

Lesson 1. Story Of The Atom

1) Which subatomic particles are positively charged?

Choose all that apply:

- A. Protons
- B. Neutrons
- C. Electrons

2) If you mix elements, you can change one (like lead) into another (like gold).

- A. True
- B. False

3) Atoms are so small that they don't have any color.

- A. True
- B. False

4) The nucleus is made of which subatomic particles??

Choose all that apply:

- A. Protons
- B. Neutrons
- C. Electrons

5) What is the name for the art of turning lead into gold?

- A. Alchemy
- B. Chemistry
- C. Pyrotechny
- D. Necromancy

Lesson 2. Elemental Dear Watson

1) Most of the mass of an atom is in the

- A. Electrons
- B. Orbitals
- C. Nucleus

2) Which element is the lightest element of all?

- A. Hydrogen
- B. Helium
- C. Neon
- D. Lithium

3) The atomic mass of an element is found by adding up the numbers of which types of subatomic particles?

Choose all that apply:

- A. Protons
- B. Neutrons
- C. Electrons

4) Who discovered the periodic table?

- A. Sophie Germain
- B. Dmitri Mendeleev
- C. Gregor Mendel
- D. Ivan Pavlov

5) How many known elements are there in 2020? _____

Lesson 3. Modeling Clay Orbitals

1) Which element has 2 protons?

- A. hydrogen
- B. helium
- C. lithium
- D. oxygen

2) What is an orbital?

- A. The region where an proton is most likely to be
- B. The region where an neutron is most likely to be
- C. The region where an electron is most likely to be

3) If an element has an atomic mass of 9 and has 5 neutrons. How many Protons does it have? _____

4) The atomic number of an element is the number of what in each atom?

Choose all that apply:

- A. Protons
- B. Neutrons
- C. Electrons

5) What type of charge do electrons have?

- A. positive
- B. negative
- C. no charge (neutral)

Lesson 4. A Noble Quest

1) What do we get when an atom has an extra neutron?

- A. A different element
- B. An isotope
- C. An ion

2) The halogens are all very

- A. reactive
- B. unreactive

3) An atom with a full shell of electrons is

- A. unreactive
- B. reactive

4) Which noble gas is the most abundant in the atmosphere?

- A. Helium
- B. Argon
- C. Neon
- D. Krypton
- E. Xenon
- F. Radon

5) Which of these elements are not noble gasses?

Choose all that apply:

- A. Argon
- B. Hydrogen
- C. Helium
- D. Oxygen

Lesson 5. Why Share Electrons

1) Table salt is made out of which two elements?

Choose all that apply:

- A. Sodium
- B. Fluorine
- C. Potassium
- D. Chlorine

2) Ions are atoms that have a positive or negative charge.

- A. True
- B. False

3) Which elements make water?

Choose all that apply:

- A. Hydrogen
- B. Helium
- C. Oxygen
- D. Sodium

4) An ionic bond is a chemical bond where electrons are:

- A. shared
- B. transferred

5) A covalent bond is a chemical bond where electrons are:

- A. shared
- B. transferred

6) Where did the sodium go?

- A. It disappeared entirely.
- B. It's in the water
- C. It's in the air

Lesson 6. Quiz Show Review

1) Which element has exactly 6 protons?

- A. Boron
- B. Carbon
- C. Nitrogen
- D. Oxygen

2) Which of the following are **not** elements?

Choose all that apply:

- A. bronze
- B. water
- C. aluminum
- D. salt

3) Select each gas that is flammable.

Choose all that apply:

- A. Hydrogen
- B. Helium
- C. Argon
- D. Nitrogen

4) Which of these elements is more dangerous?

- A. Oxygen
- B. Cobalt
- C. Arsenic
- D. Astatine

5) Beryllium has an atomic number of 4 and an atomic mass of 9. How many neutrons does an atom of beryllium have?

6) What is the atomic number of an element?

- A. The number of protons in an atom
- B. The number of neutrons in an atom
- C. The number of electrons in an atom

7) Which would you rather battle?

- A. A duck the size of a horse
- B. 100 horses the size of a duck

8) Which element below is the most stable?

- A. Oxygen
- B. Nitrogen
- C. Helium
- D. Boron

9) Which of the following are elements?

Choose all that apply:

- A. gold
- B. cotton
- C. helium
- D. steel
- E. sodium
- F. antimony
- G. quartz

10) What type of bond do water molecules have?

- A. Covalent bond
- B. Ionic bond

11) What is an isotope?

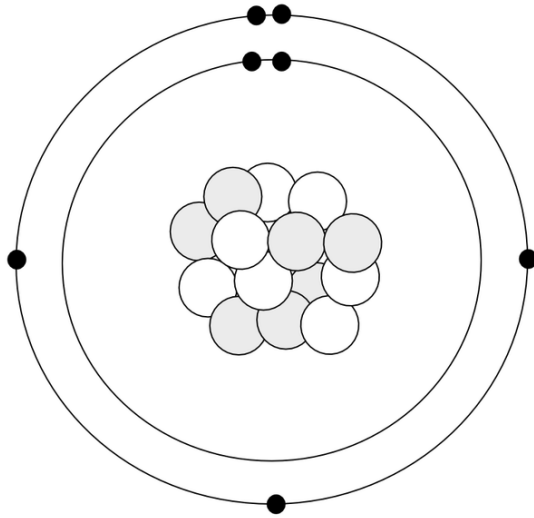
- A. An element with a different number of protons
- B. An element with a different number of neutrons
- C. An element with a different number of electrons

12) Argon has an atomic number of 18 and an atomic mass of 40. How many neutrons does an atom of argon have?

