Total 5 Balls $\rightarrow$ 3 Red Balls & 2 Blue Balls.

I pick one ball. What is prob that the ball is a Blue Ball?

$$P(BB) = \frac{2}{5}$$

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I pick up the 2nd Ball, What is the prab that it is again a Blue Ball?

Total Balls = 4 $\Rightarrow$ If 1st pick was a red ball

2R & 2B

2nd pick $P(BB) = 2/4$

Total Balls = 4 $\Rightarrow$ If 1st pick was a blue ball

3R & 1B.

$P(BB) = 1/4$

Total Balls = 5 $\Rightarrow$ 3 Red Balls & 2 Blue Balls

I pick 2 balls? What is prob that both the balls are blue balls?

<u>1st pick</u>:- $\boxed{P(B1) = \frac{2}{5}}$

2nd pick Blue Ball :-

$$\boxed{P(BB) = 1/4}$$

P(BB) in 1st time * P(BB) in 2nd time

$$\boxed{\frac{2}{5} * \frac{1}{4} = \frac{2}{20}}$$

		Win		
		False	True	
Century	False	160	154	314
	True	16	30	46
		176	184	360

$P(IW \mid SC) = 30/46$

$P(IL \mid SC) = 16/46$

Given that Sachin is scoring Century

46

$W = 30/46 \quad L = \frac{16}{46}$

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		Wm	
	F	T	
C F	160	154	314
I	16	30	46
	176	184	360

$P(C \mid IW) = 30/184$

$IW = 184$

$P(SC \mid IL) = \frac{16}{176}$

$IL = 176$

C \ Wm	F	T	
F	160	154	314
T	16	30	46
	176	184	360

$P(W) = 184/360$

$P(C) = 46/360$

$$\boxed{P(W \cap C) = \frac{30}{360}}$$

$P(C|W) = 30/184$

$P(W|C) = 30/46$

$$\frac{\frac{30}{\cancel{360}}}{\frac{184}{\cancel{360}}} = \frac{30}{184}$$

$$\boxed{P(C|W) = \frac{P(W \cap C)}{P(W)}}$$

$P(W \cap C) = 30/360$

$P(C) = \frac{46}{360}$

$$\frac{30}{\cancel{360}} \Big/ \frac{46}{\cancel{360}} = \frac{30}{46}$$

$$\boxed{P(W|C) = \frac{P(W \cap C)}{P(C)}}$$

$P(A)$, $\underline{P(B)}$, $P\underline{(A \cap B)}$

$$\boxed{\underline{P(A|B)} = \frac{P(A \cap B)}{P(B)}}$$ ← Conditional Probability ✓

$$\boxed{P(A|B) \times P(B) = P(A \cap B)}$$ ← Multiplication <u>Rule</u>

$P(C|W) = 30/184$

$P(W) = 184/360$

$P(C) = 46/360$

$$\frac{\frac{30}{\cancel{184}} * \frac{\cancel{184}}{\cancel{360}}}{\frac{46}{\cancel{360}}} = \frac{30}{46}$$

$$= P(W|C)$$

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$P(A)$, $P(B)$, $P(A|B)$

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

↳ Bayes Theorem

↳ Back bone of Naive Bayes Algorithm

C \ W	F	T	
F	160	154	314
T	16	30	46 ⇐
	176	184	360

$$P(W) = \frac{184}{360} \qquad P(C) = \frac{46}{360}$$

$$\boxed{P(W \cap C) = \frac{30}{360}}$$

$$P(C \mid W) = \frac{30}{184}$$

$$P(W \mid C) = \frac{30}{46}$$

$$\frac{P(W \cap C)}{P(C)} = \frac{30/\cancel{360}}{46/\cancel{360}} = \frac{30}{46}$$

$$P(W \cap C)/P(W) = \frac{30/360}{184/360} = \frac{30}{184}$$

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

Multiplication Rule $\Rightarrow \boxed{P(A|B) * P(B) = P(A \cap B)}$

Bayes Theorem $\rightarrow \boxed{\underline{P(B|A)} = \frac{P(A|B) * P(B)}{P(A)}}$

$$P(c|x) = \frac{P(x|c)\ P(c)}{P(x)}$$

$P(c) \Rightarrow$ Class Prior Probability

$P(x) \Rightarrow$ Predictor Prior Probability

$P(x|c) \Rightarrow$ Likelihood

$P(c|x) \Rightarrow$ Posterior Probability

Three types of Bayes Theorem

1. Guassian Naive Bayes ← target is continuous
2. Multinomial Naive Bayes ← target is multinomial
   categorical.
3. Bernouli's Naive Bayes ← target is Binary
   categorical