$$g(x) = \ln(x) = \ln(\underbrace{9+(x-9)})$$

related to integration + geometric

series ....

$$g'(x) = (\ln x)' = \frac{1}{x} = \frac{1}{9+x-9}$$

$$= \frac{1}{9}\left(\frac{1}{1+\frac{x-9}{9}}\right)$$

$$= \frac{1}{9}\left(\frac{1}{1-\underbrace{\left(-\frac{(x-9)}{9}\right)}_{r}}\right) = \frac{1}{9}\cdot\underbrace{\frac{1}{1-r}}$$

$$= \frac{1}{9}\sum_{n=0}^{\infty} r^n \checkmark \text{ where } r = \frac{-(x-9)}{9}$$

$$g'(x) = \frac{1}{9}\sum_{n=0}^{\infty}\left(-\frac{(x-9)}{9}\right)^n = \frac{1}{9}\sum_{n=0}^{\infty}(-1)^n\frac{(x-9)^n}{9^n}$$

$$g(x) = \int g'(x)\,dx = \frac{1}{9}\sum_{n=0}^{\infty}\frac{(-1)^n}{9^n}\int(x-9)^n\,dx$$

$$= \frac{1}{9}\sum_{n=0}^{\infty}\frac{(-1)^n}{9^n}\frac{(x-9)^{n+1}}{n+1} + C = \boxed{\sum_{n=0}^{\infty}\frac{(-1)^n}{9^{n+1}}\frac{(x-9)^{n+1}}{n+1} + \ln 9}$$