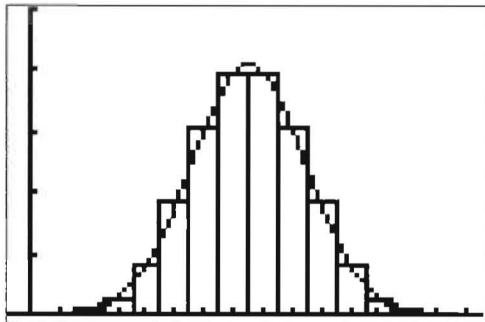


Example - Consider tossing a coin 15 times. This is a binomial experiment with $N=15$, $P=.5$ and we will let X =number of heads. Since it is binomial, we can find that $\mu = 15 \cdot .5 = 7.5$ and $\sigma = \sqrt{15 \cdot .5 \cdot .5} = \sqrt{3.75}$ (about 1.9).

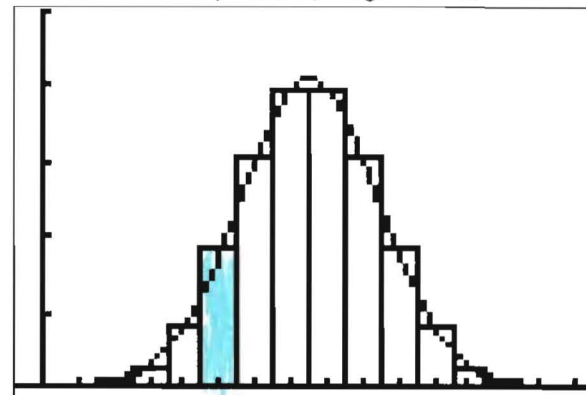
Look at the normal distribution with $\mu = 7.5$ and $\sigma = \sqrt{3.75}$ and the binomial distribution histogram on the same graph:



We will use the normal curve to APPROXIMATE the binomial distribution.

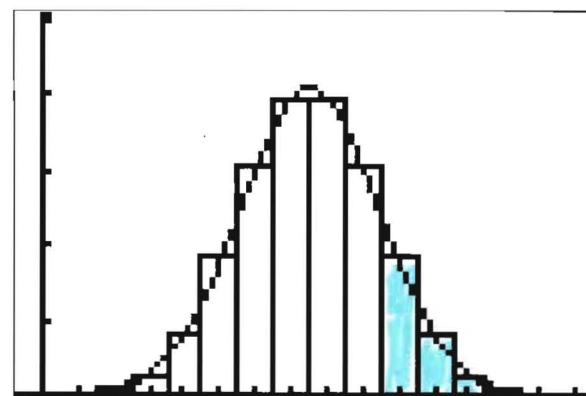
What is the probability that you toss exactly 5 heads?

$$\text{binompdf}(15, .5, 5) = .0916$$



$$\text{normalcdf}(4.5, 5.5, 7.5, \sqrt{3.75}) = .0902$$

What is the probability of more than 9 heads?



$$1 - \text{binomcdf}(15, .5, 9) = .1509$$

$$\text{normalcdf}(9.5, 15.5, 7.5, \sqrt{3.75}) = .1508$$

THE NORMAL CURVE APPROXIMATION TO THE BINOMIAL DISTRIBUTION

At a school 1000 children are exposed to the flu. There is a 35% chance of getting the flu if you are exposed. Use the normal curve approximation to the binomial distribution to estimate the probability that

(a) more than 360 children get the flu. $X = \underline{360}, \dots, \underline{1000}$
 $\text{normalcdf}(360.5, 1000.5, 350, \sqrt{227.5})$
 $= .2432$

(b) fewer than 320 children get the flu. $X = \underline{0}, \dots, \underline{319}$
 $\text{normalcdf}(-.5, 319.5, 350, \sqrt{227.5})$
 $= 0.0216$

(c) between 325 and 375 children get the flu. $X = \underline{326}, \dots, \underline{374}$
 $\text{normalcdf}(325.5, 374.5, 350, \sqrt{227.5})$
 $= 0.8957$

Binomial: success = flu

$$N = 1000, p = .35$$

$$\mu = 1000 \times .35 = 350$$

$$\sigma = \sqrt{1000 \times .35 \times (1 - .35)} = \sqrt{227.5}$$