

Sample Proportion:

The ratio of: $\frac{\text{\# times an event occurs}}{\text{Sample Size}}$

A survey was conducted in the city Memphis, TN.
850 people were asked what their favorite music was and
738 chose country.

Find the sample proportion to the nearest whole percent.

$$\frac{738}{850} \times 100 = 87\%$$

Population Proportion:

The ratio of: $\frac{\text{\# times an event occurs}}{\text{Population}}$

To find the population proportion in Memphis, TN about
peoples favorite music you would have to:

Ask all 655,155 residents of Memphis!

Margin of Error:

A range of values that most likely contains the actual
population proportion.

Usually given as $\pm\%$.

SOURCE: Exclusive poll done for the Free Press/WXYZ-TV (Channel 7) and our statewide media polling partners. The survey was done May 17-20 by Lansing-based EPIC-MRA. It was a 600-voter sample, using 20% cell phones, with an error margin of ± 4 percentage points. About 20% of respondents were union members and 58% of respondents were at

Margin of Error Formula:

$$\pm \frac{1}{\sqrt{n}} \quad n = \text{sample size} \quad \text{Convert this to a percent by } \times 100.$$

$$\pm \frac{1}{\sqrt{600}} \times 100 \approx \pm 4\%$$

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A random sample of 275 people shows that 44% are not satisfied with the job the governor is doing so far. What is the margin of error of this survey?

$$\pm \frac{1}{\sqrt{275}} \times 100 = \pm 6\%$$

What is the interval that is most likely to contain the **population proportion** for the percent of people that are not satisfied?

$$44\% \pm 6\% \\ 38\% - 50\%$$

The margin of error in a survey is $\pm 3\%$.

Find the sample size to the nearest whole number.

Alternative method

$$\left(\frac{1}{\sqrt{n}} \right)^2 = (.03)^2$$

$$\frac{1}{n} = .0009$$

$$1 = .0009n \rightarrow n = 1111$$

Alternative method diagram: $\frac{1}{\sqrt{n}} \leftrightarrow \frac{.03}{1}$ and $\left(\frac{1}{\sqrt{n}} \right)^2 = (.03)^2$

What happens to the margin of error as the sample size increases?

Margin of error should decrease with a larger sample size

Decreases?

Margin of error should increase with a smaller sample size.

What sample size would give the most accurate results?

The entire population - - EVERYBODY!

A poll taken before an election shows that 52% of registered voters are in favor of Proposal A. If the survey has a margin of error of $\pm 2.5\%$ estimate the number of voters in the poll to the nearest whole number.

$$\frac{1}{\sqrt{n}} = .025 \quad n = 1600$$

Since 52% of the people favor Proposal A is it a sure thing that the proposal will pass?

$$52 \pm 2.5 \quad 49.5 \text{ to } 55$$

A college has 9580 juniors. A survey of 525 juniors shows that 360 already have their careers mapped out.

- Find the sample proportion. 69%
- Find the margin of error $\frac{1}{\sqrt{525}} = \pm 4\%$
- Find the interval that most likely contains the actual percentage (population proportion) of juniors who have their careers mapped out.
 from 65% to 73%

- Find the interval for the actual number of juniors who have their careers mapped out.
 from 6227 to 6993
 $.65(9580) \quad .73(9580)$

A sample of 50 yogurt containers is taken off the production line and tested. 3 are found to have traces of Salmonella.

- Find the sample proportion. $\frac{3}{50} \quad 6\%$

- Find the margin of error. $\frac{1}{\sqrt{50}} \quad \pm 14\%$

- If the manufacturer produces 3200 containers of yogurt a day how many of those will probably have traces of Salmonella?

$$\text{from } -8\% \text{ to } 26\% \\ 0 \text{ to } 640$$

The highest rated TV show of all-time is the final episode of the show MASH when 60% of US households watched. The margin of error was $\pm 7\%$.

- Find the number households that were in the survey. $\frac{1}{\sqrt{n}} = .07 \quad 204$
- How would the margin of error change if the number of households surveyed were quadrupled?

$$204 \times 4 = 816$$

If sample size is quadrupled margin of error is halved

$$\frac{1}{\sqrt{816}} \times 100 = \pm 3.5\%$$