

A card is drawn at random from a standard deck. Find the theoretical probability that the card is neither an ace nor a heart.

Solution.

Find the probability that the card is an ace:

$$P(A) = \frac{4}{52} = \frac{1}{13}$$

Find the probability that the card is a heart:

$$P(H) = \frac{13}{52} = \frac{1}{4}$$

We must **subtract the ace of hearts** so we don't double count. So the probability that the card is either a heart or an ace is

$$P_{AH} = P(A) + P(H) - \frac{1}{52} = \frac{16}{52} = \frac{4}{13}$$

The probability that is neither a heart nor an ace is that probability subtracted from 1:

$$P = 1 - \frac{4}{13} = \frac{9}{13}$$

Answer: $P = \frac{9}{13}$.