13) Which family in the periodic table is known for being unreactive or forming very few bonds with other elements?

- A. Halogens
- B. Noble Gases
- C. Alkali Metals
- D. Non-metals

14) Which element is pictured below?



- A. Boron
- B. Carbon
- C. Nitrogen
- D. Oxygen
- E. Chlorine

15) In what type of bond are electrons shared between two atoms?

Choose all that apply:

- A. Covalent
- B. Ionic

16) What is the atomic mass of an element with 11 protons, 12 neutrons, and 11 electrons?

Lesson 7. Element Vs Mixture Vs Compound

1) What do you call a group of atoms that are bonded together?

- A. a glop
- B. a molecule
- C. a flock
- D. a conglomeration

2) Which of the following are mixtures?

Choose all that apply:

- A. Orange juice
- B. Water
- C. Boron
- D. Vinegar

3) A molecule can be made of just one type of atom.

- A. True
- B. False

4) Select all of the molecules below that are not compounds.

Choose all that apply:

- A. Water
- B. Alcohol
- C. Vinegar
- D. Nitrogen

5) A compound is a molecule made of more than one type of element.

- A. True
- B. False

Lesson 8. What Is Radioactivity

1) All elements have equal numbers of protons and neutrons.

- A. True
- B. False

2) Which types of radiation are harmful to your DNA?

Choose all that apply:

- A. Microwaves
- B. X-rays
- C. Ultraviolet light
- D. Infrared light

3) Select the elements below that are radioactive.

Choose all that apply:

- A. Uranium
- B. Radon
- C. Polonium
- D. Titanium
- E. Molybdenum

4) Everybody is exposed to radiation.

- A. True
- B. False

5) Is it safe to eat bananas?

- A. Yes (unless you have a food allergy)
- B. No (bananas are radioactive)

Lesson 9. Going Bananas

1) There could never be a radioactive form of helium because its nucleus is too small.

- A. True
- B. False

2) If an atom has 3 protons, 5 neutrons, and 4 electrons, what element is it?

- A. Hydrogen
- B. Helium
- C. Lithium
- D. Beryllium
- E. Boron

3) If a boron atom gained a neutron, what element would we have?

- A. Beryllium
- B. Boron
- C. Carbon
- D. Nitrogen

4) You are exposed to radiation every day.

- A. True
- B. False

5) If a carbon atom gained a proton, what would happen?

Choose all that apply:

- A. It would become charged.
- B. It would become a heavier isotope of carbon.
- C. It would no longer be carbon.

Lesson 10. Edible Experiments

1) When you add sugar to water, new molecules are formed.

- A. True
- B. False

2) Which of the following dissolve in water?

Choose all that apply:

- A. Salt
- B. Oil
- C. Flour
- D. Sugar

3) Would you rather live a month as a squirrel or a hawk?

- A. Squirrel
- B. Hawk

Lesson 11. States Of Matter

1) When does a bottle of water weigh the most?

- A. In its liquid state
- B. After you freeze it
- C. Both weigh the same

2) What substance exists naturally on Earth as a solid, a liquid, and a gas?

Choose all that apply:

- A. Mercury
- B. Water
- C. Nitrogen
- D. Carbon Dioxide

3) Melting is a change of state from

- A. Liquid to gas
- B. Solid to liquid
- C. Gas to solid
- D. Solid to gas

4) When something changes from gas to liquid, this is called

- A. Freezing
- B. Melting
- C. Condensing
- D. Evaporating

5) Which weighs more

- A. Popped popcorn
- B. Unpopped popcorn
- C. They weigh the same

Lesson 12. Matter Batter

1) Baking soda mixed into dough or batter will:

- A. Cause a chemical reaction
- B. Cause no chemical reaction

2) Cooking something on the stove will do which of these things? (Mark all that apply.)

Choose all that apply:

- A. Change water molecules from a liquid to a gas.
- B. Change iron molecules from a solid to a liquid.
- C. Cause chemical reactions between molecules.
- D. Cause no chemical reactions

3) What is the word for when something changes from a gas to a liquid?

- A. Melting
- B. Freezing
- C. Subliming
- D. Evaporating or boiling
- E. Condensing
- F. Desubliming or deposition

4) If a chemical reaction such as hydrogen gas exploding into a fireball happens inside a closed space, you will have exactly the same number of atoms before and after the reaction.

- A. True
- B. False

5) When water goes from room temperature to 180 degrees Fahrenheit, it will

- A. Freeze
- B. Melt
- C. Boil
- D. Sublime
- E. Deposit
- F. Explode
- G. Not change state

Lesson 13. Physical Reactions

1) Which of these are physical changes?

Choose all that apply:

- A. Melting ice
- B. Cooking an egg
- C. Freezing butter
- D. Burning a match

2) How cold is liquid nitrogen?

- A. 0°C
- B. -50°C
- C. -100°C
- D. -200°C
- E. -400°C

3) Clouds are mostly made of:

Choose all that apply:

- A. Water droplets (liquid)
- B. Water vapor (gas)
- C. Ice crystals (solid)

4) Which is colder?

