Problem

Sally wanted an allowance. Her Mother offers two options:

1. $10 per week for a year, or

2. $204.80 in January, $102.40 in February, and so on, halving her allowance each month for the rest of the year.

   a) Which option would you choose? 1. or 2. 

   b) Determine which option gives the greatest total allowance.

   c) Could you answer part b) without summing the allowances for the entire year?

Extension:

1. Suppose, in option 2, Mother tells Sally her March allowance will be $75, instead of telling her January’s and February’s. Would your answer to b) change?
Hints

**Hint 1** - a) If you chose Option 1, how could you determine the total allowance for the year?

**Hint 2** - b) If you chose Option 2, what would be your allowance in March? In May?

**Hint 3** - c) Given that May’s allowance is $12.80, how does the size of Sally’s allowance compare to this for the remaining seven months of the year?

*Suggestion:* Have students assume there are 52 weeks in a year.

*Extension:*

**Hint 1** - What would Sally’s allowance be for February in this case? In January?
Solution

b) Option 1 would give Sally a total allowance over the year of $10 \times 52 = $520. To find the total for Option 2, we halve each month’s allowance to get the next month’s, and sum them. Starting with January and February, and continuing, we have:

\[
204.80 + 102.40 + 51.20 + 25.60 + 12.80 + 6.40 + 3.20 + 1.60 + 0.80 + 0.40 + 0.20 + 0.10 = $409.50.
\]

Thus Option 1 gives the greatest total allowance.

c) Noting that the first four months’ allowance sum to $384.00, and that the remaining eight months must be less than $13.00 each, we see that the total for Option 2 must be less than $384.00 + ($13.00 \times 8) = $488.00. So it is sufficient to just sum the first four months, and then estimate the remainder of the year, in order to see that Option 1 is better.

Extension:

1. In this case, Sally’s February allowance would be twice her March allowance, or $150, and her January allowance would be twice $150, or $300. Hence, by the end of March, she would already have $300 + $150 + $75 = $525, which is greater than the whole year’s allowance for Option 1.