

When Is Evidence That Supports An Inference Considered What Are The Solutions Of The Equation $(x+8)^2=144$? Enter

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Understanding how to interpret evidence that supports an inference is a fundamental skill in critical thinking, research, and problem-solving. Whether you're analyzing scientific data, evaluating arguments, or solving mathematical equations, recognizing when evidence justifies an inference is crucial. In this article, we'll explore the concept of evidence supporting inferences and delve into solving the specific mathematical equation $(x+8)^2=144$, providing comprehensive explanations and solutions to enhance your understanding.

Understanding Evidence Supporting an Inference

What Is an Inference?

An inference is a conclusion or deduction made based on evidence and reasoning. It involves taking known information and logically deriving new information. For example, if you see dark clouds gathering, you might infer that it will rain soon.

When Is Evidence Considered Supportive?

Evidence supports an inference when it:

- Is relevant to the conclusion being drawn.
- Is sufficient in quantity and quality to justify the inference.
- Is consistent with other existing evidence.
- Directly relates to the conclusion without contradictions.

Types of Evidence

- Direct Evidence: Clearly proves a fact (e.g., eyewitness testimony).

- Circumstantial Evidence: Implies a fact by suggesting a conclusion (e.g., fingerprints at a crime scene).
- Corroborative Evidence: Supports other evidence to strengthen an inference.
- Contradictory Evidence: Opposes or challenges an inference.

Assessing the Strength of Evidence

To determine whether evidence supports an inference, consider:

- Relevance: Does the evidence relate directly to the conclusion?
- Reliability: Is the evidence credible and trustworthy?
- Sufficiency: Is there enough evidence to justify the inference?
- Consistency: Does the evidence align with other known facts?

Applying the Concept to Mathematical Equations

Mathematics often involves making inferences based on given data or equations. Solving equations requires analyzing the information provided and deducing the solution logically.

The Equation $(x8)^2=144$: Clarifying the Expression

The expression " $(x8)^2=144$ " can be interpreted in multiple ways due to ambiguity in notation. It's essential to understand the intended structure to solve it correctly.

Possible interpretations:

1. $(x + 8)^2 = 144$
- The expression inside parentheses is " $x + 8$ ".
2. $(x 8)^2 = 144$
- The expression inside parentheses is " x times 8".
3. $x 8^2 = 144$
- " x times 8 squared".
4. $(x8)^2 = 144$
- Possibly a concatenation or typo, but less likely.

Given typical algebraic conventions, the most common interpretation is:

$$(x + 8)^2 = 144$$

We will proceed with this assumption, but also discuss solutions if the expression is different.

Solving the Equation $(x + 8)^2 = 144$

Step 1: Recognize the Structure

The equation is a quadratic form where a binomial squared equals a constant. This suggests taking the square root of both sides.

Step 2: Take the Square Root of Both Sides

- When taking the square root of both sides, remember to consider both positive and negative roots:

$$\begin{aligned} \sqrt{} \\ x + 8 &= \pm \sqrt{144} \\ \sqrt{} \end{aligned}$$

- Calculate the square root:

$$\begin{aligned} \sqrt{} \\ x + 8 &= \pm 12 \\ \sqrt{} \end{aligned}$$

Step 3: Solve for x

- For the positive root:

$$\begin{aligned} \sqrt{} \\ x + 8 &= 12 \implies x = 12 - 8 = 4 \\ \sqrt{} \end{aligned}$$

- For the negative root:

$$\begin{aligned} \sqrt{} \\ x + 8 &= -12 \implies x = -12 - 8 = -20 \\ \sqrt{} \end{aligned}$$

Final Solutions:

$$\begin{aligned} \sqrt{} \\ x &= 4 \quad \text{or} \quad x = -20 \\ \sqrt{} \end{aligned}$$

Solutions of the Equation $(x + 8)^2 = 144$

If the original expression was intended as $(x + 8)^2 = 144$, then:

Step 1: Rewrite the Equation

$$\begin{aligned} & \backslash \\ & (x + 8)^2 = 144 \\ & \backslash \end{aligned}$$

