$$\sum_{r=0}^{n} r \cdot {}_n\mathrm{C}_r \, a^r b^{n-r} = na(a+b)^{n-1}$$

$\sum_{r=0}^{n} r \cdot {}_{n}\mathrm{C}_{r}\, a^{r} b^{n-r} = na(a+b)^{n-1}$

Start

$$(at+b)^{n} \qquad =$$

Start

$$(at+b)^n = \sum_{r=0}^{n}$$

▸ Start

$$(at+b)^n \quad = \quad \sum_{r=0}^{n} {}_n\mathrm{C}_r$$

Start

$$(at+b)^n = \sum_{r=0}^{n} {}_n\mathrm{C}_r a^r$$

Start

$$(at+b)^n = \sum_{r=0}^{n} {}_n\mathrm{C}_r a^r b^{n-r}$$

Start

$$(at+b)^n = \sum_{r=0}^{n} {}_n\mathrm{C}_r a^r b^{n-r} t^r$$

▸ Start

$$(at+b)^n = \sum_{r=0}^{n} {}_n\mathrm{C}_r a^r b^{n-r} t^r$$

n

$\sum_{r=0}^{n} r \cdot {}_n\mathrm{C}_r\, a^r b^{n-r} = na(a+b)^{n-1}$

Start

$$(at+b)^n = \sum_{r=0}^{n} {}_n\mathrm{C}_r a^r b^{n-r} t^r$$

$$n(at+b)$$

$\sum_{r=0}^{n} r \cdot {}_n\mathrm{C}_r\, a^r b^{n-r} = na(a+b)^{n-1}$

▸ Start

$$(at+b)^n = \sum_{r=0}^{n} {}_n\mathrm{C}_r a^r b^{n-r} t^r$$

$$n(at+b)^{n-1}$$

▸ Start

$$(at+b)^n = \sum_{r=0}^{n} {}_n\mathrm{C}_r a^r b^{n-r} t^r$$

$$n(at+b)^{n-1}a$$

Start

$$(at+b)^n = \sum_{r=0}^{n} {}_n\mathrm{C}_r a^r b^{n-r} t^r$$

$$n(at+b)^{n-1}a = \sum_{r=1}^{n}$$

$\sum_{r=0}^{n} r \cdot {}_n\mathrm{C}_r\, a^r b^{n-r} = na(a+b)^{n-1}$

▸ Start

$$(at+b)^n = \sum_{r=0}^{n} {}_n\mathrm{C}_r a^r b^{n-r} t^r$$

$$n(at+b)^{n-1}a = \sum_{r=1}^{n} r$$

$\sum_{r=0}^{n} r \cdot {}_n\mathrm{C}_r\, a^r b^{n-r} = na(a+b)^{n-1}$

▸ Start

$$
\begin{aligned}
(at+b)^n &= \sum_{r=0}^{n} {}_n\mathrm{C}_r a^r b^{n-r} t^r \\
n(at+b)^{n-1} a &= \sum_{r=1}^{n} r \cdot {}_n\mathrm{C}_r
\end{aligned}
$$

$\sum_{r=0}^{n} r \cdot {}_n\mathrm{C}_r\, a^r b^{n-r} = na(a+b)^{n-1}$

▸ Start

$$(at+b)^n = \sum_{r=0}^{n} {}_n\mathrm{C}_r a^r b^{n-r} t^r$$

$$n(at+b)^{n-1} a = \sum_{r=1}^{n} r \cdot {}_n\mathrm{C}_r a^r$$

$\sum_{r=0}^{n} r \cdot {}_n\mathrm{C}_r\, a^r b^{n-r} = na(a+b)^{n-1}$

Start

$$
\begin{aligned}
(at+b)^n &= \sum_{r=0}^{n} {}_n\mathrm{C}_r a^r b^{n-r} t^r \\
n(at+b)^{n-1}a &= \sum_{r=1}^{n} r \cdot {}_n\mathrm{C}_r a^r b^{n-r}
\end{aligned}
$$

