Theorem The limiting distribution of a Pascal(n, p) random variable is $N(\mu, \sigma^2)$ with $\mu = n/p$ as $n \to \infty$.

Proof A Pascal(n, p) random variable is the sum of n independent and identically distributed geometric(p) random variables $X_1, X_2, \dots X_n$. From the central limit theorem, as n approaches infinity, the distribution of the sum

$$X = \sum_{i=1}^{n} X_i$$

approaches normal distribution with mean $n\mu$ where μ is $1/p$, the mean of the geometric(p) distribution. So the limiting distribution of of a Pascal(n, p) random variable is $N(\mu, \sigma^2)$ with $\mu = n/p$ as $n \to \infty$.