

Answer on Question #45601 - Math - Statistics and Probability

Question

A class contains 10 boys and 20 girls of which half the boys and half girls have brown eyes. Find the probability that a student chosen at random is a boy or has brown eyes.

Solution

The probability that a student chosen at random is a boy:

$$P(A) = \frac{10}{10 + 20} = \frac{1}{3}$$

The probability that a student chosen at random has brown eyes:

$$P(B) = \frac{\frac{10}{2} + \frac{20}{2}}{10 + 20} = \frac{1}{2}$$

The probability that a student chosen at random is a boy and he has brown eyes:

$$P(A \text{ and } B) = \frac{5}{10 + 20} = \frac{5}{30} = \frac{1}{6}$$

We observe that $P(A \text{ and } B) = P(A)P(B) = \frac{1}{3} \times \frac{1}{2} = \frac{1}{6}$.

The probability that a student chosen at random is a boy or has brown eyes:

$$\begin{aligned} P(A \text{ or } B) &= P(A) + P(B) - P(A \text{ and } B) = P(A) + P(B) - P(A)P(B) = \\ &= \frac{1}{3} + \frac{1}{2} - \frac{1}{6} = \frac{5}{6} - \frac{1}{6} = \frac{4}{6} = \frac{2}{3} \end{aligned}$$

Answer: $\frac{2}{3}$ (66.67 %).