- A. Liquid nitrogen
- B. Dry ice

5) In a physical reaction, new molecules are formed.

- A. True
- B. False

Lesson 14. Fizzing Reactions

1) If you put a balloon over a bottle of soda pop and shake it, gas fills up the balloon. What type of reaction is this?

- A. Physical Reaction
- B. Chemical Reaction
- C. Both
- D. Neither

2) When you put baking soda into vinegar, what type of reaction do you get?

- A. Physical Reaction
- B. Chemical Reaction
- C. Both
- D. Neither

3) If you put pop rocks into soda pop, what type of reaction do you get?

- A. Physical Reaction
- B. Chemical Reaction
- C. Both
- D. Neither

4) Alka-seltzer tablets react fastest in

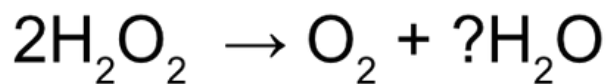
- A. Hot water
- B. Warm water
- C. Cold water

5) Alka-seltzer tablets react fastest when

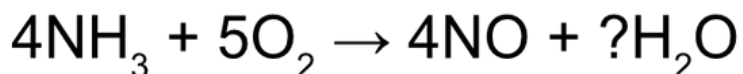
- A. they are whole
- B. they are broken into small pieces

Lesson 15. What Is A Reaction

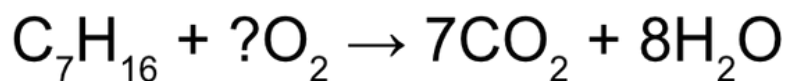
1) Find the missing number to balance the equation.



2) Find the missing number to balance the equation.



3) Find the missing number to balance the equation.



4) Water boiling on the stove is an example of a

- A. chemical reaction
- B. physical reaction

5) Which of the following could be one of the reactants in the chemical equation below?



Choose all that apply:

- A. table salt
- B. oxygen gas
- C. hydrochloric acid
- D. sodium hydroxide
- E. sugar (C₁₂H₂₂O₁₁)

Lesson 16. Chemical Reactions

1) New molecules are formed in what type of reaction?

- A. chemical reaction
- B. physical reaction

2) Isotopes of an element have a different number of

- A. protons
- B. neutrons
- C. electrons

3) Ammonia is made of which elements?

Choose all that apply:

- A. Oxygen
- B. Nitrogen
- C. Hydrogen
- D. Carbon

4) Which is the smallest?

- A. a proton
- B. a neutron
- C. an electron
- D. an atom

5) If electrons are shared between two atoms, the bond is

- A. a covalent bond
- B. an ionic bond
- C. a James Bond

Lesson 17. Chemical Reactions 2

1) The molecules you have after the reaction are called the

- A. products
- B. reactants
- C. solvents
- D. precipitate

2) When a reaction releases energy, it is

- A. endothermic
- B. anthropomorphic
- C. exothermic

3) When a reaction requires energy, it is called

- A. hypodermic
- B. endothermic
- C. exothermic

4) The molecules you have before the reaction are called the

- A. products
- B. reactants
- C. precipitate
- D. solution

5) What causes the color change in the iodine clock reaction?

- A. magic
- B. oxygen photosynthesizing
- C. Iodine reacting with starch
- D. Iodine reacting with hydrogen

Lesson 18. Carbon

1) A reaction that produces heat is called

- A. endothermic
- B. exothermic
- C. a chemical reaction
- D. a physical reaction

2) If two molecules are safe and non-toxic, then when they react the products they form will also be safe and non-toxic.

- A. True
- B. False

3) In the sugar snake reaction, what is the black column of a sugar snake made of?

- A. Carbon
- B. Water
- C. sugar
- D. sulfuric acid

Lesson 19. Toasters And Cooking Mysteries

1) What is energy?

- A. The ability to do work.
- B. An element on the periodic table
- C. A type of vegetable

2) Which of these are types of energy?

Choose all that apply:

- A. Heat
- B. Light
- C. Kinetic
- D. Electricity
- E. Sound

3) In an incandescent light bulb, 90% of the electricity turns into heat.

- A. True
- B. False

4) Soft pretzels came about after someone accidentally coated a bagel with lye instead of egg wash.

- A. True story
- B. Contains an element of truth
- C. Completely false

5) The Maillard reaction that gives cooked food much of its smell and flavor is a chemical reaction between

- A. Proteins and acids
- B. Sugar and proteins
- C. Sugar and water
- D. Water and protein

Lesson 20. Lemon Battery

1) Which are examples of exothermic reactions?

Choose all that apply:

- A. evaporating water
- B. burning a match
- C. iron rusting
- D. sugar snake

2) Batteries get their energy from a chemical reaction.

- A. True
- B. False

3) Electricity is a flow of electrons.

- A. True
- B. False

4) Which is better?

- A. Math Dad with a beard
- B. Math Dad without a beard
- C. same

5) You can make a "lemon battery" with any type of fruit or vegetable.

- A. True
- B. False

Lesson 21. Quiz Show

1) Select the elements below that are in a sugar molecule.

Choose all that apply:

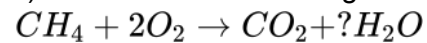
- A. Carbon
- B. Nitrogen
- C. Oxygen
- D. Sodium
- E. Hydrogen

2) Select the examples of organic carbon below.

