22. A bag contains m blue and n yellow marbles. One marble is selected at random from the bag and its colour is noted. It is then returned to the bag along with k other marbles of the same colour. A second marble is now selected at random from the bag. What is the probability that the second marble is blue?

A $\frac{m}{m+n}$ B $\frac{n}{m+n}$ C $\frac{m}{m+n+k}$ D $\frac{m+k}{m+n+k}$ E $\frac{m+n}{m+n+k}$

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22. **A** The probability that the second marble is blue equals P(2nd marble is blue given that the 1st marble is blue) + P(2nd marble is blue given that the 1st marble is yellow), which is

$$\frac{m}{m+n}\times\frac{m+k}{m+n+k}+\frac{n}{m+n}\times\frac{m}{m+n+k}=\frac{m^2+mk+mn}{(m+n)(m+n+k)}=\frac{m(m+k+n)}{(m+n)(m+n+k)}=\frac{m}{m+n}.$$

Note: this expression is independent of k.