

Name:

There are 50 lottery scratcher tickets in a row (randomly arranged), and it is known that 47% of all such lottery tickets give prizes. A person scratches each ticket in order, starting from the first to the fiftieth; however, she stops when she gets to the 12th prize. What is the probability that she will have to scratch exactly 20 tickets to get exactly 12 prizes?

Solution: As with the World Series HW problem, here we know that the 20th ticket must have a prize. So, we want to know the probability that there are eleven tickets with a prize among the first 19 that she scratches with the 12th ticket also having a prize. Let X be our random variable that counts the number of tickets she will scratch off. [Note: X can take on values between 12 and 50 with positive probability.]

$$P(X = 20) = \binom{19}{11} (.47)^{11} (.53)^8 (.47)$$