Choose all that apply:

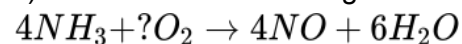
- A. gasoline
- B. diamonds
- C. carbon dioxide
- D. sugar
- E. graphite

3) What number is missing in the balanced chemical equation below?



?=_____

4) What number is missing in the balanced chemical equation below?



?=_____

5) The lemon battery wouldn't work if you used a potato instead of a lemon because lemons carry an electrical charge while potatoes are inert.

- A. True
- B. False

6) By mass, the most abundant element in the human body is

- A. Carbon
- B. Hydrogen
- C. Oxygen
- D. Nitrogen

7) Which type of radiation below has the most energy?

- A. red light
- B. blue light
- C. microwaves
- D. infrared light

8) This type of reaction absorbs heat

- A. Endothermic
- B. Exothermic

9) Water evaporating is an example of an

- A. endothermic physical reaction
- B. exothermic physical reaction
- C. endothermic chemical reaction
- D. exothermic chemical reaction

10) Which animal has fingerprints that are so indistinguishable from humans that they have been confused at a crime scene?

- A. Orangutan
- B. Koala
- C. Chimpanzee
- D. Marmoset

11) Activation energy is

- A. the energy released by a reaction
- B. the energy stored up by a reaction
- C. the energy needed to start a reaction
- D. the energy created by the motion of electrons

12) A battery made of 1000 lemons will supply enough energy to power a car.

- A. True
- B. False

13) Select each true statement.

Choose all that apply:

- A. Energy cannot be created.
- B. Energy cannot be destroyed.
- C. Energy can only be transferred.

14) In carbon dioxide, the bond between each oxygen atom and the carbon atom is a

- A. single bond
- B. double bond
- C. triple bond

15) When a rise in temperature causes atoms and molecules to move faster and collide with each other, this increase in energy is called

- A. light energy
- B. thermal energy
- C. kinetic energy
- D. chemical energy
- E. potential energy

Lesson 22. Where Do Fossil Fuels Come From

1) The carbon in gasoline once existed in dinosaurs.

- A. True
- B. False

2) Which of the following are examples of organic carbon?

Choose all that apply:

- A. Gasoline
- B. Carbon Dioxide
- C. Wood
- D. Coal
- E. Natural gas

3) It takes about 100 years to replace the oil we are pumping out of the ground today.

- A. True
- B. False

4) During the Carboniferous period

- A. There was less oxygen in the atmosphere than today.
- B. There was more oxygen in the atmosphere than today.
- C. There was the same amount of oxygen in the atmosphere as today.

5) Fossil fuels include

Choose all that apply:

- A. Natural gas
- B. Olive oil
- C. Kerosine
- D. Gasoline
- E. Coal

Lesson 23. What Is Fire Really

1) Combustion creates

Choose all that apply:

- A. Water vapor
- B. Methane
- C. Carbon Dioxide
- D. Sodium Chloride

2) What things must be present for fire?

Choose all that apply:

- A. Nitrogen
- B. Heat
- C. Fuel
- D. Oxygen
- E. Explosives

3) Burning wood produces water.

- A. True
- B. False

4) A candle flame casts a shadow.

- A. True
- B. False

5) The brightest part of a flame is the hottest part.

- A. True
- B. False

6) A candle flame on a space station (0 gravity but plenty of oxygen) is shaped like a small blue sphere.

- A. True
- B. False

Lesson 24. Why Do Leaves Change Color

1) Select each example of a fossil fuel below.

Choose all that apply:

- A. Coal
- B. Ethanol
- C. Natural Gas
- D. Petroleum
- E. Wood

2) Which of these is not necessary for a fire.

- A. fuel
- B. spark
- C. oxygen
- D. heat

3) The best way to put out a grease fire is to

- A. cut off the oxygen by covering it
- B. pouring water on it
- C. applying pure oxygen
- D. placing ice cubes in the fire

4) Burning wood creates water.

- A. True
- B. False

5) What shape does a flame have on a space station?

- A. long and narrow
- B. a cylinder
- C. undulating spikes
- D. a round ball

Lesson 25. Chemistry Of Lava

1) Which two elements are the most abundant elements in lava?

Choose all that apply:

- A. Oxygen
- B. Carbon
- C. Hydrogen
- D. Silicon
- E. Nitrogen

2) What is the most abundant element in the Earth's crust?

- A. Oxygen
- B. Iron
- C. Nitrogen
- D. Hydrogen

3) How hot is lava?

- A. 300-500 degrees Celsius
- B. 700-1000 degrees Celsius
- C. 1500-2000 degrees Celsius
- D. 2500-300 degrees Celsius

4) Which of these is an element?

Choose all that apply:

- A. Silicone
- B. Silica
- C. Silicon

5) Which volcano is more likely to have an explosive eruption?

- A. One with low silica content
- B. One with high silica content

Lesson 26. Acids And Bases

1) What does pH stand for?

- A. Potential of hydrogen
- B. Perfect hydroxide
- C. Perennial helium
- D. Power of hydride

2) Which of the following is an acid?

Choose all that apply:

- A. Vinegar
- B. Window cleaner
- C. Ammonia
- D. Lemon juice

3) If you saw 3 hot spring pools that had signs displaying their pH levels, which one would be safe to swim in?

- A. Pool with a pH of 2
- B. Pool with a pH of 8
- C. Pool with a pH of 14

4) What is the pH of pure water?

