

## Chemistry Review Questions.

These questions should guide you through the topic on chemistry. You will need to be able to call up all of the following information and use it.

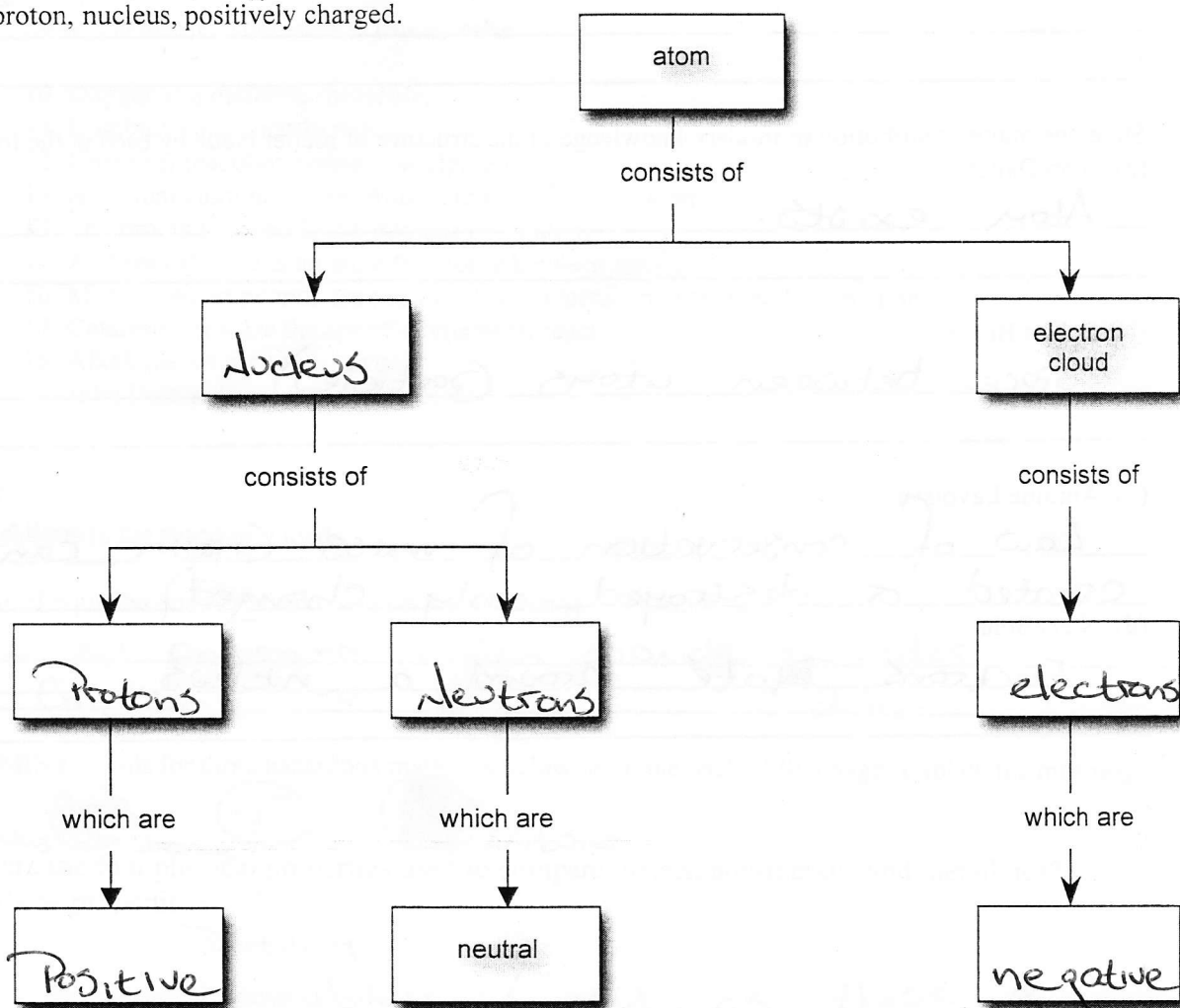
### Matching

Match the phrase in column A with a term in column B. Write the letter of the response in the blank on the left.

