Grady, Sophia and Ella Zappone were going trick-or-treating together down a long road with houses only on the right side of the street. The addresses of the first three houses were 296 Boo Blvd, 300 Boo Blvd and 304 Boo Blvd, and the house numbers continued to increase by 4 down the entire road. The kids decided to take turns knocking on the doors of the houses, so that Grady knocked at house 296, Sophia knocked at house 300, Ella knocked at house 304, and then Grady started the sequence over at house 308. Grady will knock on the doors of a lot of houses. When Grady gets to the first house with a units digit of 2 and it is his turn to knock, what is the number of the house?

Because the house numbers increase by four and there are three kids, we can see that the numbers of the houses where Grady gets to knock on the door increase by $3 \times 4 = 12$. So, Grady knocks on house 296, 308, 320, and then 332. This is Grady’s first house with a units digit of 2.

Once Grady, Sophia and Ella returned home, a careful process of sorting and trading candy began. The kids agreed on a barter system: 1 piece of bubble gum is worth 4 candy corns, 1 lollipop is worth 3 pieces of bubble gum, and 1 candy bar is worth 2 lollipops. If candy bars are sold in bags of 35 bars and candy corns are sold in bags of 80 candy corns, how many bags of candy corn are equal to a bag of candy bars? Express your answer as a decimal to the nearest tenth.

Let $BG = bubble$ gum, $CC = candy$ corn, $LP = lollipop$ and $CB = candy$ bars. We know:

1 $BG = 4CC$

1 $LP = 3BG$ and

1 $CB = 2LP$.

A bag of candy bars is 35CB. Working backwards, if we multiply both sides of the third equation above by 35, we have $35CB = 70LP$. Multiplying the middle equation above by 70, we have $70LP = 210BG$. Multiplying the first equation above by 210, we have $210BG = 840CC$. Stringing these new equations together, we have $35 \text{ CB} = 70\text{ LP} = 210\text{ BG} = 840\text{ CC}$, so a bag of 35 candy bars is equal to 840 candy corns, which is $840 \div 80 = 10.5$ bags.

Mrs. Zappone was giving out licorice to the kids that came to her door, but by the time trick-or-treating was finished, she had a lot left over. Grady took 1/2 of the licorice that was left in Mrs. Zappone’s big dish, and passed the dish to Sophia. Sophia took 1/3 of the remaining licorice pieces and passed the dish to Ella. Ella then took 1/4 of the licorice that remained and passed the dish to Mr. Zappone who ate the last 12 pieces of licorice. How many pieces of licorice did Grady take?
Let’s work backwards. When Ella got the dish, she took \( \frac{1}{4} \) of what was in the dish and Mr. Zappone ate the rest, which was \( \frac{3}{4} \) of what was in the dish when Ella got it. This means that Mr. Zappone’s 12 pieces were \( \frac{3}{4} \) of the pieces that were in the dish when Ella got it, so there were 16 pieces in the dish when Sophia passed the dish to Ella. Sophia took a third of the pieces in the dish when she got it and passed two-thirds, or 16 pieces to Ella. This means Sophia took 8 pieces, and there were 24 pieces in the dish when she originally got the dish from Grady. If Grady took half the pieces in the dish and then passed along the other half (or 24 pieces) to Sophia, then Grady must have taken 24 pieces of licorice.
Problems
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