Start

$$(at+b)^n = \sum_{r=0}^{n} {}_n\mathrm{C}_r a^r b^{n-r} t^r$$

$$n(at+b)^{n-1}a = \sum_{r=1}^{n} r \cdot {}_n\mathrm{C}_r a^r b^{n-r} t^{r-1}$$

Start

$$(at+b)^n = \sum_{r=0}^{n} {}_n\mathrm{C}_r a^r b^{n-r} t^r$$

$$n(at+b)^{n-1}a = \sum_{r=1}^{n} r \cdot_n \mathrm{C}_r a^r b^{n-r} t^{r-1}$$

$$n(at+b)^{n-1}a$$

Start

$$
\begin{aligned}
(at+b)^n &= \sum_{r=0}^{n} {}_n\mathrm{C}_r a^r b^{n-r} t^r \\
n(at+b)^{n-1}a &= \sum_{r=1}^{n} r \cdot {}_n\mathrm{C}_r a^r b^{n-r} t^{r-1}
\end{aligned}
$$

$$n(at+b)^{n-1}at$$

$\sum_{r=0}^{n} r \cdot {}_n\mathrm{C}_r\, a^r b^{n-r} = na(a+b)^{n-1}$

▸ Start

$$(at+b)^n = \sum_{r=0}^{n} {}_n\mathrm{C}_r a^r b^{n-r} t^r$$

$$n(at+b)^{n-1}a = \sum_{r=1}^{n} r \cdot {}_n\mathrm{C}_r a^r b^{n-r} t^{r-1}$$

$$n(at+b)^{n-1}at = \sum_{r=1}^{n} r \cdot {}_n\mathrm{C}_r \cdot a^r b^{n-r}$$

Start

$$\begin{aligned}
(at+b)^n &= \sum_{r=0}^{n} {}_n\mathrm{C}_r a^r b^{n-r} t^r \\
n(at+b)^{n-1}a &= \sum_{r=1}^{n} r \cdot_n \mathrm{C}_r a^r b^{n-r} t^{r-1} \\
n(at+b)^{n-1}at &= \sum_{r=1}^{n} r \cdot_n \mathrm{C}_r \cdot a^r b^{n-r} t^r
\end{aligned}$$

▸ Start

$$
\begin{aligned}
(at+b)^n &= \sum_{r=0}^{n} {}_n\mathrm{C}_r a^r b^{n-r} t^r \\
n(at+b)^{n-1}a &= \sum_{r=1}^{n} r \cdot {}_n\mathrm{C}_r a^r b^{n-r} t^{r-1} \\
n(at+b)^{n-1}at &= \sum_{r=1}^{n} r \cdot {}_n\mathrm{C}_r \cdot a^r b^{n-r} t^r = \sum^{n}
\end{aligned}
$$

$\sum_{r=0}^{n} r \cdot {}_n\mathrm{C}_r\, a^r b^{n-r} = na(a+b)^{n-1}$

Start

$$
\begin{aligned}
(at+b)^n &= \sum_{r=0}^{n} {}_n\mathrm{C}_r a^r b^{n-r} t^r \\
n(at+b)^{n-1}a &= \sum_{r=1}^{n} r \cdot {}_n\mathrm{C}_r a^r b^{n-r} t^{r-1} \\
n(at+b)^{n-1}at &= \sum_{r=1}^{n} r \cdot {}_n\mathrm{C}_r \cdot a^r b^{n-r} t^r = \sum_{r=0}^{n}
\end{aligned}
$$

Start

$$\begin{aligned}
(at+b)^n &= \sum_{r=0}^{n} {}_n\mathrm{C}_r a^r b^{n-r} t^r \\
n(at+b)^{n-1}a &= \sum_{r=1}^{n} r \cdot {}_n\mathrm{C}_r a^r b^{n-r} t^{r-1} \\
n(at+b)^{n-1}at &= \sum_{r=1}^{n} r \cdot {}_n\mathrm{C}_r \cdot a^r b^{n-r} t^r = \sum_{r=0}^{n} r \cdot {}_n\mathrm{C}_r \cdot a^r b^{n-r} t^r
\end{aligned}$$