- |                    | A   |
|--------------------|---|
| <u>  i  </u>       | 1. The mass is 14 g.                              |
| <u>  g  </u>       | 2. A heterogeneous mixture.                       |
| <u>  b  </u>       | 3. An element is made of one type of ...          |
| <u>  c  </u>       | 4. A ratio of mass and volume.                    |
| <u>Electricity</u> | 5. Used to break substances down by electrolysis. |
| <u>  H  </u>       | 6. Developed the first atomic theory.             |
| <u>  D  </u>       | 7. Frying an egg.                                 |
| <u>  e  </u>       | 8. Tomato juice and dusty air.                    |

- |              | B                        |
|--------------|--------------------------|
| a            | Antoine Lavoisier        |
| <del>b</del> | atom                     |
| <del>c</del> | density                  |
| <del>d</del> | chemical change          |
| <del>e</del> | suspensions              |
| f            | molecule                 |
| <del>g</del> | colloid                  |
| h            | physical change          |
| <del>i</del> | quantitative observation |
| <del>j</del> | John Dalton              |

9. Complete this concept map for parts of an atom. Use each of the following terms: electron, negatively charged, neutron, proton, nucleus, positively charged.



10. For each of the following pairs, describe one major difference.

(a) a pure substance and a mixture

Pure = Chemically Bonded atoms ; Mixture = easily separated.

(b) a hypothesis and a theory

Theory = Tested idea hypothesis = untested.

(c) a chemical change and a physical change

Chemical = Rebonding of atoms Physical = Solid  $\rightarrow$  Liquid  $\rightarrow$  Gas

11. List three observations that would suggest that a chemical change has occurred.

Change of Colour, Odour, Heat.

12. On a clear evening, drivers cannot see the beam of light from a car's headlights. On a foggy evening, however, the beam is visible. Name and explain the scientific principle that accounts for this phenomenon.

Light reflects off of each particle as it is travelling further.

13. State one major contribution to modern knowledge of the structure of matter made by each of the following:

(a) John Dalton

Atom exists.

(b) Robert Boyle

Space between atoms (particles).

(c) Antoine Lavoisier

Law of conservation of mass. (Matter can't be created or destroyed, only changed).

(d) Niels Bohr

Electrons Rotate around a nucleus.

## Matching

Match the phrase in column A with the term in column B. Write the letter in the blank at left.

A

- G 1. Location of the neutron in the atom
- H 2. A positive, subatomic particle
- X 3. The number of protons in a nucleus
- C 4. Results from shared electrons
- D 5. Formed by the attraction of opposite charges
- E 6. Physical property
- A 7. Chemical property
- F 8. A halogen
- B 9. A noble gas

B

- ~~(a)~~ combustibility
- ~~(b)~~ neon
- ~~(c)~~ molecular compound
- ~~(d)~~ ionic bond
- ~~(e)~~ ductility
- ~~(f)~~ fluorine
- ~~(g)~~ nucleus
- ~~(h)~~ proton
- (i) electron
- (j) mass number
- ~~(k)~~ atomic number

## True or False

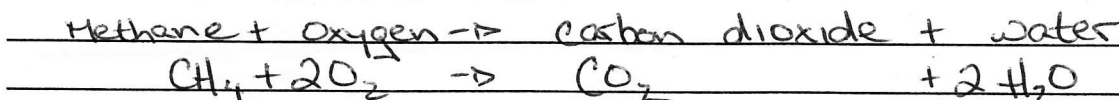
Circle T or F to show whether the statement is true or false.

- (T) F 10. Oxygen is a diatomic molecule.
- T (F) 11. Combustion is endothermic.
- T (F) 12. Chemical reactions create new elements.
- (T) F 13. A lithium atom has more protons than a hydrogen atom.
- (T) F 14. The proton is found in the nucleus of an atom.
- (T) F 15. A chemical bond is an attractive force between atoms.
- T (F) 16. Molecular compounds are produced when metal and non-metal atoms bond.
- T (F) 17. Catalysts decrease the speed of chemical reactions.
- T (F) 18. Alkali metals are unreactive.
- T (F) 19. John Dalton discovered the electron.

## Short Answer

Answer the questions in the space provided.

20. Give the word equation and chemical equation for a common chemical reaction.



21. Draw WHMIS symbols for three hazardous materials below or on the back of this page. Explain the meaning of each.



22. What are the four physical properties used to compare metals, non-metals, and metalloids?  
 Why use these properties?

Ductility  
 Malleability  
 Conductivity  
 State

} used as these 4  
 will differentiate the  
 classifications.

1. Match the definitions in column A with a term in column B. Write the letter of the response in the blank space on the left.

