Name: _____ Period: _____

Introduction to Science

Unit 1 Workbook

Guided Notes

1. A systematic study of nature based on observation is known as _____.
2. The Greek Philosopher Aristotle perfected _____.
3. Aristotle's philosophy begins with a statement called _____.
4. The solution is derived from logical statements which comes from a _____.
5. He revolutionized the scientific community by introducing a new way: _____
6. He argued that _____ was logical.
7. In science we must be able to measure what we see in some way
    a. _____
    b. _____
8. The goal of gathering data is to be as _____as possible.
9. This data deals with numbers: _____
10. List four examples:
    a. _____
    b. _____
    c. _____
    d. _____
11. This data deals with descriptions: _____
12. This type of data can be _____ but not measured.

13. List four examples:
    a. _____
    b. _____
    c. _____
    d. _____

14. A supposition or proposed explanation made based on limited evidence as a starting point for further investigation: _____.

15. A type of hypothesis that proposes that no statistical significance exists in a set of given observations: _____, it is known as the hypothesis of "no change".

16. When a researcher conducts a procedure to observe natural phenomenon in the laboratory setting to better understand laws and theories this is known as _____.

17. A _____ procedure is carried out to support, refute, or validate a hypothesis, demonstrate what type of outcome occurs (when a particular factor is manipulated) and relies on repeatable procedure and logical analysis of the results.

18. This procedure typically includes _____ controls, which are designed to minimize the effects of variables other than the _____ variables.

19. This increases the reliability of the results, often through a comparison between _____and the other measurements.

20. It is a variable that stands alone and isn't changed by the other variables you are trying to measure is known as an _____.

21. If something that depends on other factors and could change because of various forms of manipulation it is known as a _____.

22. Scientific Method relies on _____.

23. "A model which has been born out by repeated tests and observation is known as a _____."

24. All scientists will make the same observations about an event; observations are facts and are _____to interpretation.

25. However, scientists can make different inferences of the same event.

26. When a scientist's current knowledge and perspective affects his/her interpretation this is known as an _____.

27. In the laboratory setting, you record _____.

28. This represents your conclusion about what occurred: _____

29. The _____ uses inference to evaluate a person's psychological state.

30. Unlike theories, scientific laws are not subject to _____.

31. Scientific laws are not theories that have been _____.

32. A law generalizes a body of _____.

33. No _____ have been found to a scientific law

34. Scientific laws _____, but they do not _____. A scientific theory provides an explanation for a _____ or _____in nature.

35. Scientists _____ and _____ laws.

36. Scientists _____ theories which exist to help explain the natural world and are uncovered through scientific investigation.

37. All scientific knowledge is subject to _____ testing and revision.

38. All scientific knowledge can be _____ or _____when new evidence justifies it.

39. Scientists' knowledge can change when scientists _____ existing findings.

40. A successful theory is _____ by you or by anyone.

41. These make no predictions, are un-testable and can't be falsified (proven to be un-true): _____

42. This has no provable basis for an event or theory: _____

43. This appears as scientific truth but is not testable: _____

44. A tendency for people to favor information that confirms their preconceptions or hypotheses regardless of whether the information is true is known as _____

45. As a result, people gather evidence and recall information from memory selectively, and interpret it in a _____ way

46. True Science is:
    a. _____
    b. _____
    c. _____
    d. _____

47. If it cannot be tested, it cannot be _____ or _____.

48. Pure objectivity is _____ to obtain

49. True science must be able to be expressed in some form of _____l relationships

50. A Particular view or bias is known as a _____.

51. This is the way we perceive _____ and _____.

52. Any events which occurred inadvertently but were recognized as discovery by the scientist(s) involved is known as a _____

53. The study of all elements other than carbon and their compositions is known as_____ science.

54. The study of all element's containing carbon is known as_____ science.

55. The study of the chemical process in living things is known as_____.

56. The study of radioactivity, the nucleus and the changes that the nucleus undergoes is known as_____.

57. Scientific knowledge for the sake of finding out new facts about matter is known as_____ science.

58. Scientific knowledge for the sake of creating useful products is known as_____ science.

Application Section

Using the slides under the Thematic Application Test (TAT) section, write at least one full paragraph, describe what you think is occurring in each picture:

1. TAT Example 1

2. TAT Example 2

3. TAT Example 3

Identify whether this is an observation (O) or inference (I)

1. _____The White Sox baseball team is losing in their division
2. _____My motorbike stopped running because it was out of gas.
3. _____That plant in my living room is extremely wilted.
4. _____The White Sox baseball team is losing in division because many of their best players are hurt.
5. _____The car I was driving in stopped running
6. _____The tree in my yard is dying due to a lack of water

Identifying Variables

Directions: Read through each scenario and identify the independent variable, dependent variable, and the control. Beware- not all experiments will have control!