▸ Start

$$(at+b)^n = \sum_{r=0}^{n} {}_n\mathrm{C}_r a^r b^{n-r} t^r$$

$$n(at+b)^{n-1}a = \sum_{r=1}^{n} r \cdot {}_n\mathrm{C}_r a^r b^{n-r} t^{r-1}$$

$$n(at+b)^{n-1}at = \sum_{r=1}^{n} r \cdot {}_n\mathrm{C}_r \cdot a^r b^{n-r} t^r = \sum_{r=0}^{n} r \cdot {}_n\mathrm{C}_r \cdot a^r b^{n-r} t^r$$

n

▸ Start

$$
\begin{aligned}
(at+b)^n &= \sum_{r=0}^{n} {}_n\mathrm{C}_r a^r b^{n-r} t^r \\
n(at+b)^{n-1}a &= \sum_{r=1}^{n} r \cdot {}_n\mathrm{C}_r a^r b^{n-r} t^{r-1} \\
n(at+b)^{n-1}at &= \sum_{r=1}^{n} r \cdot {}_n\mathrm{C}_r \cdot a^r b^{n-r} t^r = \sum_{r=0}^{n} r \cdot {}_n\mathrm{C}_r \cdot a^r b^{n-r} t^r
\end{aligned}
$$

$$n(a+b)^{n-1}$$

$\sum_{r=0}^{n} r \cdot_n \mathrm{C}_r\, a^r b^{n-r} = na(a+b)^{n-1}$

▸ Start

$$
\begin{aligned}
(at+b)^n &= \sum_{r=0}^{n} {}_n\mathrm{C}_r a^r b^{n-r} t^r \\
n(at+b)^{n-1}a &= \sum_{r=1}^{n} r \cdot_n \mathrm{C}_r a^r b^{n-r} t^{r-1} \\
n(at+b)^{n-1}at &= \sum_{r=1}^{n} r \cdot_n \mathrm{C}_r \cdot a^r b^{n-r} t^r = \sum_{r=0}^{n} r \cdot_n \mathrm{C}_r \cdot a^r b^{n-r} t^r \\
n(a+b)^{n-1}a &
\end{aligned}
$$

▸ Start

$$(at+b)^n = \sum_{r=0}^{n} {}_n\mathrm{C}_r a^r b^{n-r} t^r$$

$$n(at+b)^{n-1}a = \sum_{r=1}^{n} r \cdot {}_n\mathrm{C}_r a^r b^{n-r} t^{r-1}$$

$$n(at+b)^{n-1}at = \sum_{r=1}^{n} r \cdot {}_n\mathrm{C}_r \cdot a^r b^{n-r} t^r = \sum_{r=0}^{n} r \cdot {}_n\mathrm{C}_r \cdot a^r b^{n-r} t^r$$

$$n(a+b)^{n-1}a = \sum_{r=0}^{n}$$

$\sum_{r=0}^{n} r \cdot_n \mathrm{C}_r\, a^r b^{n-r} = na(a+b)^{n-1}$

Start

$$(at+b)^n = \sum_{r=0}^{n} {}_n\mathrm{C}_r a^r b^{n-r} t^r$$

$$n(at+b)^{n-1}a = \sum_{r=1}^{n} r \cdot_n \mathrm{C}_r a^r b^{n-r} t^{r-1}$$

$$n(at+b)^{n-1}at = \sum_{r=1}^{n} r \cdot_n \mathrm{C}_r \cdot a^r b^{n-r} t^r = \sum_{r=0}^{n} r \cdot_n \mathrm{C}_r \cdot a^r b^{n-r} t^r$$

$$n(a+b)^{n-1}a = \sum_{r=0}^{n} r \cdot_n \mathrm{C}_r \cdot a^r b^{n-r}$$

▸ Start

$$(at+b)^n = \sum_{r=0}^{n} {}_n\mathrm{C}_r a^r b^{n-r} t^r$$

$$n(at+b)^{n-1}a = \sum_{r=1}^{n} r \cdot {}_n\mathrm{C}_r a^r b^{n-r} t^{r-1}$$

$$n(at+b)^{n-1}at = \sum_{r=1}^{n} r \cdot {}_n\mathrm{C}_r \cdot a^r b^{n-r} t^r = \sum_{r=0}^{n} r \cdot {}_n\mathrm{C}_r \cdot a^r b^{n-r} t^r$$