Step 2: Simplify

$$\begin{aligned} & \backslash \\ & 64x^2 = 144 \\ & \backslash \end{aligned}$$

Step 3: Solve for x^2

$$\begin{aligned} & \backslash \\ & x^2 = \frac{144}{64} = \frac{9}{4} \\ & \backslash \end{aligned}$$

Step 4: Take the Square Root

$$\begin{aligned} & \backslash \\ & x = \pm \sqrt{\frac{9}{4}} = \pm \frac{\sqrt{9}}{\sqrt{4}} = \pm \frac{3}{2} \\ & \backslash \end{aligned}$$

Final Solutions:

$$\begin{aligned} & \backslash \\ & x = \pm \frac{3}{2} \\ & \backslash \end{aligned}$$

Summary of Solutions for Different Interpretations

Interpretation	Solutions
$(x + 8)^2 = 144$	$x = 4, x = -20$
$(8x)^2 = 144$	$x = 3/2, x = -3/2$

Common Mistakes and Tips for Solving Similar Equations

Common Mistakes

- Ignoring both roots when taking square roots; always consider both positive and negative solutions.
- Misinterpreting notation, leading to incorrect assumptions.
- Forgetting to isolate the variable after taking roots.
- Omitting the domain considerations, especially when dealing with square roots.

Helpful Tips

- **Clarify the expression before starting the solution.**
- **Write each step clearly to avoid errors.**
- **Remember that the square root of a positive number has both positive and negative roots.**
- **Check solutions by substituting back into the original equation.**

Conclusion

Understanding when evidence supports an inference is essential in both logical reasoning and mathematical problem-solving. Recognizing the relevance and sufficiency of evidence helps determine the validity of conclusions. When solving equations like $(x + 8)^2 = 144$

or $(8x)^2=144$, carefully interpret the expressions, follow logical steps, and consider all possible solutions, including negative roots. Mastering these skills enhances critical thinking and mathematical proficiency, empowering you to approach complex problems with confidence.

Additional Resources

- Algebra Practice Problems: Improve your skills with a variety of algebra exercises.**
- Critical Thinking Guides: Learn more about evaluating evidence and making sound inferences.**
- Mathematics Tutorials: Explore step-by-step solutions to algebraic equations.**

If you have further questions or need clarification on any part of this article, feel free to ask!

Frequently Asked Questions

What types of evidence support an inference in logical reasoning?

Evidence such as empirical data, statistical analysis, direct observations, and credible expert testimony can

support an inference by providing factual basis for conclusions.

When is evidence considered sufficient to support an inference?

Evidence is sufficient when it is strong, relevant, consistent, and directly related to the inference being made, reducing uncertainty and increasing confidence in the conclusion.

How can I determine if evidence is valid for supporting a specific inference?

Validate evidence by checking its source credibility, accuracy, consistency with other data, and relevance to the inference to ensure it appropriately supports your conclusion.

What are common solutions to the equation $(x-8)^2 = 144$?

The solutions are $x = 8 + 12 = 20$ and $x = 8 - 12 = -4$.

How do I solve the quadratic equation $(x-8)^2 = 144$?

Take the square root of both sides: $x - 8 = \pm 12$. Then, solve for x : $x = 8 + 12 = 20$ and $x = 8 - 12 = -4$.

Is $(x-8)^2 = 144$ an example of a perfect square equation?

Yes, because $(x-8)^2$ is a perfect square, and the solutions involve taking the square root of both sides.

What is the importance of verifying solutions in equations like $(x-8)^2=144$?

Verifying solutions ensures they satisfy the original equation and helps identify extraneous solutions that may arise during algebraic manipulation.

Can the solutions to $(x-8)^2=144$ be complex numbers?

No, since the right side is positive and real, the solutions are real numbers: $x=20$ and $x=-4$. If the right side were negative, solutions could be complex.

Additional Resources

When Is Evidence That Supports An Inference Considered?

