

Objective: Use Inductive & Deductive Reasoning and Conditional Statements.

Vocabulary

- When a pattern is formed & you assume the pattern will continue, you are applying inductive reasoning.
- Deductive reasoning is making logical conclusions from facts, definitions, and properties.
- A statement you believe to be true based on inductive reasoning is called a conjecture.
- A counterexample shows that a conjecture is false.
- A conditional statement can be written in the form: "If _____, then _____."
- The hypothesis is the part *p* of a conditional statement following the word *if*.
- The conclusion is the part *q* of a conditional statement following the word *then*.
- The converse is the statement formed by exchanging the hypothesis and the conclusion.

hypothesis
converse
conclusion
conditional
inductive
deductive
conjecture
false

For Exercises 9-11, complete each conjecture by looking for a pattern. Give at least 2 examples for support.

- The sum of two odd numbers is even examples: 3+5=8 1+5=6
- The difference of any two even numbers is even examples: 8-6=2 10-4=6
- The square of any negative number is positive examples: -2²=4 -6²=36
- The product of 2 odd numbers is odd examples: 3*5=15 1*7=7

Show that each conjecture is false by finding a counterexample (sketch a counterexample for #18 & #19).

- For any number, *n*, $2n > n$.
- For any number, *n*, $-n < n$
- If $x^2 = 16$, then $x = 4$

If $n = \underline{-1}$, then $2n < n$

If $n = \underline{0}$ or $\underline{-1}$ then $-n > n$

If $x = 4$ or $\underline{-4}$, then $x^2 = 16$

- For any rational number, *n*, $n > \frac{1}{n}$


- The difference of 2 negative integers is a negative.


If $n = \underline{-2}$ or $\underline{\frac{1}{2}}$ then $n < \frac{1}{n}$

$\underline{-5 - (-2) = -3}$

Example of 2 negative numbers whose difference is positive: $-2 - (-5) = 3$

- Every pair of supplementary angles includes an obtuse angle.
- Each angle in a right triangle has a different measure

 False
Two right ∠'s can equal a supplementary ∠.

 False
A right triangle = 180°
one ∠ = 90° the other ∠'s = 45°

20. Use inductive reasoning to complete the next 3 terms of each pattern:

- | | | | | |
|-------------------------------|-------------------------------------|-----------------------------------|---|-------------------------------------|
| a. 100, 81, 64, 49, ... | b. $\frac{2}{3}, 2, 6, 18, \dots$ | c. -8, -3, 2, 7, ... | d. $\frac{1}{4}, \frac{1}{2}, \frac{3}{4}, 1, \dots$ | e. -1, 2, -4, 8, ... |
| <u>36</u> <u>25</u> <u>16</u> | <u>54</u> , <u>162</u> , <u>486</u> | <u>12</u> , <u>17</u> , <u>22</u> | <u>$\frac{1}{4}$</u> , <u>$\frac{1}{2}$</u> , <u>$\frac{3}{4}$</u> | <u>-16</u> , <u>32</u> , <u>-64</u> |

Write a conditional statement from each of the following. Underline the hypothesis and (circle) the conclusion

21. Congruent segments have equal measures.

If segments are congruent, then they have equal measures

22. Vertical angles are congruent.

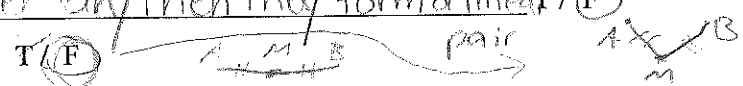
If angles are vertical, then they're congruent.

Write the converse for each conditional statement. State if each statement is TRUE or FALSE

23. Conditional: If two angles form a linear pair, then they are supplementary. (T) F

Converse: If angles are supplementary then they form a linear pair (F)

24. Conditional: If $AM = MB$, then M is the midpoint of \overline{AB} . (F)



Converse: If M is the midpoint of \overline{AB} , then $AM = MB$ (T) F

Decide if the conclusion is ALWAYS, SOMETIMES, or NEVER true.

25. A segment that is a diameter of a circle has endpoints on the circle. \overline{GH} has endpoints on a circle. Therefore, \overline{GH} is

Sometimes a diameter of the circle

26. An obtuse triangle has two acute angles. Triangle ABC is obtuse. Triangle ABC Always has two acute angles.

27. If 2 angles are complementary then both angles are acute. $\angle A$ & $\angle B$ are both acute angles. Therefore, $\angle A$ & $\angle B$ are

Sometimes complementary angles.

28. $\triangle ABC$ is a right triangle with hypotenuse \overline{AC} . Therefore, AB is never equal to AC .

Draw the conclusion that would result from using all of the given information by the Law of Syllogism.

29. Given: If two segments intersect, then they are not parallel. If two segments are not parallel, then they could be perpendicular. \overline{EF} and \overline{MN} intersect, therefore they could be perpendicular

30. If 2 angles form a linear pair, then they are adjacent. If 2 angles are adjacent, then they share a ray. $\angle A$ & $\angle B$ form a linear pair, therefore they share a ray

31. A sports store has running shoes 25% off original prices. Andrea sees a pair of running shoes that she likes for \$60.00. Which is a valid conclusion?

A The sale price of the shoes is \$40.00.

(B)
D

The sale price of the shoes is \$45.00.

C Andrea will buy the shoes.

Andrea will not buy the shoes.

32. Decide if the following conclusions use inductive or deductive reasoning:

a. Annika completed all of her homework assignments from Ch. 1 and earned an A on her Ch. 1 test. Annika completes all homework assignments in Ch. 2. Therefore, Annika will earn an A on the Ch. 2 test.

inductive

b. Each homework assignment in Geometry is worth 5 points. Annika has completed 10 homework assignments. Annika has earned 50 homework points.

deductive

c. Which method of reasoning do you believe is more reliable in drawing conclusions... inductive or deductive reasoning?

Explain: deductive you can use the facts to prove the statement.