A

B

- B Elements on the periodic table are ordered by ...  
D Contains elements with similar properties.  
A The name for a column in the periodic table.  
G A horizontal row in the periodic table.  
C A combination of symbols and numerals.  
H Malleable, ductile elements that are good conductors.

- ~~a~~ group  
~~b~~ atomic number  
~~c~~ formula  
~~d~~ chemical family  
e metalloids  
f non metals  
~~g~~ period  
~~h~~ metals

### Fill in the blanks

2. Which element does each of these symbols represent?

H hydrogen He helium Li lithium Be beryllium B boron C carbon  
N nitrogen O oxygen F fluorine Ne neon Na sodium Mg magnesium  
Al aluminum Si silicon P phosphorus S sulfur Cl chlorine Ar argon

3. Name each of the following compounds, then identify each as a molecular or ionic compound:

Formula	Name	Ionic or molecular?
NaCl	<u>sodium chloride</u>	<u>I</u>
H <sub>2</sub> F	<u>dihydrogen <sup>mono</sup>fluoride</u>	<u>M</u>
H <sub>3</sub> O	<u>trihydrogen <sup>mono</sup>oxide</u>	<u>M</u>
NH <sub>2</sub>	<u>nitrogen dihydride</u>	<u>M</u>
MgF	<u>magnesium fluoride</u>	<u>I</u>
SF <sub>2</sub>	<u>sulfur difluoride</u>	<u>M</u>

## Multiple Choice

Circle the letter of the phrase that best completes the phrase.

4. Ionic compounds ...
- (a) are composed of metal ions bonded to other metal ions
  - ☒ (b) are formed when metals react with non-metals
  - (c) are substances with low melting points
  - (d) are usually insoluble in water
5. Molecular compounds ...
- (a) are combinations of metals and non-metals
  - (b) are good conductors of electricity
  - (c) result from the transfer of electrons
  - ☒ (d) form when electrons are shared
6. A substance with a high melting point
- (a) must be a metal
  - ☒ (b) has strong forces holding the atoms together
  - (c) will conduct electricity
  - (d) contains molecular bonds

## Short Answer

7. Give the name and symbol for an example of each of the following:
- (a) alkali metal *Li, lithium*
  - (b) alkaline earth metal *Mg, magnesium*
  - (c) halogen *chlorine, Cl*
  - (d) noble gas *Ar, argon*
8. Name two examples of each and give their chemical symbols:
- (a) metal *Ti, titanium; Hg, mercury*
  - (b) non-metal *N, nitrogen; C, carbon*
  - (c) metalloid *Ge, germanium; As, arsenic*
9. When Mendeleev arranged the elements in the first periodic table, he left spaces marked by a question mark. Why did he do this and what did he suggest would happen in the future?

To keep periodic trend in  $P^+$  (he said they  
would be found & they were).

F F F F F F F F F F

- ### Fill in the Blanks

11. The chemical name for rust is iron oxide and the chemical equation for the reaction is  $\text{Fe}_2\text{O}_3$

13. The process of electroplating uses the chemical reaction of COPPER

$$C_3H_8 + O_2 \rightarrow CO_2 + H_2O$$

(a) Salt (b) Heat

17. Write the word equation for this reaction:  $2\text{Mg(s)} + \text{O}_2\text{(g)} \rightarrow 2\text{MgO(s)} + \text{light}$

magnesium + oxygen  $\rightarrow$  magnesium oxide.

19. Hair can be bleached using the compound hydrogen peroxide. \* Ignore.

20. Ozone is created when sunlight reacts with pollutant chemicals produced by burning fuels.  
is destroyed making Oxygen.

## Space Exploration Review Questions.

These questions should guide you through the topic on space exploration. You will need to be able to call up all of the following information and use it.

### Definitions

Define each term in full sentences.

1. altitude

above horizon

2. frame of reference

Perspective.

3. eyepiece

Point to look through.

4. resolving power

Magnification (ocular  $\times$  objective lens).

5. geocentric

Theory = Earth @ center of universe.

### Matching

Match each definition in column A with the correct term in column B. Draw a line from each definition to the corresponding term.

A

6. Kepler's discovery — the shape of planetary orbits

7. instrument used to measure azimuth

8. telescope with a mirror for an objective

9. an object seen in the sky beyond Earth

10. a planet turns on its axis

B

rotation

celestial body

reflecting

elliptical

compass

11. While Jack runs past Sally at 15 km/h toward the east, Sam passes Jack at a speed 5 km/h faster than Jack's speed.

(a) What is Sam's speed, including direction, relative to Sally?