Understanding when evidence supports an inference is a fundamental question in logic, critical thinking, and scientific reasoning. An inference involves drawing a conclusion based on evidence or premises. The strength

and validity of this conclusion depend heavily on the nature and sufficiency of the supporting evidence. Recognizing when evidence genuinely supports an inference helps prevent logical fallacies, enhances decision-making, and advances scientific discoveries. In this article, we explore the criteria that determine whether evidence truly supports an inference, the various types of evidence, and practical considerations in evaluating inferential support.

Defining Evidence and Inference

Before delving into when evidence supports an inference, it is essential to clarify what constitutes evidence and inference.

What Is Evidence?

Evidence comprises facts, observations, data, or other information that can be used to support or refute a claim or hypothesis. It is the foundation upon which inferences are built. Evidence can be:

- Empirical (observable and measurable)**
- Testimonial (statements from witnesses or experts)**
- Logical (premises within an argument)**
- Statistical (data analyzed quantitatively)**

What Is an Inference?

An inference is a logical process whereby a conclusion is drawn from one or more premises or pieces of evidence. It involves moving from specific observations to broader generalizations or from premises to a conclusion.

Types of Inferences:

- Deductive: Conclusions necessarily follow from premises (e.g., mathematical proofs)**
- Inductive: Conclusions are probable based on evidence (e.g., scientific hypotheses)**
- Abductive: Inferences to the best explanation (e.g., diagnosing a disease based on symptoms)**

Criteria for Evidence Supporting an Inference

Determining when evidence supports an inference involves assessing several criteria. These criteria help distinguish between mere correlation, coincidence, and genuine support.

1. Relevance of Evidence

The evidence must be directly related to the claim or hypothesis in question. Irrelevant evidence does not contribute to supporting an inference.

2. Sufficiency of Evidence

The evidence should be adequate in quantity and quality to justify the conclusion. Insufficient evidence can lead to weak or invalid inferences.

3. Reliability of Evidence

The evidence must be trustworthy, accurate, and free from bias or error. Unreliable evidence undermines the support it provides.

4. Logical Connection

There must be a logical link between the evidence and the conclusion. The inference should follow logically from the evidence, adhering to principles of sound reasoning.

5. Consistency with Other Evidence

The evidence should be consistent with other known facts and observations. Contradictory evidence weakens the support.

Types of Evidence and Their Role in Supporting Inferences

Different types of evidence play varying roles in underpinning inferences. Understanding these helps in evaluating the strength of the support.

Empirical Evidence

- Features: Based on observation or experiment.**
- Pros: Directly observable, verifiable.**
- Cons: May be limited by measurement errors, sample size, or contextual factors.**
- Example: A thermometer reading supports the inference that the temperature is high.**

Statistical Evidence

- Features: Derived from data analysis, often indicating trends or probabilities.**
- Pros: Can handle large data sets, reveal patterns.**
- Cons: Correlation does not imply causation; statistical errors can occur.**
- Example: A survey showing 80% of respondents prefer a product supports the inference that the product is popular.**

Testimonial or Testimonial Evidence

- Features: Statements from witnesses or experts.**
- Pros: Offer expert insights or eyewitness accounts.**
- Cons: Subject to bias, memory errors, or dishonesty.**
- Example: An expert's statement supports a scientific**

hypothesis.

Logical Evidence

- **Features:** Premises derived from reasoning.
- **Pros:** If premises are true, conclusions follow necessarily.
- **Cons:** Invalid premises lead to invalid inferences.
- **Example:** The syllogism "All humans are mortal; Socrates is human; therefore, Socrates is mortal" hinges on logical deduction.

Common Fallacies and Misjudgments in Supporting Evidence

Even when evidence appears compelling, logical pitfalls can lead to unsupported inferences.

Correlation vs. Causation

- **Issue:** Assuming that because two variables are correlated, one causes the other.
- **Impact:** Can lead to false conclusions.
- **Example:** Ice cream sales and drowning incidents both increase in summer; one does not cause the other.

Cherry-Picking Data

- **Issue:** Selecting only data that supports a conclusion.
- **Impact:** Creates a biased view that overstates support.
- **Solution:** Consider all relevant evidence, including conflicting data.

