How Many Halves?

Robbie won 300 gumballs and he would like to share the winnings with his friends. He decides to list his friends in order based on how long he has known each of them. He wants to give away the most gumballs to the friend he has known the longest. Then he will give the next friend on the list exactly half as many gumballs as the person he has known the longest. He continues to give away exactly half as many to the next friend on his list, until the pattern cannot continue. (He will not give away half a gumball.)

A) If he gives away 100 gumballs to the first friend on the list, how many friends will receive gumballs? Justify your answer.

B) If the last person he gives gumballs to receives 5 gumballs, what is the largest number of gumballs that the first friend on the list can receive? How many gumballs are given away? Justify your answers.

C) If Robbie wants to maximize the number of friends that receive gumballs, how many gumballs should the first person on the list receive? How many friends receive gumballs? Justify your answers.

More Info:
Check the CEMC at Home webpage on Thursday, May 14 for the solution to this problem. Alternatively, subscribe to Problem of the Week at the link below and have the solution emailed to you on Thursday, May 14.

This CEMC at Home resource is the current grade 3/4 problem from Problem of the Week (POTW). This problem was developed for students in grades 3 and 4, but is also appropriate for students in grades 5 and 6. POTW is a free, weekly resource that the CEMC provides for teachers, parents, and students. Each week, problems from various areas of mathematics are posted on our website and e-mailed to our subscribers. Solutions to the problems are e-mailed one week later, along with a new problem. POTW is available in 5 levels: A (grade 3/4), B (grade 5/6), C (grade 7/8), D (grade 9/10), and E (grade 11/12).

To subscribe to Problem of the Week, to view this week’s grade 5/6 problem, and to find many more past problems and their solutions, visit the Problem of the Week webpage.