17 Rowdy Reindeer

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Challenge

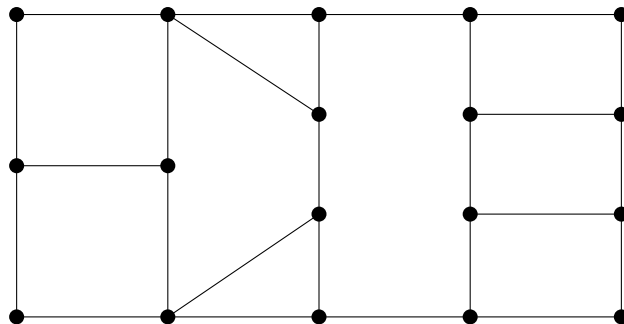Santa has a stable for his reindeer, which is divided into nine enclosures as shown in Figure 1.

Figure 1: Santa's stable.

Santa's elves have ordered red-nosed and brown-nosed reindeer to fill these nine enclosures. Unfortunately, something went wrong: instead of nine reindeer they accidentally ordered twelve. To make it even worse, the reindeer are very territorial: the enclosures of any two brown-nosed reindeer cannot share a wall without the reindeer fighting, and the same holds for the enclosures of any two red-nosed reindeer. Fortunately, a reindeer will never fight with a reindeer whose nose has a different color; so the enclosures of a red-nosed reindeer and a brown-nosed reindeer can share a wall. Also, there will never be any fighting between reindeer whose enclosures only meet in a corner, or do not meet at all.

The elves cannot change the total number of reindeer they have already ordered, but they can still choose the number of red-nosed and brown-nosed reindeer they receive. To accommodate the twelve reindeer, the elves need to create exactly three new enclosures within the existing stable. For this purpose, they to are instructed to build *exactly three new straight walls*. Each of the new walls must be put in between two points where already at least two walls meet. These 18 points are marked in Figure 1. Furthermore, the new walls are neither aloud to cross the old walls nor other new ones.

In how many ways can the elves build the three new straight walls, such that it is possible to give each of the twelve reindeer its own enclosure without any reindeer fighting?

Possible answers:

1. Zero ways, i. e. it is not possible build the three walls as required.

2. One way.

3. Four ways.

4. Five ways.

5. Six ways.

6. Eight ways.

7. Nine ways.

8. Twelve ways.

9. Fourteen ways.

10. Sixteen ways.