

31.3

$$S = \log 2 + \log 2^2 + \log 2^3 + \cdots + \log 2^{10}$$

$$S = \log(2 \cdot 2^2 \cdot 2^3 \cdots 2^{10}) = \log 2^{(1+2+3+\cdots+10)} = \frac{10(10+1)}{2} \log 2 = 55 \log 2$$