20 km/h East.

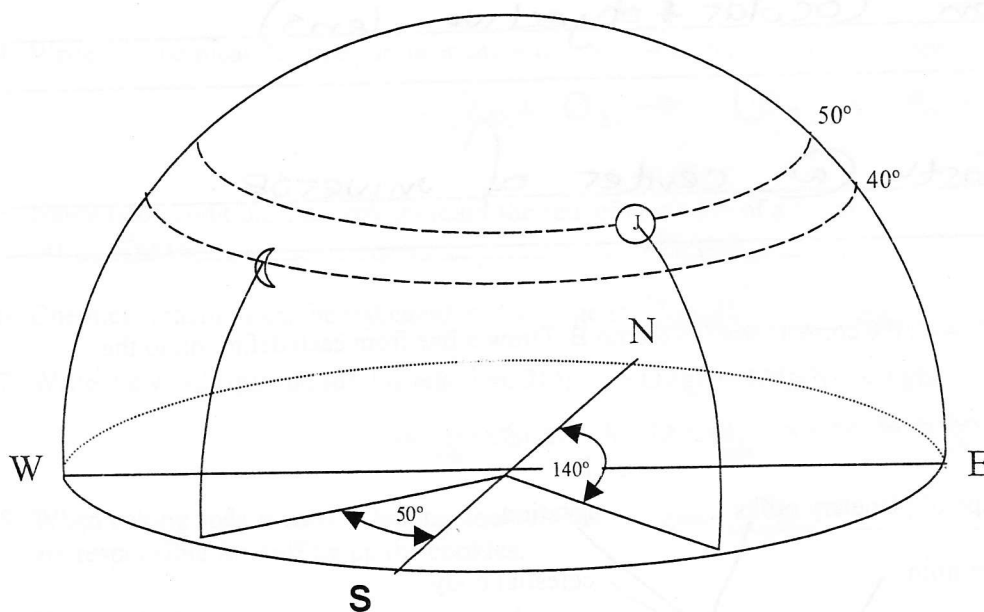
(b) What is Jack's speed, including direction, relative to Sam?

-5 km/h East or 5 km/h west

12. How did the ancient astronomers know that the planets were different from the stars?

in a night.  
Movement in the sky (stars move, planets move over time).

Use this diagram to answer the next question.



13. Write the altitude-azimuth co-ordinates for the Moon and Jupiter in the diagram.

Moon → ~~90°~~ 40°, ~~270°~~ 230°.

Jupiter → 50°, 140°



14. How was the model of the universe that Copernicus presented similar to and different from the model used by Ptolemy?

Ptolemy = heliocentric, fixed rotation.  
Copernicus = heliocentric, retrograde of planets.

15. When people buy astronomical telescopes, they have an option to buy a set of eyepieces to go with the telescope. If Fred bought a telescope with an objective with a focal length of 2000 mm, and eyepieces with focal lengths of 40 mm, 16 mm, and 8 mm, then what magnifications will Fred expect from his telescope?

$2000 / 40$ ,  $2000 / 16$ ,  $2000 / 8$ .

16. How did Galileo come to the conclusion that the moon has mountains on its surface?

Observation with a telescope & reflection of light.

### Definitions

1. Define each term in full sentences.

- (a) spectrum - The split of white light into various wave lengths.  
(b) light-year - Distance in 1 yr for light to go.  
(c) triangulation - 2 points & angles used to measure distance.  
(d) radio waves - waves used for communication.  
(e) adaptive optics - used to aid vision.

### Matching

Match each definition in column A with the correct term in column B. Draw a line from each definition to the corresponding term.

A

2. energy waves which include visible light  
3. apparent change of wave frequency caused by motion  
4. a device used to produce a spectrum  
5. spectrum of a hot solid  
6. technique that combines images from two telescopes

B

- diffraction grating  
interferometry  
electromagnetic radiation  
continuous  
Doppler effect

