$$P(\text{head}) = \frac{\text{possibility of getting head}}{\text{total possibilities}} = 1/2$$

Addition and Multiplication Rule :

$$P(E \cup F) = P(E) + P(F) - P(E \cap F)$$

find the probability of drawing a red card or a king.

$$P(\text{red}) = 26/52$$

$$P(\text{king}) = 4/52$$

$$P(\text{red and king}) = 2/52$$

$$\therefore P(\text{red or a king}) = P(\text{red}) + P(\text{king}) - P(\text{red} \cap \text{king})$$

$$= \frac{26}{52} + \frac{4}{52} - \frac{2}{52}$$

(82)

Multiplication Rule (Dependent Events):

1) First dice showing 5
2) Sum of the numbers on the two dice is 8.

$$P(E \cap F) = P(E) \times P(F|E)$$

$$= \frac{1}{6} \times \frac{1}{6} = \frac{1}{36} \#$$

Multiplication Rule (Independent Events):

$$P(E \cap F) = P(E) \times P(F)$$

Bayes theorem :

What is the probability that an email is spam given that it contains the word lottery

$P(\text{spam}) = 20\%$

$P(\text{lottery}) = 2\%$

$P(\text{lottery} \mid \text{spam}) = 5\%$

$$P(\text{spam} \mid \text{lottery}) = \frac{P(\text{lottery} \mid \text{spam}) \times P(\text{spam})}{P(\text{lottery})}$$

$$= \frac{5 \times 20}{2} = 50\%$$