$$n(a+b)^{n-1}a = \sum_{r=0}^{n} r \cdot {}_n\mathrm{C}_r \cdot a^r b^{n-r}$$

$$\therefore$$

Start

$$(at+b)^n = \sum_{r=0}^{n} {}_nC_r a^r b^{n-r} t^r$$

$$n(at+b)^{n-1}a = \sum_{r=1}^{n} r \cdot_n C_r a^r b^{n-r} t^{r-1}$$

$$n(at+b)^{n-1}at = \sum_{r=1}^{n} r \cdot_n C_r \cdot a^r b^{n-r} t^r = \sum_{r=0}^{n} r \cdot_n C_r \cdot a^r b^{n-r} t^r$$

$$n(a+b)^{n-1}a = \sum_{r=0}^{n} r \cdot_n C_r \cdot a^r b^{n-r}$$

$$\therefore \sum_{r=0}^{n}$$

Start

$$(at+b)^n = \sum_{r=0}^{n} {}_nC_r a^r b^{n-r} t^r$$

$$n(at+b)^{n-1}a = \sum_{r=1}^{n} r \cdot {}_n C_r a^r b^{n-r} t^{r-1}$$

$$n(at+b)^{n-1}at = \sum_{r=1}^{n} r \cdot {}_n C_r \cdot a^r b^{n-r} t^r = \sum_{r=0}^{n} r \cdot {}_n C_r \cdot a^r b^{n-r} t^r$$

$$n(a+b)^{n-1}a = \sum_{r=0}^{n} r \cdot {}_n C_r \cdot a^r b^{n-r}$$

$$\therefore \sum_{r=0}^{n} r$$

$\sum_{r=0}^{n} r \cdot_n \mathrm{C}_r\, a^r b^{n-r} = na(a+b)^{n-1}$

Start

$$
\begin{aligned}
(at+b)^n &= \sum_{r=0}^{n} {}_n\mathrm{C}_r a^r b^{n-r} t^r \\
n(at+b)^{n-1}a &= \sum_{r=1}^{n} r \cdot_n \mathrm{C}_r a^r b^{n-r} t^{r-1} \\
n(at+b)^{n-1}at &= \sum_{r=1}^{n} r \cdot_n \mathrm{C}_r \cdot a^r b^{n-r} t^r = \sum_{r=0}^{n} r \cdot_n \mathrm{C}_r \cdot a^r b^{n-r} t^r \\
n(a+b)^{n-1}a &= \sum_{r=0}^{n} r \cdot_n \mathrm{C}_r \cdot a^r b^{n-r}
\end{aligned}
$$

$$\therefore \sum_{r=0}^{n} r \cdot_n \mathrm{C}_r$$

Start

$$(at+b)^n = \sum_{r=0}^{n} {}_n\mathrm{C}_r a^r b^{n-r} t^r$$

$$n(at+b)^{n-1}a = \sum_{r=1}^{n} r \cdot {}_n\mathrm{C}_r a^r b^{n-r} t^{r-1}$$

$$n(at+b)^{n-1}at = \sum_{r=1}^{n} r \cdot {}_n\mathrm{C}_r \cdot a^r b^{n-r} t^r = \sum_{r=0}^{n} r \cdot {}_n\mathrm{C}_r \cdot a^r b^{n-r} t^r$$

$$n(a+b)^{n-1}a = \sum_{r=0}^{n} r \cdot {}_n\mathrm{C}_r \cdot a^r b^{n-r}$$

$$\therefore \sum_{r=0}^{n} r \cdot {}_n\mathrm{C}_r\, a^r$$

$\sum_{r=0}^{n} r \cdot {}_n\mathrm{C}_r\, a^r b^{n-r} = na(a+b)^{n-1}$

Start

$$(at+b)^n = \sum_{r=0}^{n} {}_n\mathrm{C}_r a^r b^{n-r} t^r$$

$$n(at+b)^{n-1}a = \sum_{r=1}^{n} r \cdot {}_n\mathrm{C}_r a^r b^{n-r} t^{r-1}$$

$$n(at+b)^{n-1}at = \sum_{r=1}^{n} r \cdot {}_n\mathrm{C}_r \cdot a^r b^{n-r} t^r = \sum_{r=0}^{n} r \cdot {}_n\mathrm{C}_r \cdot a^r b^{n-r} t^r$$

