2.6B Solving Combination Equations for $n$

These are done similar to solving permutation equations for $n \cdot\binom{n}{r}=n C_{r}=\frac{n!}{r^{\prime}(n-\bar{r})!}$
Example 1:
Example 1:
Solve for $n$ and state restrictions.

$$
\begin{aligned}
& \left.\begin{array}{l}
\text { (A) }{ }_{n} c_{2}=6 \\
\frac{n!}{2!(n-2)!}=6 \\
\text { RT: } \frac{n(n-1)(n-2)!}{2!(n-2)!}=6 \cdot 2!
\end{array} \right\rvert\, \begin{array}{l}
7 n(n-1)=12 \\
n^{2}-n-12=0 \\
(n+3)(n-4)=0 \\
n+3=0, n-4=0 \\
n 7<3,1 n=4
\end{array}
\end{aligned}
$$

(B) ${ }_{n} C_{2}=15$

$$
\begin{gathered}
\frac{n!}{2!(n-2)!}=15 \\
2(n \cdot n-1)(n-2)! \\
2!(n-2)! \\
n(n-1)=30
\end{gathered} \quad\left[\begin{array}{l}
n^{2}-n-30=0 \\
(n+5)(n-6)=0 \\
n+5=0) \frac{n-6=0}{n+5} 1 n=6 \\
n>5
\end{array}\right]
$$

$$
\text { (C) }\binom{n}{\mathbb{Q}}=10
$$

$$
\frac{n!}{2!(n-2)!}=10
$$

$$
\left[\begin{array}{cc}
n+4=0, & n-5=0 \\
n=+4 & , n=5
\end{array}\right.
$$

$$
\begin{gathered}
\frac{2 x}{2+(n-2)(n-2)}=10 \cdot 21 \\
n(n-1)=20 \\
n^{2}-n-20=0 \\
(n+4)(n-5)
\end{gathered}
$$

$$
\begin{aligned}
& \text { (D) } \frac{\not x_{n} C_{2}}{\partial}=\frac{30}{2} \\
& n C_{2}=15
\end{aligned}
$$

See (B) for entive solution.

$$
\begin{aligned}
& \text { (E) }{ }_{n+1} C_{1}=20 \\
& \frac{(n+1)!}{!(n+1-1)!}=20 \\
& \frac{(n+1)!}{1!n!}=20 \\
& \frac{(n+1) n t}{n!}=20 \\
& \rightarrow n+1=20 \\
& n=20-1 \\
& n=19
\end{aligned}
$$

