23 Mr. Johnson's Broken Christmas Ornaments

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Project: EF-LI-Opt-1

Challenge

Mr. Johnson is a Christmas enthusiast who has five favorite Christmas tree ornaments that he built himself! Sadly, last year, two of them were smashed by his cat Rhombi. This year, to save Christmas Eve, he has to rebuild the two broken ones.
Luckily, he still knows where to buy the nets he needs to craft these ornaments. The nets are flat versions of the ornaments. He has to fold and glue them in the correct places to create three-dimensional objects. He buys the same pack of five nets that he had bought years ago, from which he can craft the five different ornaments that brought him so much joy - but he still has three whole ornaments that look brand new!
In Figure 1 you can see Mr. Johnson's remaining whole ornaments and in Figure 2 the five nets (A-E) he just bought. Help the old man keep track of his ornaments: Which two of the nets create ornaments that are **not** among those that he already has?

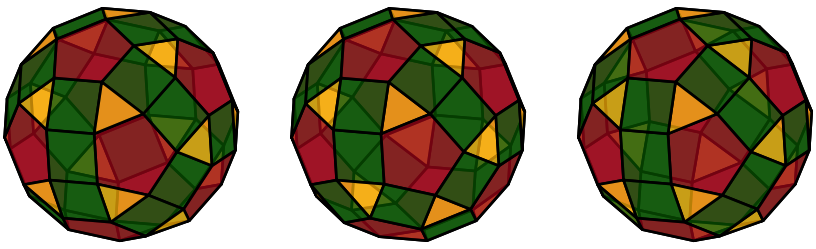
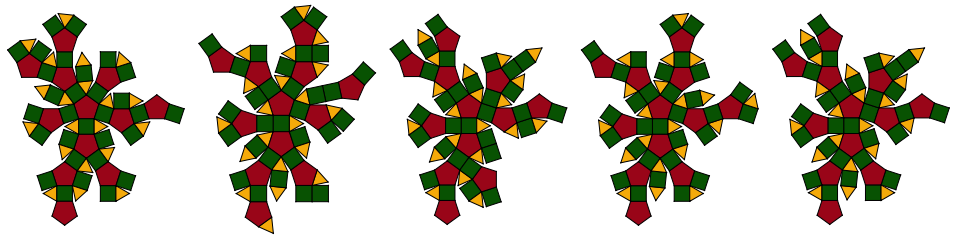


Figure 1: The three remaining intact Christmas ornaments.



A B C D E

Figure 2: The five nets (A–E) used to construct the Christmas ornaments.

Possible answers:

1. A and B
2. B and E
3. A and C
4. C and D
5. B and D
6. A and E
7. A and D
8. B and C
9. D and E
10. C and E

Project reference:

In the project EF-LI-Opt-1, algebro-geometric objects are studied with combinatorial and discrete methods. Polytopes naturally arise in this intersection of disciplines, three of which are depicted in the challenge.