From all dwarfs, we can expect four groups of answers and assign them symbols:

- Green hats always telling truth – $green$
- Orange hats starting with answering the 1st question with a lie, therefore telling truth to the 2nd question and lying to the 3rd – $orange_{oddLie}$
- Orange hats starting with truth – opposite of the last group, truth to 1st and 3rd question and lie to 2nd question – $orange_{evenLie}$
- Red hats always lying – red

Graphically, we can represent them in a table of truth, which can be applied to any set of questions:

Answers	$\boldsymbol{green}$	$\boldsymbol{orange_{oddLie}}$	$\boldsymbol{orange_{evenLie}}$	$\boldsymbol{red}$
1st	Truth	Lie	Truth	Lie
2nd	Truth	Truth	Lie	Lie
3rd	Truth	Lie	Truth	Lie

To build our system of equations, we can combine the table of truth with actual questions and answers:

Question	$\boldsymbol{green}$	$\boldsymbol{orange_{oddLie}}$	$\boldsymbol{orange_{evenLie}}$	$\boldsymbol{red}$
Green hat?	**Positive**	**Positive**	Negative	**Positive**
Orange hat?	Negative	**Positive**	Negative	**Positive**
Red hat?	Negative	**Positive**	Negative	Negative

Now we can easily transpose the table to equations where the known number of positive answers is combined with proper addends:

$$\begin{cases} green + orange_{oddLie} + red = 34 \\ orange_{oddLie} + red = 26 \\ orange_{oddLie} = 11 \end{cases}$$

Last equation would be the sum of all dwarfs:

$$green + orange_{oddLie} + orange_{evenLie} + red \ = \ 43$$

Final system:

$$\begin{cases} green + orange_{oddLie} + orange_{evenLie} + red \ = \ 43 \\ green + orange_{oddLie} + red = 34 \\ orange_{oddLie} + red = 26 \\ orange_{oddLie} = 11 \end{cases}$$

The results are:

$$\begin{cases} green = \ 8 \\ orange_{oddLie} = 11 \\ orange_{evenLie} = 9 \\ red = 15 \end{cases}$$

So, the answer is: 20 dwarfs with orange hats attended the party