

Baye's Theorem :-

By previously Information

$$P(A|B) = \frac{P(A \cap B)}{P(B)}$$

$$P(B|A) = \frac{P(A \cap B)}{P(A)}$$

$$\Rightarrow \boxed{P(A|B) = \frac{P(B|A) \times P(A)}{P(B)}} \quad \text{Baye's Theorem}$$

Exp:- What is the probability of two girls given (at least one girl ??)

$$P(2G | \text{at least } 1G) = \frac{P(1G/2G) \times P(2G)}{P(1G)}$$

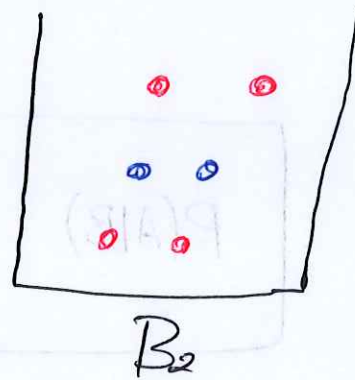
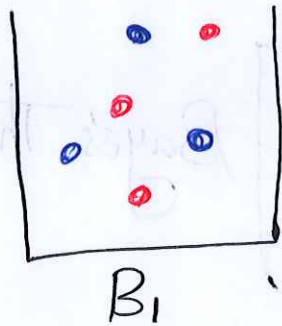
$$= \frac{1 \times \frac{1}{4}}{\frac{3}{4}} = \boxed{\frac{1}{3}}$$

$$\boxed{\frac{2}{2}} \times \frac{1}{4} = \frac{1}{2}$$

Exp: IF I have two different buckets, I'm having balls of different color inside of these two buckets.

IF I randomly draw a blue ball.

What is probability of being in 1st bucket?



sol.

$$P(A|B_1) = \frac{1}{2}$$

Since A : select a blue ball
 B_1 : first Bucket

$$P(A|B_2) = \frac{1}{3}$$

B_2 : Second Bucket

$$P(B_1|A) = \frac{\cancel{P(B_1)} \times P(A|B_1) \times P(B_2)}{P(A)}$$

$$= \frac{\frac{1}{2} \times \frac{1}{2}}{P(A \cap B_1) + P(A \cap B_2)}$$

$$= \frac{\frac{1}{4}}{\frac{5}{12}} = \frac{1}{4} \times \frac{12}{5} = \boxed{\frac{3}{5}}$$

$$P(A) = P(A \cap B_1) + P(A \cap B_2)$$

$$= P(A|B_1) \times P(B_1) + P(A|B_2) P(B_2)$$

$$= \frac{1}{2} \times \frac{1}{2} + \frac{1}{3} \times \frac{1}{2}$$

$$= \frac{1}{4} + \frac{1}{6} = \frac{5}{12}$$

$$P(A|B) = \frac{P(A \cap B)}{P(B)}$$