5) What happens if you combine an acid and a base?

- A. They react.
- B. They don't react.

Lesson 27. Quiz Show

1) This element is the most abundant element in Earth's crust.

- A. Hydrogen
- B. Carbon
- C. Nitrogen
- D. Oxygen

2) This element is the second most abundant element in Earth's crust.

- A. Iron
- B. Silicon
- C. Magnesium
- D. Carbon

3) Acids are dangerous, but bases are safe to handle.

- A. True
- B. False

4) Which materials below contain the element silicon?

- A. silica
- B. silicone
- C. both
- D. neither

5) Sodium has an atomic mass of 23 and an atomic number of 11. How many neutrons does each sodium atom have?

6) Which of the following are noble gases?

Choose all that apply:

- A. Neon
- B. Ozone
- C. Nitrogen
- D. Krypton
- E. Argon

7) How many protons does an atom of cadmium have?

8) The first medical X-ray took place in what year?

- A. 1895
- B. 1922
- C. 1964
- D. 1983

9) Which superpower below would you choose for yourself?

- A. super sight (Can see infrared and ultraviolet light/colors)
- B. super hearing
- C. super sense of smell
- D. super sense of taste

10) What is the pH of pure water?

11) Select each item below that has a basic pH.

Choose all that apply:

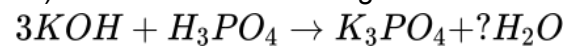
- A. baking soda
- B. vinegar
- C. orange juice
- D. soap
- E. ammonia

12) When acids and bases are mixed, what is produced?

Choose all that apply:

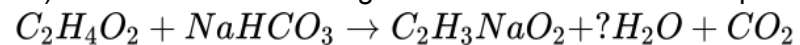
- A. water
- B. salts
- C. carbon dioxide
- D. ozone

13) What number is missing in the balanced chemical equation below?



?= _____

14) What number is missing in the balanced chemical equation below?



?= _____

15) What is the only element whose atoms usually have more protons than neutrons?

- A. Hydrogen
- B. Carbon
- C. Chlorine
- D. Neon
- E. Silicon

16) Iron rusting is an example of an exothermic reaction.

- A. True
- B. False

Lesson 28. Chemistry Of Pools

1) Why shouldn't you pee in the pool?

- A. It adds harmful bacteria to the water.
- B. It will make you dehydrated.
- C. It produces toxic chemicals in the pool water.
- D. It might attract sharks.

2) Which type of water is most dense?

- A. Hot water
- B. Cold water
- C. Hot salt water
- D. Cold salt water

3) What will happen to a swimming pool without chlorine?

- A. It will turn green.
- B. There will be no change.
- C. It will be healthier to swim in.
- D. It will evaporate much faster.

4) Natural hot springs can contain *Naegleria Fowleri* (brain eating amoeba).

- A. True
- B. False

5) Which type of ions are typically in hard water

Choose all that apply:

- A. magnesium ions
- B. arsenic ions
- C. chlorine ions
- D. calcium ions

Lesson 29. Photosynthesis

1) The oxygen we are breathing came from plants.

- A. True
- B. False

2) 98% of the mass of a tree came from water and air.

- A. True
- B. False

3) How much of the world's oxygen comes from the Amazon rainforest?

- A. 80%
- B. 50%
- C. 20%
- D. 9%

4) Plants are the only organisms that perform photosynthesis.

- A. True
- B. False

5) What is photosynthesis?

- A. Using the power of the sun to convert carbon dioxide to sugar
- B. Using the power of the sun to convert sugar into carbon dioxide
- C. Combining hydrogen and oxygen to create water
- D. The capture of sunlight to create nuclear fission

Lesson 30. Frankenseeds

1) Some seeds will only sprout if they are exposed to cold temperatures.

- A. True
- B. False

2) Which of the following are seeds?

Choose all that apply:

- A. Rice
- B. Peanuts
- C. Coconuts
- D. Peppercorns
- E. Pomegranate arils

3) One of the oldest seeds that has grown into a plant was a date palm that was

- A. 50 years old
- B. 200 years old
- C. 500 years old
- D. 2000 years old

4) Which of these are *ESSENTIAL* for most seeds to germinate?

- A. Water
- B. Light
- C. Cold temperatures
- D. Warm temperatures

5) What will happen if a person swallows watermelon seeds without chewing them first?

- A. The seeds will be digested.
- B. The seeds will pass through the digestive system unchanged, much like a piece of chewing gum.
- C. The seeds will sprout inside the stomach.

Lesson 31. All About Sugar

1) What is the correct name for table sugar?

- A. Sucrose
- B. Glucose
- C. Fructose
- D. Lactose

2) Why does sugar taste sweet?

- A. Because it contains a lot of carbon
- B. Because it contains fructose
- C. Because it contains glucose

3) When the doctor measures your blood sugar, what is being measured?

- A. Sucrose
- B. Glucose
- C. Fructose
- D. Lactose

4) How many carbons does a glucose molecule have?

5) What elements is sugar made out of?

Choose all that apply:

- A. Hydrogen
- B. Nitrogen
- C. Oxygen
- D. Potassium
- E. Carbon

Lesson 32. Why Can't You Eat Books

1) What is the name of a long chain of identical units?

