

HALLOWEEN TRANSFORMATIONS

2018 GHOSTS, 2016 WITCHES, AND 2020 GHOULS ASSEMBLE IN THE DARK WOODS ON HALLOWEEN NIGHT. ALL OF THESE MAGICAL CREATURES INTERACT IN STRANGE WAYS. IF A WITCH AND A GHOST QUARREL, THEY EACH TURN INTO A GHOUL. IF A WITCH AND A GHOUL QUARREL, THEY EACH TURN INTO A GHOST. IF A GHOUL AND A GHOST QUARREL, THEY EACH TURN INTO A WITCH. IF TWO CREATURES OF THE SAME KIND QUARREL, THEY JUST STAY AS THEY ARE (ONLY ANGRY). GIVEN THAT THIS IS A RATHER QUARRELSOME LOT, COULD THEY QUARREL TILL ALL OF THEM TURN INTO THE SAME KIND OF CREATURE? WHY OR WHY NOT?

ANSWER: IT IS NOT POSSIBLE. At any transformation, pairwise differences between the number of creatures change By 3. At the beginning pairwise differences are 2,2 and 4. If all creatures turn into the same kind, the pairwise differences Would be 0, 0, 6054, which is divisible by 3. But the initial Differences are not divisible by 3

