The χ2 Hypothesis Tests for categorical variables: $\textbf{chi-square statistic} = \sum \frac{(\textbf{observed} - \textbf{expected})^2}{\textbf{expected}}$

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*When comparing the distribution of **one categorical variable to a fixed/specified population distribution**

IDENTIFY: **χ2 Goodness of Fit Test**

CHECK:
- Data come from a random sample or process.
- If sampling without replacement, n ≤ 10% of N
- All expected counts ≥ 5. (To calculate expected counts for each category, multiply the sample size by the expected proportion under H_0.)

CALCULATE:
$\chi^2 =$
$df =$ # of categories $- 1$

When comparing the distribution of **a categorical variable across 2 or more populations/treatments**

IDENTIFY: **χ2 Test for Homogeneity**

CHECK:
- Data come from 2 or more independent random samples or 2 or more randomly assigned treatments.
- If sampling without replacement, each n should ≤ 10% of each corresponding N
- All expected counts ≥ 5. (Calculate expected counts and verify this to be true.)

CALCULATE:
$\chi^2 =$
$df = ($# of rows $- 1)($# of cols $- 1)$

When looking for **association or dependence between two categorical variables**

IDENTIFY: **χ2 Test for Independence**

CHECK:
- Data come from a random sample or process.
- If sampling without replacement, n ≤ 10% of N
- All expected counts ≥ 5. (Calculate expected counts and verify this to be true.)

CALCULATE:
$\chi^2 =$
$df = ($# of rows $- 1)($# of cols $- 1)$

*Not tested on the AP® Exam.