- A. Colander
- B. Polymer
- C. Monomer
- D. Polygon

2) Starch and cellulose are both polymers made of

- A. Glucose
- B. Fructose
- C. Sucrose
- D. Lactose

3) An enzyme is

- A. a state of matter
- B. a carbohydrate that stores energy
- C. a starch that changes color
- D. a protein that makes an action happen

4) If a cow lived in a world with no bacteria, it would starve to death.

- A. True
- B. False

5) Human beings can digest cellulose

- A. True
- B. False

Lesson 33. Quiz Show

1) Which of the following are carbohydrates?

Choose all that apply:

- A. Starch in a potato
- B. Glucose in a sports drink
- C. Cellulose in paper
- D. Lactose in milk

2) Which of the following is the most acidic?

- A. Milk
- B. Baking Soda
- C. Grapes
- D. Ammonia

3) All isotopes are radioactive.

- A. True
- B. False

4) How many neutrons does an atom have if it has an atomic number of 15 and an atomic mass of 31?

5) Which noble gas is the most abundant in our atmosphere?

- A. Helium
- B. Neon
- C. Krypton
- D. Argon

6) A liquid with a pH of 5 is

- A. Acidic
- B. Basic
- C. Neutral

7) Which of the following describes water in a solid state?

- A. Water molecules that are moving rapidly
- B. Water molecules that are arranged in a lattice
- C. Water molecules that are forming ions

8) Which of the following elements are not metals?

Choose all that apply:

- A. Carbon
- B. Cadmium
- C. Neon
- D. Neodymium

9) Which would you rather have?

- A. A magic carpet
- B. Your own personal robot

10) Which of the following are compounds?

Choose all that apply:

- A. Water
- B. Oxygen
- C. Ammonia
- D. Nitrogen
- E. Gallium

11) The number of neutrons in platinum is always equal to the number of protons.

- A. True
- B. False

12) Why does ice float?

- A. Warm water sinks to the bottom while cold water stays on top.
- B. The magnetic pull of the Earth is stronger for liquids.
- C. The molecules are more spread out in solid water than in liquid.

13) Select each true statement.

Choose all that apply:

- A. A candle flame casts a shadow.
- B. Wax is the main fuel of a candle.
- C. Fire is an element.
- D. The center part of a flame is the hottest part.
- E. Smoke is made mostly of water vapor and carbon dioxide.

14) Rocks are mostly made of which two elements?

Choose all that apply:

- A. Silicon
- B. Hydrogen
- C. Oxygen
- D. Iron

15) Why can a termite digest wood?

- A. It has special bacteria in its stomach that can break cellulose into glucose.
- B. It has an enzyme that can break cellulose into glucose.
- C. All insects can digest cellulose.

Lesson 34. Lipids

1) Which is least dense?

- A. Water
- B. Oil
- C. Corn syrup

2) Fats and oils are made of which two elements?

Choose all that apply:

- A. Carbon
- B. Oxygen
- C. Nitrogen
- D. Hydrogen

3) Why don't oil and water mix?

- A. Because oil doesn't evaporate
- B. Because oil is less dense
- C. Because oil doesn't have any charged or partially charged atoms
- D. Because oil cannot absorb salt

4) What type of molecule is soap?

- A. Hydrophobic
- B. Hydrophilic
- C. Hydrogenated
- D. Amphiphilic (both hydrophobic and hydrophilic)

5) Which of the following are lipids?

Choose all that apply:

- A. Margarine
- B. Fat
- C. Vinegar
- D. Butter
- E. Olive Oil

Lesson 35. Plankton

1) Which of these is a single-celled organism?

Choose all that apply:

- A. Amoeba
- B. Virus
- C. Jellyfish
- D. Green algae

2) Which part of a cell is made of lipids?

- A. DNA
- B. The membrane
- C. The nucleus
- D. The whole inside

3) DNA is a polymer of

- A. Sugars
- B. Proteins
- C. Lipids
- D. Nucleic acids

4) Which of the following can be called plankton?

Choose all that apply:

- A. Plant spores
- B. Algae
- C. Baby fish
- D. Amoeba

5) What portion of seawater is salt?

- A. 2%
- B. 3.5%
- C. 5%
- D. 7%

Lesson 36. Proteins

1) What element is found in proteins but not carbohydrates?

- A. Oxygen
- B. Potassium
- C. Nitrogen
- D. Sodium

2) How many amino acids are there?

- A. 9
- B. 21
- C. More than 200

3) Which protein is the most common in the human body?

- A. Rubisco
- B. Collagen
- C. Keratin
- D. Muscle

4) Lipids and fats are mostly made of

- A. Carbon and Hydrogen
- B. Carbon and Oxygen
- C. Carbon, Oxygen, and Hydrogen
- D. Carbon, Oxygen, Hydrogen, Nitrogen, and sometimes Sulfur

5) Proteins are made of which smaller pieces?

- A. Sugars
- B. Fatty Acids
- C. Amino Acids
- D. Lipids

Lesson 37. Bioluminescence

1) A glowstick will glow longer in cold weather than in hot weather.

- A. True
- B. False

2) When a chemical reaction produces light, this is called

- A. Fluorescence
- B. Chemiluminescence
- C. Incandescence
- D. Essence

3) Which of these can be bioluminescent?

Choose all that apply:

- A. Jellyfish
- B. Insects
- C. Mushrooms
- D. Plants
- E. Bacteria

4) Fireflies need oxygen to light up.

