exposure time it takes to cause hearing damage is cut in half. How long does it take to cause hearing damage at 106 decibels? Write your answer as a decimal. 3.75 minutes

94	1
97	$\frac{1}{2}$
100	$\frac{1}{4}$

Learn
Counterexamples

To show that a conjecture is true for all cases, you must prove it. It only takes one example that contradicts the conjecture, however, to show that a conjecture is not always true. This example is called a **counterexample**, and it can be a number, a drawing, or a statement.

→ non-example

Example 5
Find Counterexamples

Find a counterexample to show that each conjecture is false.

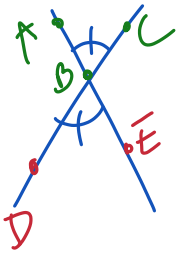
False −3

a. If *n* is a real number, then −*n* is a negative number.

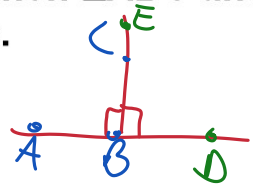
$-(-3) = +3$

False

b. If ∠*ABC* ≅ ∠*DBE*, then ∠*ABC* and ∠*DBE* are vertical angles.



Supplementary Adjacent



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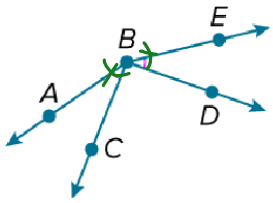
Example 5
Find Counterexamples

a. If n is a real number, then $-n$ is a negative number.

When n is -4, $-n$ is $-(-4)$ or 4, which is a positive number. Because $-n$ is not negative, this is a counterexample.

Example 5
Find Counterexamples

b. If $\angle ABC \cong \angle DBE$, then $\angle ABC$ and $\angle DBE$ are vertical angles.



When points A, B, and D are noncollinear and points E, B, and C are noncollinear, the conjecture is false.

In the figure, $\angle ABC \cong \angle DBE$, but $\angle ABC$ and $\angle DBE$ are not vertical angles.

Example 5
Find Counterexamples

Check

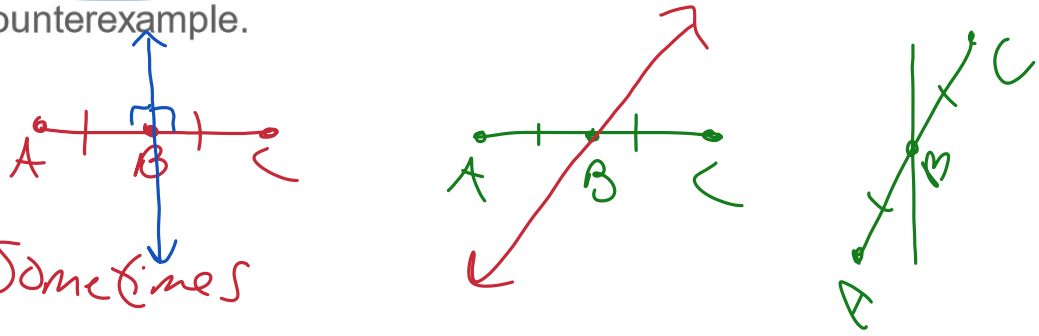
Find a counterexample to show that each conjecture is false.

a. If n is a real number, then $\frac{1}{n} < n$. Select all that apply.

A. $n = -3$ B. $n = \frac{1}{4}$ C. $n = 1$ D. $n = 5$ E. $n = 100$

Example 5
Find Counterexamples

b. If a line intersects a segment at its midpoint, then the line is perpendicular to the segment. Draw a diagram to represent the counterexample.



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Exit Ticket

Find a counterexample to show that each conjecture is false.

1. The diameter of every planet in our solar system is less than 100,000 kilometers. Jupiter, Saturn
2. Supplementary angles cannot be congruent angles. 100/80
3. For every integer n, n^3 is positive.

False

180

False

False

$4^3 = 64$

$-1^3 = -1$

$22^3 = 10648$

$-32^3 = -32,768$

$-14^3 = -2,744$

Planet	Radius (km)
Earth	6378.1
Jupiter	71,492.0
Mars	3396.2
Mercury	2439.7
Neptune	24,764.0
Saturn	60,268.0
Uranus	25,559.0
Venus	6051.8

x2 x2

Source: NASA

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Exit Ticket

Find a counterexample to show that each conjecture is false.

1. The diameter of every planet in our solar system is less than 100,000 kilometers. Jupiter or Saturn
2. Supplementary angles cannot be congruent angles. two right angles
3. For every integer n, n^3 is positive. $n \leq 0$

Planet	Radius (km)
Earth	6378.1
Jupiter	71,492.0
Mars	3396.2
Mercury	2439.7
Neptune	24,764.0
Saturn	60,268.0
Uranus	25,559.0
Venus	6051.8

Source: NASA

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