1. Sara wants to see if a new brand of hair dye lasts longer than the brand she currently uses. She puts the new hair dye on the left side of her head and the old brand on her right side. After 2 weeks she observes which side of her head has more gray hair showing through.
    a. Independent Variable = _____
    b. Dependent Variable = _____
    c. Control = _____

2. Rob is in charge of waxing the floor at the local mall. He wants to test a new brand of floor wax called Squeaky Clean. Rob waxes 20 floor tiles with Squeaky Clean and 20 tiles with the original wax brand. After one week he counts the number of scratches on the floor.
    a. Independent Variable = _____
    b. Dependent Variable = _____
    c. Control = _____

3. Chris wants to see if his basil plants grow better in full sunlight or partial sunlight. He plants 5 basil plants on the east side of his house that only receives light in the morning, and 5 more plants on the south side of his house that receives light all day. After a month Chris measures the height of each plant.
    a. Independent Variable = _____
    b. Dependent Variable = _____
    c. Control = _____

4. Shannon wants to see if the amount of time she studies will affect her grades. She normally studies for 30 minutes a night, but decides to double her study time to one hour per night. Over the next three weeks Shannon sees her science grade raise 10%.
    a. Independent Variable = _____
    b. Dependent Variable = _____
    c. Control = _____

5. Eric wants to see if a Shark vacuum works better than his current Oreck. He makes sure both of the vacuum canisters are empty, and then vacuums half of the living room with the Oreck and the other half with the Shark. After vacuuming he measures the amount of dust in each canister.
    a. Independent Variable = _____
    b. Dependent Variable = _____
    c. Control = _____

6. Rebecca wants to see if her kitten prefers new chicken flavored treats over her usual beef flavored treats. She puts 10 chicken treats in one bowl and 10 beef flavored treats in another bowl. She sees which treats her kitten eats first and repeats this experiment for 3 days.
    a. Independent Variable = _____
    b. Dependent Variable = _____
    c. Control = _____

7. Mark notices he has dropped calls on his cell phone when he walks into his bedroom. His friend told him to try and wrap aluminum foil around his phone to get better signal. Mark talks on the phone 3 times while walking into his bedroom and drops 2 of the 3 calls. He wraps his phone in aluminum foil and talks on the phone 3 more times while walking into his bedroom. With the aluminum foil on his phone he only drops 1 phone call.
    a. Independent Variable = _____
    b. Dependent Variable = _____
    c. Control = _____

8. Heidi is a chocolate lover and eats chocolate daily. She has a bad break-out and her friend told her eating chocolate causes pimples. Heidi continues to eat chocolate every day for 2 weeks and counts the number of pimples she has on her face. The following 2 weeks she doesn't eat any chocolate and counts the number of pimples on her face.
    a. Independent Variable = _____
    b. Dependent Variable = _____
    c. Control = _____

9. Ruthie has a pet goldfish. After several months the goldfish quits growing. Ruthie's Mom told her the goldfish might have stopped growing because the tank is too small. Ruthie measures the size of her goldfish in its current tank, and then puts the goldfish in a larger tank. After 2 months the goldfish is now 1cm longer.
    a. Independent Variable = _____
    b. Dependent Variable = _____
    c. Control = _____

10. Nicholas has been biting his nails since he was a kid. He wants to break the habit so he puts bitter tasting nail polish on his left hand and leaves his right hand without polish. After 3 days he notices his nails on his left hand have grown but he continued to bite his right-hand nails.
    a. Independent Variable = _____
    b. Dependent Variable = _____
    c. Control = _____

Identifying Theory, Law and Hypothesis

Directions: Read through each scenario and identify whether it is a Scientific Theory **(T)** , Scientific Law **(L)**, or Hypothesis **(H)**.

1.Scientists have observed that when water is heated to 100 degrees Celsius at sea level, it boils. What is this statement an example of?

2.A group of researchers proposes that the increase in greenhouse gases in the atmosphere leads to global warming. What kind of statement is this?

3.Over time, astronomers have observed that the planets in our solar system follow elliptical orbits around the sun. What does this observation represent?

4.A biologist suggests that the diversity of species in an ecosystem is directly related to its stability. What type of statement is this?

5.Geologists state that the movement of tectonic plates is responsible for earthquakes and the formation of mountain ranges. What category does this explanation fall into?

6.A chemist formulates a proposal that mixing certain chemicals in specific ratios will produce a new compound with unique properties. What is this statement classified as?

7.An astronomer proposes that the expansion of the universe is accelerating due to dark energy. What kind of statement is this?

8.Physicists have established that energy cannot be created or destroyed, only transformed from one form to another. What does this statement represent?

