[06-02-27-MAM11]

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1. Write in simplest form.

   (a) $\frac{8!}{7!}$ (b) $\frac{k!}{(k-1)!}$

2. Write in simplest form.

   (a) $3! + 3 \cdot 3!$ (b) $n! + n \cdot n!$

3. Write in simplest form.

   (a) $\frac{10!}{8!}$ (b) $\frac{(k+2)!}{k!}$

4. Write in simplest form.

   (a) $\frac{1}{3!} + \frac{1}{4!}$ (b) $\frac{1}{k!} + \frac{1}{(k+1)!}$

5. Evaluate.

   (a) $\binom{5}{2}$ (b) $\binom{6}{0}$ (c) $\binom{15}{1}$ (d) $\binom{20}{18}$ (e) $\binom{20}{2}$

6. Evaluate.

   (a) $\binom{6}{4}$ (b) $\binom{8}{0}$ (c) $\binom{7}{1}$ (d) $\binom{18}{15}$ (e) $\binom{18}{3}$

7. Show that

   (a) $\binom{10}{2} = \binom{10}{8}$, (b) $\binom{k+2}{2} = \binom{k+2}{k}$, (c) $\binom{n}{r} = \binom{n}{n-r}$.

8. (a) If $\binom{n}{2} = \binom{n}{4}$, find n. (b) If $\binom{12}{r} = \binom{12}{r-2}$, find r.

9. Show that

   (a) $\frac{r}{r!} = \frac{1}{(r-1)!}$, (b) $\frac{1}{2!\,8!} + \frac{1}{3!\,7!} = \frac{11}{3!\,8!}$,

   (c) $\frac{1}{r!\,n!} + \frac{1}{(r+1)!\,(n-1)!} = \frac{n+r+1}{(r+1)!\,n!}$.

10. Show that

    (a) $\binom{4}{0} + \binom{4}{1} = \binom{5}{1}$, (b) $\binom{n}{0} + \binom{n}{1} = \binom{n+1}{1}$.

11. Show that

    (a) $\binom{6}{1} + \binom{6}{2} = \binom{7}{2}$, (b) $\binom{n}{1} + \binom{n}{2} = \binom{n+1}{2}$.

12. Show that

    (a) $\binom{9}{2} + \binom{9}{3} = \binom{10}{3}$, (b) $\binom{n}{2} + \binom{n}{3} = \binom{n+1}{3}$.

13. Show that

    (a) $\binom{7}{3} = \frac{7 \cdot 6 \cdot 5}{1 \cdot 2 \cdot 3}$, (b) $\binom{n}{3} = \frac{n(n-1)(n-2)}{1 \cdot 2 \cdot 3}$.

14. Show that

    (a) $\binom{10}{4} = \frac{10 \cdot 9 \cdot 8 \cdot 7}{1 \cdot 2 \cdot 3 \cdot 4}$, (b) $\binom{n}{4} = \frac{n(n-1)(n-2)(n-3)}{1 \cdot 2 \cdot 3 \cdot 4}$.

15. Show that $\binom{n}{r} = \frac{n(n-1)(n-2)\cdots(n-r+1)}{r!}$.