- A. True
- B. False

5) The bioluminescence of a firefly is called a “cold light” because

- A. It's an endothermic reaction. Fireflies get colder when they glow.
- B. It's an exothermic reaction that doesn't produce a noticeable amount of heat.

Lesson 38. Cells To Colonies

1) Why do minty foods make your mouth feel cold?

- A. Menthol binds to a protein that is designed to sense temperature.
- B. Menthol causes an endothermic reaction.
- C. Your mouth gets hotter, so the mint feels cold.

2) Why can a dog smell better than a person?

- A. More of a dog's brain is devoted to analyzing smells
- B. Dogs have 50 times more olfactory receptors than a person.
- C. Dogs have bigger nostrils than people.
- D. Actually, people are better than dogs at smelling things.

3) Why do ants walk in a line?

- A. Because they are near-sighted
- B. To avoid predators
- C. They always follow the fastest path.
- D. Because they are following a chemical path

4) Why are jalapeño peppers spicy?

- A. Because they cause a reaction that produces heat.
- B. They contain a chemical that binds to heat receptors in your mouth.
- C. They cool your mouth down so everything feels hot.

5) The cells in your body communicate with each other using chemical signals.

- A. True
- B. False

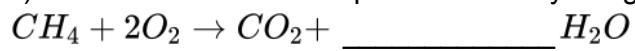
6) How old is Math Dad? _____

Lesson 39. Quiz Show

1) If an atom has 14 electrons and no charge, how many neutrons will it have?

- A. 13
- B. 14
- C. 15
- D. There is not enough info to say.

2) Balance the chemical equation below by filling in the blank.



3) Balance the chemical equation below by filling in the blank.



4) Which of these is the biggest?

- A. An atom of oxygen
- B. A molecule of water
- C. An atom of carbon
- D. A molecule of hydrogen gas

5) If a helium atom has 5 neutrons, it will

- A. be stable
- B. decay

6) Most atoms are brown, but cobalt atoms are blue.

- A. True
- B. False

7) Why does electricity travel through copper wires?

- A. Because electricity is a flow of electrons and metals share electrons very easily
- B. Because copper wires contain water
- C. Because copper atoms are covalently bonded to each other

8) What does pH measure?

- A. The ratio of hydrogen and hydroxide ions
- B. The potential of helium
- C. How safe a liquid is
- D. An isotope of nitrogen

9) What is another name for the molecule NaCl

- A. Hydrogen bromide
- B. Potassium chloride
- C. Sodium dichloride
- D. Sodium Chloride

10) Water freezing is an example of a

- A. chemical change
- B. physical change
- C. subatomic change

11) Which ability would you rather have?

- A. Speak 10 languages fluently
- B. Be able to communicate with cats
- C. Be able to communicate with insects

12) Changing the number of neutrons in an atom changes which of the following?

Choose all that apply:

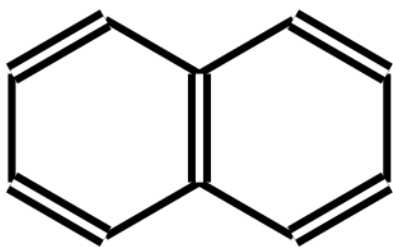
- A. Atomic mass
- B. Name of the element
- C. Atomic number
- D. The charge of the element

13) Which of the following has the highest pH value?

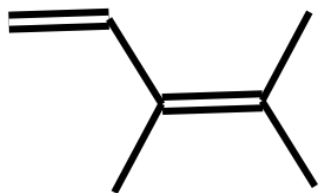
- A. Lime juice
- B. Vinegar
- C. Water
- D. Baking soda

14) An acid with a pH of 3 is _____ times more acidic than an acid with a pH of 4.

15) How many hydrogen atoms are in this hydrocarbon molecule? _____



16) How many hydrogen atoms are in this hydrocarbon molecule?



Lesson 40. Nitrogen Cycle

1) What's the most common element in plant fertilizer?

- A. Carbon
- B. Phosphorus
- C. Nitrogen
- D. Potassium
- E. Magnesium

2) Which of these ratios is closest to the composition of air?

- A. 80% oxygen, 20% nitrogen
- B. 80% oxygen, 20% carbon dioxide
- C. 80% nitrogen, 20% oxygen
- D. 80% nitrogen, 20% carbon dioxide

3) Which plants are able to use the nitrogen in the air?

- A. All of them
- B. Legumes
- C. Carrots
- D. Rice
- E. None of them

4) Nitrogen is found in

Choose all that apply:

- A. Sugars
- B. Proteins
- C. DNA
- D. Air
- E. Oil

5) Nitrogen gas in the atmosphere has a

- A. single bond
- B. double bond
- C. triple bond
- D. quadruple bond

Lesson 41. Water Reclamation

1) How much of the earth's total water is fresh (nonsalty)?

- A. 50%
- B. 30%
- C. 3%
- D. 1%

2) Which of these can be found in untreated drinking water?

Choose all that apply:

- A. Cholerea
- B. Giardia
- C. E. coli
- D. Typhoid
- E. Amoebic dysentery

3) Wastewater includes water from

Choose all that apply:

- A. Flushed toilets
- B. Showers and bathtubs
- C. Storm runoff
- D. Springs and rivers

4) Wastewater can't be converted into drinking water.

- A. True
- B. False

5) What would happen if you drank ocean water?

