



Phone Tree

In case of an emergency radiation leak at a nearby nuclear power plant, the manager is setting up a phone tree to call 10,000 homes in 15 minutes. In round 1, the manager calls 3 homes. In round 2, the person called in each of the 3 homes calls 3 more homes, who then each call 3 additional homes, and so on until all 10,000 homes have been called. This is called a 3-person phone tree. The manager starts calling at 10:21 and the phone tree must reach all homes in 15 minutes.

A community member is concerned that this may take too long and proposes a 5-person phone tree. The manager would call 5 homes and each person in turn would call 5 more homes and so on. The community leaders want to know:

1. Will the 3-person phone tree work for the current 10,000 homes?
2. Will the 3-person phone tree work for a future population of 50,000 homes?
3. Will the 5-person phone tree be needed now (with 10,000 homes) or in the future (with 50,000 homes)?

YOUR TASK

1. Table or Diagram: For each of the two proposed plans, draw a table or diagram showing how many rounds of calls must be made before all homes are contacted, and explain how you came up with the figures. You need to figure out how many calls, *total*, have been made at the end of each round.
 - Assume that the manager starts the first call at 10:21 am.
 - Assume that each call lasts 1 minute, including dialing time.
 - Assume that the next round of phone calls does not begin until all homes have been contacted during the current round.
2. Exact Time Needed for Each Plan: For each of the two proposed plans, you must state exactly how long it will take to reach all the homes.

Prepare a report for the community leaders. In this report you must:

- State your understanding of your assignment.
- Summarize your findings about the two proposed plans for contacting the current 10,000 homes and the possible future plan for 50,000 homes.
- State your recommendation: Should they use a 3-person tree? Should they use a 5-person tree? What is your recommendation for this community? Give your reasons for your recommendation.

Your work will be evaluated on:

- Your Answer(s).
- Your Understanding of the Problem.
- Your Strategies Used.
- Your Communication.
- Your Reasonableness/Reasoning.