9. Anecologistsuggests thatincreased deforestationleadstoadeclinein biodiversity. What type of statement is this?

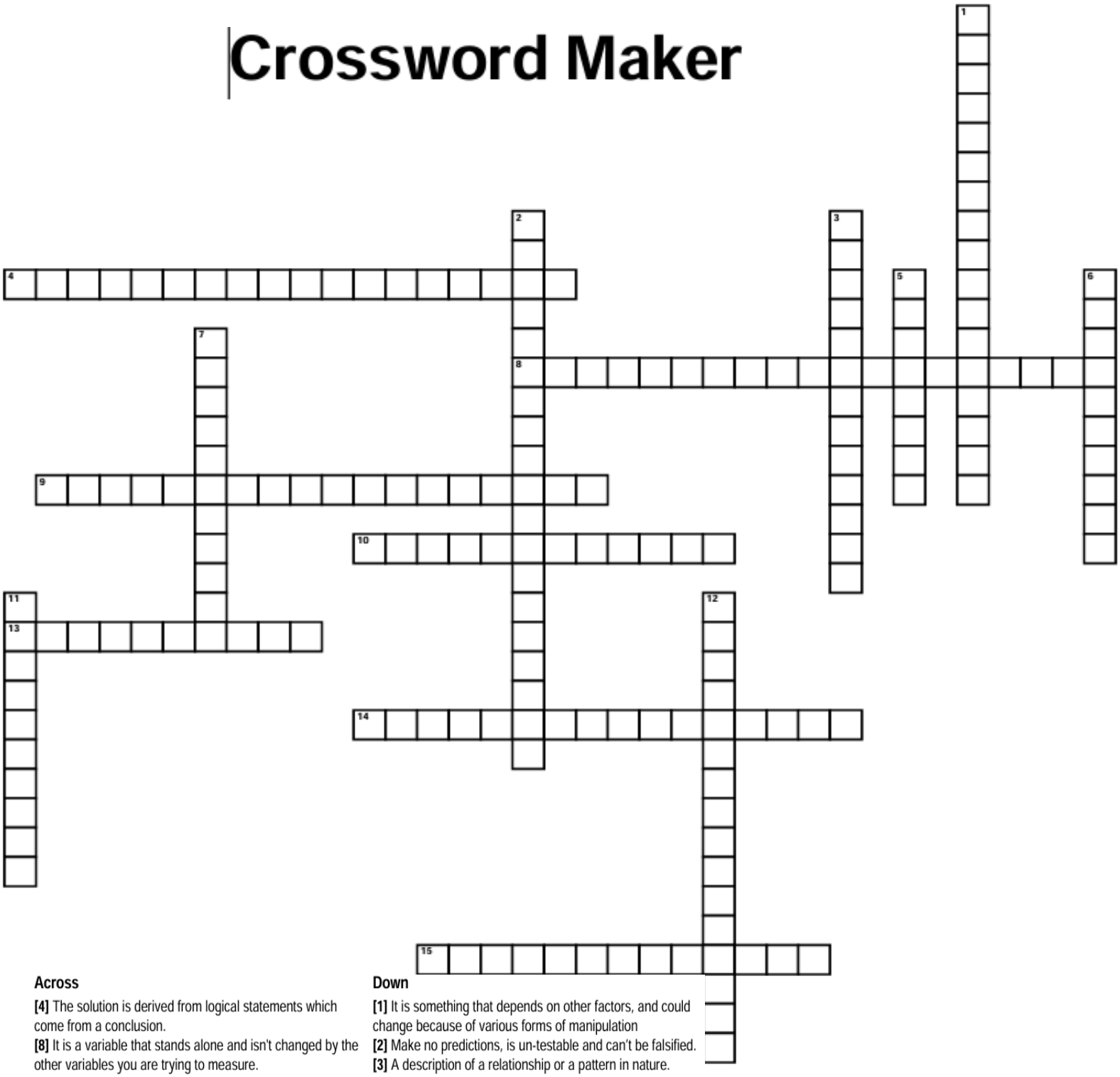
10. A psychologist proposes that exposure to violent media increases aggressive behavior in children. What does this statement represent?

Word Search Puzzle

I N P A R A D I G M R L O U I I N B R H F S T E I
M T I T D I I M C S S D H D G P U Y N R O D Y S C
C I N L H D I I I S O A E B X S E B H E R R E M T
T E T B I A I E I C T P E C O N P N P E T L V E Y
X E I A E E S T T U E R T F E D E L E S U E I B R
A P I T C X L R I N D U C T I V E E I C I W T I T
N C N E E P P E D A N N I U A Y I M E S T O A I S
N O N E M O N E H P S T E P C E E N P S O O T O I
U N I I C E N A R T S T N S T H N Q T C U M I H M
E F D E O T I R N I S T D I C Y R A E I S I T C E
S I S E H T O P Y H M E N O M O M S N E E U N U H
N R I E C N E I C S D E I L P P A I I N E E A D C
U M T Y T C E I E U O B N E D N E N S C S I U M C
L A T A D V Y C C T O C E T E F Y I B E I E Q O I
C T N H O S N T N H E T I U H V U N I E C C A D N
C I E O I G I S E N E C N F A L S I F I A B L E A
D O C C N V M H R T T N E D N E P E D N I N D H G
T N O M E N A N E S I S E H T O P Y H L L U N D R
E B P Y E S I I F A O T D P E E E R O S N A T E O
N I N H A P N O N S C I E N T I F I C N T I I D N
H A P H I R T O I Y P U R E S C I E N C E S E D I
X S C D A S F W A L C I F I T N E I C S S N E I E
Y S T P S E U D O S C I E N C E N C O A D E O R B
R S O E N I E N Y R T S I M E H C C I N A G R O I
A Y R T S I M E H C R A E L C U N N T N M I S I R