Appeal to Authority

- **Issue:** Relying solely on expert opinion without critical evaluation.
- **Impact:** Can be misleading if the authority is biased or incorrect.
- **Example:** Believing a claim solely because a famous scientist said so.

Assessing Evidence in Practice

Applying the criteria to real-world situations involves systematic evaluation and critical thinking.

Step-by-Step Approach

- 1. Identify the Claim:** Clearly define the inference you are evaluating.
- 2. Gather Evidence:** Collect all relevant data and information.

- 3. Evaluate Relevance:** Check if the evidence directly pertains to the claim.
- 4. Assess Sufficiency:** Determine whether the evidence is enough to support the conclusion.
- 5. Verify Reliability:** Ensure evidence is credible and unbiased.
- 6. Check Logical Connection:** Confirm that the evidence logically leads to the conclusion.
- 7. Cross-Validate:** Compare with other evidence or alternative explanations.
- 8. Remain Open to Revision:** Be willing to adjust conclusions as new evidence emerges.

Practical Examples and Applications

To illustrate how these principles operate in real life, consider the following scenarios.

Scientific Research

- Evidence such as experimental data supports hypotheses if it is relevant, sufficient, and reliably obtained.**
- For example, multiple clinical trials showing the effectiveness of a drug support its approval.**

Legal Reasoning

- Evidence such as fingerprints or alibis supports or refutes claims in court.
- The strength of this evidence depends on its relevance, reliability, and logical connection to the case.

Everyday Decision-Making

- Deciding whether to carry an umbrella based on weather reports involves evaluating the relevance and reliability of meteorological data.

Solutions to the Equation $((x^8)^2 = 144)$

Switching gears to a mathematical problem, let's explore how to solve the given equation systematically.

Understanding the Equation

The equation $((x^8)^2 = 144)$ involves an exponentiation nested within another. Simplifying the expression helps in solving.

Step-by-Step Solution

Step 1: Simplify the Equation

$$\begin{aligned} & \backslash \\ & (x^8)^2 = 144 \end{aligned}$$

$\backslash$
 Since $\backslash((x^8)^2 = x^{\{8 \times 2\}} = x^{\{16\}}\backslash)$,
 we rewrite the equation as:

$$\begin{aligned} & \backslash \\ & x^{\{16\}} = 144 \end{aligned}$$

Step 2: Take the 16th Root of Both Sides

To isolate $\backslash(x\backslash)$, take the 16th root:

$$\begin{aligned} & \backslash \\ & x = \pm \sqrt[16]{144} \end{aligned}$$

Note: When dealing with real numbers, the 16th root of a positive number is positive; the $\backslash(\pm\backslash)$ accounts for both roots.

Step 3: Express the Root in Terms of Exponents

Since $\backslash(144 = 2^4 \times 3^2\backslash)$, express 144 as prime factors:

$$\begin{aligned} & \backslash \\ & 144 = 2^4 \times 3^2 \end{aligned}$$

The 16th root of 144 is:

$$\begin{aligned} & \backslash \\ & x = \pm \left(144\right)^{\{1/16\}} = \pm \left(2^4 \times 3^2\right)^{\{1/16\}} \end{aligned}$$

$$\begin{aligned} & \backslash \\ & x = \pm 2^{\{4/16\}} \times 3^{\{2/16\}} = \pm 2^{\{1/4\}} \times 3^{\{1/8\}} \end{aligned}$$

Step 4: Final Expression for x

$$x = \pm 2^{\frac{1}{4}} \times 3^{\frac{1}{8}}$$

which can be approximated numerically as:

$$x \approx \pm (1.189) \times (1.148) \approx \pm 1.365$$

Step 5: Summary of Solutions

The solutions are:

$$x \approx \pm 1.365$$

Conclusion

Determining when evidence supports an inference requires a careful analysis of relevance, sufficiency, reliability, and logical connection. Recognizing the nature and quality of evidence helps avoid fallacious reasoning and leads to more accurate conclusions across various fields, including science, law, and everyday life. Whether evaluating empirical data, statistical trends, or testimonial statements, applying these criteria ensures sound decision-making.

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