

Probability and Algebra Problems

Milo and Milly both sit their driving theory test. The probability of passing the test is higher than the probability of failing the test. The probability that Milo passes the test but Millie fails the test is $\frac{21}{100}$. Find the probability that both of them fail the test.

$$P(\text{pass}) = x \quad P(\text{fail}) = 1 - x$$

$$x(1 - x) = 0.21$$

$$\Rightarrow 100x^2 - 100x + 21 = 0$$

$$x = 0.7 \text{ or } x = 0.3$$

So $P(\text{pass}) = 0.7$

$$\therefore P(\text{FF}) = 0.3 \times 0.3 = \underline{\underline{0.09}}$$

There are 9 yellow pencils and some green pencils in a pencil case. Two pencils are pulled out at random. The probability that both pencils are yellow is $\frac{6}{35}$. Find the number of green pencils in the pencil case.

$$x = \text{number of green pencils}$$

$$P(\text{YY}) = \frac{9}{x+9} \times \frac{8}{x+8} = \frac{6}{35}$$

$$\Rightarrow 6x^2 + 102x - 2088 = 0$$

$$x^2 + 17x - 348 = 0$$

$$x = \underline{\underline{12}} \text{ or } x = -29$$

There are x balls in a bag. 11 of the balls are white and the rest are orange. Two balls are chosen at random from the bag. The probability that the first ball chosen is white and the second ball chosen is orange is $\frac{77}{300}$. Find the value of x .

$$\text{No of orange balls} = x - 11$$

$$P(\text{WO}) = \frac{11}{x} \times \frac{x-11}{x-1} = \frac{77}{300}$$

$$\Rightarrow 77x^2 - 3377x + 36300 = 0$$

$$x = \underline{\underline{25}} \text{ or } x = \frac{132}{7}$$

A jar contains only orange sweets and lemon sweets. There is one more orange sweet than there are lemon sweets. Two sweets are chosen at random from the jar. The probability of choosing two lemon sweets is $\frac{11}{50}$. Find the number of orange sweets and the number of lemon sweets in the jar.

$$x = \text{no. of lemon sweets}$$

$$x+1 = \text{no. of orange sweets}$$

$$P(\text{LL}) = \frac{x}{2x+1} \times \frac{x-1}{2x} = \frac{11}{50}$$

$$\Rightarrow 6x = 72$$

$$x = \underline{\underline{12}}$$

There are black and white socks in a drawer. There are four more black socks than white socks. Finn chooses two socks at random from the drawer. The probability of him choosing one of each colour sock is $\frac{48}{95}$. Find the number of white socks and the number of black socks in the drawer.

$$x = \text{white socks} \quad x+4 = \text{black socks}$$

$$P(\text{WB}) + P(\text{BW}) = \frac{48}{95}$$

$$\frac{x}{2x+4} \times \frac{x+4}{2x+3} + \frac{x+4}{2x+4} \times \frac{x}{2x+3} = \frac{48}{95}$$

$$\Rightarrow 2x^2 - 88x + 576 = 0$$

$$x^2 - 44x + 288 = 0$$

$$x = 36 \text{ or } x = 8$$

EITHER 36 white & 40 black
OR 8 white & 12 black