Question #15406 The batteries to the remote control for your television have just run out. You find your collection of miscellaneous AA batteries and grab 2 of them to replace the used ones. The box you used to fish out the replacements contained 14 batteries, but you were unaware that 3 of them were faulty and did not work.

a) If the remote control requires two good batteries to operate properly, what is the probability that the remote control now works properly?

b) Given that the remote control is now working, what is the probability that the next two batteries you select from your remaining stash will also work?.

Solution.. a) The set of elementary events is $\Omega = \{(B, B) \mid B \text{ is one of 14 batteries}\}$, hence $|\Omega| = \binom{14}{2}$, $A = \{(B, B) \mid B \text{ is one of that good batteries}\}$m thus $|A| = \binom{11}{2}$, due to classical definition of probability $P(A) = \dfrac{|A|}{|\Omega|} = \dfrac{\frac{11!}{2!9!}}{\frac{14!}{12!2!}} = \dfrac{10 \cdot 11}{13 \cdot 14} = \dfrac{110}{182} = 55/91.$

b) this probability equals $\dfrac{\binom{9}{2}}{\binom{12}{10}} = \dfrac{9 \cdot 8}{11 \cdot 12} = 6/11.$

Answer. 55/91, 6/11.