$$n(a+b)^{n-1}a = \sum_{r=0}^{n} r \cdot {}_n\mathrm{C}_r \cdot a^r b^{n-r}$$

$$\therefore \sum_{r=0}^{n} r \cdot {}_n\mathrm{C}_r\, a^r b^{n-r}$$

$\sum_{r=0}^{n} r \cdot_n \mathrm{C}_r\, a^r b^{n-r} = na(a+b)^{n-1}$

▸ Start

$$
\begin{aligned}
(at+b)^n &= \sum_{r=0}^{n} {}_n\mathrm{C}_r a^r b^{n-r} t^r \\
n(at+b)^{n-1}a &= \sum_{r=1}^{n} r \cdot_n \mathrm{C}_r a^r b^{n-r} t^{r-1} \\
n(at+b)^{n-1}at &= \sum_{r=1}^{n} r \cdot_n \mathrm{C}_r \cdot a^r b^{n-r} t^r = \sum_{r=0}^{n} r \cdot_n \mathrm{C}_r \cdot a^r b^{n-r} t^r \\
n(a+b)^{n-1}a &= \sum_{r=0}^{n} r \cdot_n \mathrm{C}_r \cdot a^r b^{n-r}
\end{aligned}
$$

$$\therefore \sum_{r=0}^{n} r \cdot_n \mathrm{C}_r\, a^r b^{n-r} = n$$

Start

$$
\begin{aligned}
(at+b)^n &= \sum_{r=0}^{n} {}_n\mathrm{C}_r a^r b^{n-r} t^r \\
n(at+b)^{n-1}a &= \sum_{r=1}^{n} r \cdot_n \mathrm{C}_r a^r b^{n-r} t^{r-1} \\
n(at+b)^{n-1}at &= \sum_{r=1}^{n} r \cdot_n \mathrm{C}_r \cdot a^r b^{n-r} t^r = \sum_{r=0}^{n} r \cdot_n \mathrm{C}_r \cdot a^r b^{n-r} t^r \\
n(a+b)^{n-1}a &= \sum_{r=0}^{n} r \cdot_n \mathrm{C}_r \cdot a^r b^{n-r}
\end{aligned}
$$

$$\therefore \sum_{r=0}^{n} r \cdot_n \mathrm{C}_r\, a^r b^{n-r} = na$$

$\sum_{r=0}^{n} r \cdot_n \mathrm{C}_r\, a^r b^{n-r} = na(a+b)^{n-1}$

Start

$$
\begin{aligned}
(at+b)^n &= \sum_{r=0}^{n} {}_n\mathrm{C}_r a^r b^{n-r} t^r \\
n(at+b)^{n-1}a &= \sum_{r=1}^{n} r \cdot_n \mathrm{C}_r a^r b^{n-r} t^{r-1} \\
n(at+b)^{n-1}at &= \sum_{r=1}^{n} r \cdot_n \mathrm{C}_r \cdot a^r b^{n-r} t^r = \sum_{r=0}^{n} r \cdot_n \mathrm{C}_r \cdot a^r b^{n-r} t^r \\
n(a+b)^{n-1}a &= \sum_{r=0}^{n} r \cdot_n \mathrm{C}_r \cdot a^r b^{n-r}
\end{aligned}
$$

$$\therefore \sum_{r=0}^{n} r \cdot_n \mathrm{C}_r\, a^r b^{n-r} = na(a+b)$$

Start

$$\begin{aligned}
(at+b)^n &= \sum_{r=0}^{n} {}_n\mathrm{C}_r a^r b^{n-r} t^r \\
n(at+b)^{n-1}a &= \sum_{r=1}^{n} r \cdot {}_n\mathrm{C}_r a^r b^{n-r} t^{r-1} \\
n(at+b)^{n-1}at &= \sum_{r=1}^{n} r \cdot {}_n\mathrm{C}_r \cdot a^r b^{n-r} t^r = \sum_{r=0}^{n} r \cdot {}_n\mathrm{C}_r \cdot a^r b^{n-r} t^r \\
n(a+b)^{n-1}a &= \sum_{r=0}^{n} r \cdot {}_n\mathrm{C}_r \cdot a^r b^{n-r}
\end{aligned}$$

$$\therefore \sum_{r=0}^{n} r \cdot {}_n\mathrm{C}_r\, a^r b^{n-r} = na(a+b)^{n-1}$$

Home

END