- A. You would become severely dehydrated.
- B. The water would taste salty, but otherwise you'd be fine.
- C. The fish would hunt you down out of jealousy.
- D. Marmoset

Lesson 42. Chemistry Of Water

1) Where does your drinking water come from?

- A. groundwater (a well)
- B. city water (a lake or reservoir)
- C. I don't know.

2) In an emergency, drinking seawater can prevent dehydration.

- A. True
- B. False

3) Which of these would be the best source of nitrogen for a plant?

- A. nitrogen gas in the atmosphere (78%)
- B. nitrate in the soil (less than 1%)

4) Deja has a farm and wants to sell some of the animal waste as fertilizer. Which of the following would have the highest source of nitrogen?

- A. llama poop
- B. llama spit
- C. cow urine
- D. cow manure

5) Why do animals need nitrogen?

- A. It's an essential ingredient in carbohydrates.
- B. They use it as an energy source.
- C. It's an essential ingredient in proteins.
- D. It's a vitamin.

Lesson 43. DIY Water Filter

1) If you were lost in a swamp that is known to be contaminated with raw sewage, which of these would be the safest to drink?

- A. Swamp water
- B. Swamp water placed in a jar and shaken vigorously
- C. Swamp water with arsenic to kill the bacteria
- D. Your own urine

2) Water from a well is always safe to drink.

- A. True
- B. False

3) An ion has a charge of -1, an atomic mass of 19, and 10 neutrons. How many electrons does it have?

4) What portion of the world's population does not have access to safe drinking water?

- A. 47%
- B. 29%
- C. 14%
- D. 6%

5) Rainwater running off a roof would be safe to drink.

- A. True
- B. False

Lesson 44. Firework Safety

1) The three main ingredients in fireworks are:

- A. Fuel, oxidizer, and binder
- B. Saltpeter, sulfur, and charcoal
- C. Phosphorus, oxygen, and iron

2) The temperature of sparklers is approximately:

- A. 97°C (206°F)
- B. 600°C (1,112°F)
- C. 1,200°C (2,192°F)
- D. 1,800°C (3,272°F)

3) If you buy small fireworks at the grocery store to set off in your driveway, which of the following should you have while lighting them:

Choose all that apply:

- A. A bucket of water
- B. Heat proof gloves
- C. Eye protection
- D. Adult supervision

4) When should you wear safety goggles?

Choose all that apply:

- A. When doing experiments that produce heat
- B. When doing experiments that produce a color change
- C. When doing experiments that produce gas
- D. When doing experiments that might splash

5) Without oxygen, gunpowder will not burn.

- A. True
- B. False

Lesson 45. Quiz Show

1) Select each molecule that is built out of glucose chains.

Choose all that apply:

- A. lipids
- B. cellulose
- C. protein
- D. starch

2) Which of the following can only be accomplished by bacteria?

Choose all that apply:

- A. Converting sugars into carbon dioxide
- B. Converting atmospheric nitrogen into ammonia
- C. Making coal into diamonds
- D. Breaking cellulose into glucose

3) The Hindenburg airship was able to float because it was filled with which gas?

- A. Hydrogen
- B. Helium
- C. Oxygen
- D. Nitrogen

4) Lipids are composed of which elements?

Choose all that apply:

- A. Hydrogen
- B. Carbon
- C. Nitrogen
- D. Oxygen
- E. Chlorine

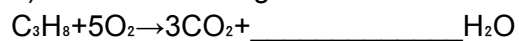
5) The smallest particle of an element that retains the properties of that element is a(n)

- A. proton
- B. neutron
- C. electron
- D. atom

6) There will ALWAYS be the same number and type of atoms before and after a chemical reaction or physical process.

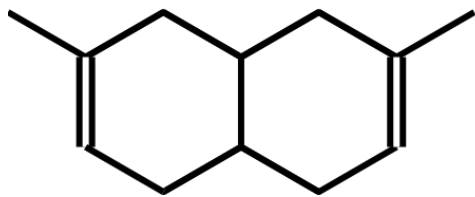
- A. True
- B. False

7) Fill in the missing value to balance the chemical equation.



8) An atom has 12 neutrons, 11 protons, and 10 electrons. What element is it?

9) How many hydrogen atoms are part of the hydrocarbon molecule below?



10) Is the elephant toothpaste experiment exothermic or endothermic?

- A. Exothermic, heat is released
- B. Exothermic, heat is absorbed
- C. Endothermic, heat is released
- D. Endothermic, heat is absorbed

11) Surprise Math Question.

What is the exact numerical value of $\frac{3}{e^{\pi i}}$?

12) This animal is called a pygmy



13) The symbol Sn stands for which element?

- A. Tin
- B. Scandium
- C. Antimony
- D. Selenium

14) The element most likely to have a mass of 232 atomic mass units is_____.

15) Which of these molecules is the least likely to react with another molecule in a chemical reaction?

- A. O_2
- B. N_2
- C. H_2O
- D. Cl_2

16) Of the molecules below, which has the most mass?

- A. H_2O
- B. CO_2
- C. Ne
- D. NaCl

17) Which of the following statements is true?

- A. Water releases heat when it transitions from liquid to gas, warming the surface where the evaporation took place.
- B. Liquid water is less dense than solid water.
- C. Water is the only substance on Earth that naturally exists in solid, liquid, and gaseous states of matter.
- D. Each water molecule can form hydrogen bonds with 4 other water molecules.