CC.9–12.S.CP.2

## 3 EXAMPLE Showing that Events are Independent

**The two-way table shows the data from the first example. Show that a flight arriving on time and a flight being a domestic flight are independent events.**

| | Late Arrival | On Time | TOTAL |
|---|---|---|---|
| **Domestic Flight** | 12 | 108 | 120 |
| **International Flight** | 6 | 54 | 60 |
| **TOTAL** | 18 | 162 | 180 |

**A** Let event $A$ be the event that a flight arrives on time. Let event $B$ be the event that a flight is a domestic flight.

To find $P(A)$, $P(B)$, and $P(A \text{ and } B)$ note that there is a total of 180 flights.

There is a total of 162 on-time flights.

So, $P(A) = \frac{162}{180} = \frac{9}{10}$. (on time)

There is a total of 120 domestic flights.

So, $P(B) = \frac{120}{180} = \frac{2}{3}$. (domestic)

There is a total of 108 on-time domestic flights.

So, $P(A \text{ and } B) = \frac{108}{180} = \frac{3}{5}$. (on time + domestic)

| | Late Arrival | On Time (A) | TOTAL |
|---|---|---|---|
| **Domestic Flight (B)** | 12 | 108 | 120 |
| **International Flight** | 6 | 54 | 60 |
| **TOTAL** | 18 | 162 | 180 |

**B** Compare $P(A \text{ and } B)$ and $P(A) \cdot P(B)$.

$P(A) \cdot P(B) = (\frac{9}{10}^{3}_{5}) \cdot (\frac{2}{3}^{1}) = \frac{3}{5}$

So, the events are independent events because $P(A) \cdot P(B) = P(A \text{ and } B)$