probability and games the most closely.

Ex 1 You draw two cards from a standard deck **without** replacement. What is the probability that:

a) the first card is a Jack and the second card is a 3?

Using multiplication law

$P = \frac{4}{52} \cdot \frac{4}{51}$ (J, 3)

$= 0.0060 = 0.60\%$

Using combinatorics

$P = \frac{fav}{total} = \frac{{}^{J}4C_1 \cdot {}^{3}4C_1}{{}^{52}C_1 \cdot {}^{51}C_1}$

$= \frac{4}{52} \cdot \frac{4}{51} = 0.60\%$

b) one card is a Jack and the other is a 3?

Using multiplication law

$P = \frac{4}{52} \cdot \frac{4}{51} + \frac{4}{52} \cdot \frac{4}{51}$ (J→3 or 3→J)

$= 0.60\% + 0.60\%$

$= \boxed{1.21\%}$

Using combinatorics

$P = \frac{fav}{total} = \frac{{}^{J}4C_1 \cdot {}^{3}4C_1}{{}^{52}C_2}$ (and)

$= \frac{4 \cdot 4}{1326} = \boxed{1.21\%}$

c) both cards are diamonds?

Using multiplication law

$P = \frac{13}{52} \cdot \frac{12}{51} = 0.0588$

$= 5.88\%$

Using combinatorics

$P = \frac{fav}{total} = \frac{{}^{13}C_2}{{}^{52}C_2}$

$= \frac{78}{1326} = 5.88\%$

d) both cards are different suits?

Using multiplication law

$P = \frac{13}{52} \cdot \frac{39}{51} + \frac{13}{52} \cdot \frac{39}{51} + \frac{13}{52} \cdot \frac{39}{51} + \frac{13}{52} \cdot \frac{39}{51}$

$= 4 \cdot (0.1912) = 76.47\%$

Using combinatorics

$P = \frac{{}_4C_2 \cdot {}_{13}C_1 \cdot {}_{13}C_1}{{}_{52}C_2} =$

$= \frac{1014}{1326} = 76.47\%$

Ex 2 You are trying to use your bank card, but you forgot your 4-digit PIN! Fortunately, you do remember that the first digit is a 3 and the second digit is an odd number. What is the probability you guess your PIN on your first try? *(NOTE: a digit can be 0-9)*

Using multiplication law

$P = \frac{1}{1} \cdot \frac{1}{5} \cdot \frac{1}{10} \cdot \frac{1}{10}$

$= 0.002 = 0.2\%$

Using combinatorics

Given info

$P \Rightarrow \frac{1}{1} \cdot \frac{5}{10} \cdot \frac{10}{10}$

$\frac{fav}{tot} = \frac{1}{500} = 0.2\%$