hidden Trap: counting numbers that start with 2

(a) 3
Too few. With 3 fixed in front, 2, 2, 3, 3 can be arranged in 6 ways.

(b) 6 ✓
3 in front, then 4!/(2! x 2!) = 6 arrangements of 2, 2, 3, 3.

(c) 9
Too many. It includes numbers that start with 2, which are below 30000.

(d) 12
Too many. All five digits together give only 10 distinct numbers.

CRACK THE HIDDEN RULE

For a number to exceed 30000 using these five digits, the first digit has to be 3, since a leading 2 gives a number below 30000.

Fix the first digit, then arrange the rest and divide by the factorials of repeated digits.

Arrangements = 4! / (2! x 2!) = 6

FIRST DIGIT	REST	COUNT
Must be 3	2, 2, 3, 3	4!/(2! x 2!) = 6

WORKED IN 3 CLEAN STEPS

1 Fix the first digit
A leading 2 gives a number below 30000. So the first digit is 3.

2 Arrange the rest
Digits 2, 2, 3, 3 remain: 4! / (2! x 2!) = 24 / 4 = 6.

3 Cross check
All arrangements: 5! / (2! x 3!) = 10. Those starting with 2: 4. So 10 - 4 = 6.

ANSWER: (b) 6

THE 3-SECOND SHORTCUT

Fix the digit the condition forces, then count the rest and divide for repeats. Confirm by subtracting the bad cases from the total: 10 - 4 = 6.

fix the forced digit | divide for repeats | check by subtraction

→ Distinct numbers means repeated digits must be divided out.
→ The total of 10 shows (d) 12 cannot be right.

WHY ASPIRANTS LOSE MARKS HERE

1. **Using 5! = 120.** Repeated digits make most arrangements identical.
2. **Forgetting the first digit rule.** Starting with 2 gives numbers below 30000.
3. **Dividing by only one factorial.** Both repeats, 2! and 3! or 2! x 2!, must be divided out.

ATTEMPT	FLAG	SKIP
~35 sec	if unsure	never
Fix the first digit, count, done.	Subtract the bad cases from the total.	A quick scorer.

THE ONE-LINE TAKEAWAY

Fix the digit the condition forces, then count the rest and divide for repeats.

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