**Part 7.5: Working Backwards and Using the Formula**

Often we are given harder situations where we are required to work backwards, i.e. we are given the answer and we need to work out some of the parameters of the situation. Sometimes this is easiest to do by trial and error on the calculator, and other times we need to use the formula. Let's look at an example where we can use the formula, and then you'll get to do a series of questions where you can choose the approach.

**Example**
In a factory a quality control system is used to check 10 items at regular intervals. If one or more of them is faulty then the machine needs to be fixed. 88.5% of the time the machine is fine (i.e. no items are faulty in the sample). Calculate the percentage of items produced that are faulty based on these outcomes.

**Answer**
First of all we should write down what we know. We know $x = 0$, $n = 10$ and the answer should be 0.885. If we put all this information into the formula we get:
$$P(X = x) = \binom{n}{x} \pi^x (1 - \pi)^{n-x} = \binom{10}{0} \pi^0 (1 - \pi)^{10-0} = (1 - \pi)^{10} = 0.885$$
If we put $(1 - \pi)^{10} = 0.885$ into solver on the calculator (EQUA → SOLV) we find $\pi = 0.01214$ (4sf) which means 1.214% of the items produced are faulty.

*Note: sometimes the easiest way to solve this is just by trial and error in the calculator.*

**Exercise 7.5**

1. The probability of a student being sick on any given day is 5%.
    a. If the probability that 50 students are away from a school is 0.05779 how many students are at the school?
    b. A certain number of students are away today from a school of 550. This number of students being away occurs 6.65% of the time. How many students are away?

2. An office building has 930 light bulbs.
    a. If the probability that 31 light bulbs are blown is 0.0612, what is the probability that a light bulb blows?
    b. On 6.4% of days the number of light bulbs that are blown today happens, what number of light bulbs is blown if the probability a bulb blows is 4%.