

Understanding Confidence Intervals Practice

Use the following information to answer the first question.

A company that makes elevator bolts takes a sample of 100 bolts and determines a mean length of 2.25 inches, with a margin of error of 0.3 inches. The result is considered accurate 95% of the time. Three other samples of different sizes were taken using the same confidence level, but the margin for error for each sample was mixed up.

Sample Size	Margin of Error (inches)
75	0.1
275	0.8
600	0.2

1. Which statement below is true?

- A) A sample size less than 75 would have a margin of error less than 0.3.
- B) A sample size greater than 600 would have a margin of error greater than 0.3.
- C) A sample size of 75 has a margin of error of 0.8.
- D) A sample size of 275 has a margin of error of 0.1.

Use the following information to answer the next question.

Several years ago, Hypertension Canada conducted a survey of 1000 Canadian adults aged 18 and older and found that 67% was unaware that high blood pressure (hypertension) may also be linked to dementia. The margin of error was 3.1 percentage points, 19 times out of 20.

2. The confidence interval is

- A) 19 - 20 B) 63.9 – 70.1 C) 63.1 – 67 D) 67 – 70.1

Use the following information to answer the next question.

A company produces bags of popcorn designed to have an acceptable mass of 340 g. The company produces 12 000 bags a day. A study sample found that 92% of the bags had an acceptable mass. The results are considered accurate $\pm 2.4\%$, 9 times out of 10.

3. Which statement below is true?

- A) We can say with 90% confidence that between 10 752 and 11 328 bags have acceptable masses.
- B) We can say with 95% confidence that between 10 752 and 11 328 bags have acceptable masses.
- C) We can say with 90% confidence that between 9 876 and 11 542 bags have acceptable masses.
- D) We can say with 95% confidence that between 9 876 and 11 542 bags have acceptable masses.

4. The results of a survey have a confidence interval of 76.6% to 86.6%, 99 times out of 100. The margin of error is _____.

Use the following information to answer the next question.

Consider the following statements.

Statement 1	The sample size does not affect the margin of error.
Statement 2	The margin of error increases as the confidence level increases.
Statement 3	The confidence interval is determined from the margin of error.
Statement 4	As the sample size increases, the margin of error increases.

5. The two true statements are

- A) 1 and 2 B) 3 and 4 C) 1 and 4 D) 2 and 3

Understanding Confidence Intervals Practice Solutions

Use the following information to answer the first question.

A company that makes elevator bolts takes a sample of 100 bolts and determines a mean length of 2.25 inches, with a margin of error of 0.3 inches. The result is considered accurate 95% of the time.

Three other samples of different sizes were taken using the same confidence level, but the margin for error for each sample was mixed up.

Sample Size	Margin of Error (inches)
75	0.1
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1. Which statement below is true?

- A) A sample size less than 75 would have a margin of error less than 0.3.
- B) A sample size greater than 600 would have a margin of error greater than 0.3.
- C) A sample size of 75 has a margin of error of 0.8.
- D) A sample size of 275 has a margin of error of 0.1.

Solution

The analysis of the sample space and margin of error is done relative to the question stating a sample of 100 bolts and a margin of error of 0.3 inches.

A sample size of 75, which is a reduction from 100, should yield a margin of error greater than 0.3. **Statement A is false.**

A sample size of 600, which is an increase from 100, should yield a margin of error less than 0.3. **Statement B is false.**

A sample size of 75 has a margin of error greater than 0.3. The only possible options given in the question is 0.8. **Statement C is true.**

The largest sample size of 600 should have the least margin of error, which is 0.1. It is not a sample of 275 that has this margin of error (it has 0.2). **Statement D is false.**

The correct answer is C.

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Several years ago, Hypertension Canada conducted a survey of 1000 Canadian adults aged 18 and older and found that 67% was unaware that high blood pressure (hypertension) may also be linked to dementia. The margin of error was 3.1 percentage points, 19 times out of 20.

2. The confidence interval is

A) 19 - 20

B) 63.9 – 70.1

C) 63.1 – 67

D) 67 – 70.1

Solution

The confidence interval is determined by adding the margin of error (3.1) to the data value of 67%, and subtracting the margin of error from the data value of 67%.

$$67\% + 3.1\% = 70.1\%$$

$$67\% - 3.1\% = 63.9\%$$

The confidence interval is 63.9 – 70.1.

The correct answer is B.

Use the following information to answer the next question.

A company produces bags of popcorn designed to have an acceptable mass of 340 g. The company produces 12 000 bags a day. A study sample found that 92% of the bags had an acceptable mass. The results are considered accurate $\pm 2.4\%$, 9 times out of 10.

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Solution

When the question says, 9 times out of 10, the confidence level is indicated to be 90%. Thus, options B and D are eliminated.

In terms of percentages, the confidence interval is 89.6% (92% - 2.4%) and 94.4% (92% + 2.4%).

Multiply the total number of bags produced per day by these interval percentages.

(12 000) (0.896) to (12 000) (0.944)

10 752 to 11 328

The correct answer is A.

4. The results of a survey have a confidence interval of 76.6% to 86.6%, 99 times out of 100. The margin of error is 5.

Solution

Find the difference between the 2 values for the confidence interval (the range) and divide this by 2.

$$\frac{86.6 - 76.6}{2} = \frac{10}{2} = 5$$

The margin of error is 5%.

Use the following information to answer the next question.

Consider the following statements.	
Statement 1	The sample size does not affect the margin of error.
Statement 2	The margin of error increases as the confidence level increases.
Statement 3	The confidence interval is determined from the margin of error.
Statement 4	As the sample size increases, the margin of error increases.

5. The two true statements are

A) 1 and 2

B) 3 and 4

C) 1 and 4

D) 2 and 3

Solution

The sample size does affect the margin of error. As the sample size increases, the margin of error decreases (assuming the same confidence level is required).

Statements 1 and 4 are thus incorrect. Statements 2 and 3 are true.

The correct answer is D.