

**MATH 8**  
**THE MATH BATTLE!**  
NOV 18, 2018

1. Jane has baked a cake and wants to cut it into pieces (not necessarily equal) so that it can be evenly divided among 8 people or among 10 people. What is the smallest possible number of pieces?
2. A committee has 7 members. They keep some important documents in a safe. Can you come up with a way to put some locks on the safe and give the keys to these locks to the committee members so that at least three members need to be present to open the safe?  
(To open the safe, all locks must be unlocked)

3. Solve

$$x = \sqrt{20} + \frac{13}{\sqrt{20} + \frac{13}{\sqrt{20} + \frac{13}{\sqrt{20} + \frac{13}{x}}}}$$

4. 20 computers are connected by cables so that:

- each cable connects two computers
- each computer has at most two cables attached

A system administrator wants to label the cables using color labels so that for each computer, the cables attached to it have different colors. What is the minimal number of colors which would be enough for any configuration of computers?

5. In a regular 5000-gon, 2001 vertices are colored in red. Show that it is possible to choose 3 red vertices which form an isosceles triangle.