For the first term, we define our new index to be \( n = m - 2 \). Then, \( n \) starts from 0. Then, the first can be written as \( \sum_{n=0}^{\infty} (n+2)(n+1)a_{n+2}x^n \).

For the second term, we multiply \( x \) in first to get the standard form of series:

\[
\sum_{k=1}^{\infty} ka_k x^{k-1} = \sum_{k=1}^{\infty} ka_k x^k = \sum_{n=1}^{\infty} na_n x^n
\]

Now, the two terms have the same power for \( x \) but the indices don’t agree. To make them agree, we can add a term in the second series \( 0 \ast a_0 \ast x^0 \). Notice that this term is zero and hence we don’t have to subtract to balance. Therefore:

\[
\sum_{n=0}^{\infty} (n+2)(n+1)a_{n+2}x^n + \sum_{n=0}^{\infty} na_n x^n = \sum_{n=0}^{\infty} [(n+2)(n+1)a_{n+2} + na_n]x^n
\]

Merging the left hand side, we have

\[
\sum_{n=1}^{\infty} na_n x^{n-1} + 2 \sum_{n=0}^{\infty} a_n x^n = 0
\]

Hence

\[
a_{n+1} = -\frac{2}{n+1} a_n, \quad n = 0, 1, 2, 3, \ldots
\]

Using this relation, we find a formula for \( a_n \):

\[
a_1 = -\frac{2}{1} a_0
\]

\[
a_2 = -\frac{2}{2} a_1
\]

\[
a_3 = -\frac{2}{3} a_2
\]

\[
\ldots
\]

\[
a_n = -\frac{2}{n} a_{n-1}
\]
Hence, \( a_n = (-2)^n \frac{1}{n(n-1)(n-2)\cdots a_0} = \frac{(-2)^n}{n!} a_0. \)

Hence, \( y = \sum_{n=0}^{\infty} a_n x^n = \sum_{n=0}^{\infty} \frac{(-2)^n}{n!} a_0 x^n = a_0 \sum_{n=0}^{\infty} \frac{(-2x)^n}{n!} = a_0 e^{-2x} \)

Actually, the equation is \( y' + 2y = 0 \). It’s natural to get \( y = Ce^{-2x} \).