Applied science
Biochemistry
Confirmation bias
Data
Deductive
Dependent
Experiment
Falsifiable
Fortuitous
Hypothesis
Independent
Inductive
Inference
Inorganic chemistry
Nonscientific
Nuclear chemistry
Null hypothesis
Organic chemistry
Paradigm
Phenomenon
Pseudoscience
Pure Science
Quantitative
Science
Scientific law

Crossword Maker



Across

[4] The solution is derived from logical statements which come from a conclusion.
[8] It is a variable that stands alone and isn't changed by the other variables you are trying to measure.
[9] Collect specific information about a problem and then draw conclusion based on the data.
[10] Deals with numbers, this data can be measured.
[13] A supposition or proposed explanation made based on limited evidence as a starting point for further investigation.
[14] A tendency for people to favor information that confirms their preconceptions.
[15] Appears as scientific truth but is not testable.

Down

[1] It is something that depends on other factors, and could change because of various forms of manipulation
[2] Make no predictions, is un-testable and can't be falsified.
[3] A description of a relationship or a pattern in nature.
[5] Particular view or bias.
[6] A procedure carried out to support, refute, or validate a hypothesis.
[7] Deals with descriptions, this data can be observed but not measured.
[11] No provable basis for an event or theory.
[12] A model which has been born out by repeated tests and observation.

Open Note Review

Multiple Choice

1. _____ The solution is derived from logical statements:

   a. Inductive reasoning
   c. Deductive reasoning
   b. Hypothesis
   d. Scientific guess

2. _____The result is probable or most likely:

   a. Inductive reasoning
   c. Deductive reasoning
   b. Hypothesis
   d. Scientific guess

3. _____An educated guess:

   a. Inductive reasoning
   c. Deductive reasoning
   b. Hypothesis
   d. Scientific guess

4._____ Summarizes a hypothesis or group of hypotheses:

   a. Scientific law
   c. Scientific Theory
   b. Non-Scientific theory
   d. Non-Scientific guess

5. _____ A generalization of a body of observations:

   a. Scientific law
   c. Scientific Theory
   b. Non-Scientific theory
   d. Non-Scientific guess

6. _____ Makes no predictions, un-testable:

   a. Scientific law
   c. Scientific Theory
   b. Non-Scientific theory
   d. Non-Scientific guess

7. _____ No provable basis for an event or theory:

a. Pseudoscience c. Falsifiable

b. Phenomenon d. Observable

8. _____ Appears as scientific truth but is not:

a. Pseudoscience c. Falsifiable

b. Phenomenon d. Observable

9. _____ Theory can be proven wrong by new information:

a. Pseudoscience c. Falsifiable

b. Phenomenon d. Observable

10. _____ Can be measured or described:

a. Pseudoscience c. Falsifiable

b. Phenomenon d. Observable

T**rue/False**

11. Inductive not deductive reasoning is based upon the belief that logic always leads to truth. _____

12. The scientific method can lead one to determine absolute truth. _____

13. The scientific method is a general deductive, not inductive approach to a problem. ____

14. The scientific method involves following a rigidly defined set of steps to arrive at an absolute solution. _____

15. Scientific theories must be accepted without question, since they have resulted from thorough investigation. _____

Matching:

Identify the definition with the Major Branch of Chemistry that would study it.

16. _____Non-carbon elements
17. _____Chemical process of living things
18. _____Carbon based elements
19. _____Radioactivity

a. nuclear chemistry
b. organic chemistry
c. inorganic chemistry
d. biochemistry

Identify the following events as either (A) Inference or (B) Observation based on following laboratory exercise.

A student takes 10 grams of Zinc metal and places it in a beaker of hydrochloric acid immediately:

20. _____ The solution begins to bubble.
21. _____ A chemical reaction immediately occurs.
22. _____ Gas is produced in the reaction.
23. _____ The beaker becomes hot to touch.
24._____ A thermometer in the solution registers the temperature as 57 degrees Celsius.
25._____ Salt crystals are seen forming on the bottom of the solution.