## Short Answers

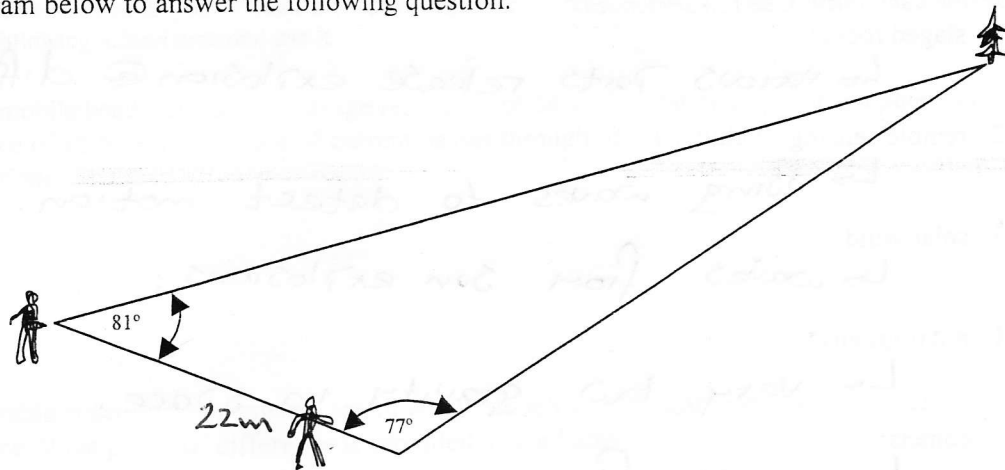
7. How is an element identified in the Sun's spectrum?

By its spectrum that's emitted & compared  
to known spectra.

8. How do astronomers analyze starlight to decide if a star is moving toward or away from us?

Blue vs Red  
↓ ↓  
Towards. Away  
Due to wavelength of those colors.

Use the diagram below to answer the following question.



9. If the baseline for this measurement is 22 m, then how far away is the tree? Use a separate sheet for your answer.

\* Measure with a ruler the 22m line, create a ratio. Measure the bottom line & multiply by the ratio.

10. The star Vega is 25 light-years away from us. If we sent a radio message to Vega, and another civilization on a planet circling that star answered us, in what year could we expect to here a reply?

25 years from now.

11. Why was it necessary to make radio telescopes so much bigger than optical telescopes?

waves are larger in radio waves.

F  
T  
T  
F  
T  
T

6. Planets follow circular orbits around the Sun.  
7. The angle above the horizon of a star is its altitude.  
8. The Sun's light exhibits an emission spectrum.  
9. An astronomical unit (AU) is the distance light travels in one year.  
10. A satellite that orbits Earth in about 1.5 h is in a low Earth orbit.  
11. The terrestrial planets have similar conditions on their surfaces.

(Not heat though).

## Definitions

Define each term. Use full sentences.

1. staged rocket

↳ various parts release explosion @ different times.

2. remote sensing

↳ using waves to detect motion.

3. solar wind

↳ waves from sun explosions.

4. microgravity

↳ very low gravity in space.

5. comets

↳ rocks flying in space.

## Matching

- |   |                               |
|---|-------------------------------|
| 6. device that records images from newer telescopes             | <u>9</u> GPS                  |
| 7. orbit that makes a satellite stay over one location on Earth | <u>10</u> Pluto               |
| 8. using a planet to change the orbit of a spacecraft           | <u>6</u> CCD                  |
| 9. satellite system used to locate things on Earth              | <u>8</u> gravitational assist |
| 10. the only planet not visited by a spacecraft from Earth      | <u>7</u> geosynchronous       |

## Short Answers

11. Suppose that a spacecraft were to be sent to Venus and another to Mars. Which spacecraft would need more shielding from the solar wind? Why?

Venus = closer to the sun.

12. The space shuttle is powered by a staged rocket system. Why?

Get off Earth, out of atmosphere, & then into rotation without all the mass.

13. Humans don't have a rocket system powerful enough to send a large spacecraft to any but the nearest planets. Give two ways that scientists get around this problem.

Gravitational assist & staged systems / Inertia  
(without gravity, an object will continue to  
move without stopping).

## Environmental Chemistry

These questions should guide you through the topic on space exploration. You will need to be able to call up all of the following information and use it.

1. Explain the difference between **organic** and **inorganic** compounds.

organic has Carbon & is in living things.

2. What is the role of the following?

Carbohydrates Energy

Lipids Cell membranes.

Proteins and Amino Acids build tissue.

Nucleic Acids make amino acids.

3. Elements needed, but in only small amounts, are called macro or microminerals.

4. Explain **hydrolysis**.

SPLIT  $H_2O$  into  $H_2$  &  $O_2$  using electricity.

5. Identify the macronutrient

Nutrient	Importance in Plants	Importance in Humans
<u>N</u>	- disease resistance	- muscle contraction
<u>A</u>	- production of fruits and grains	- enzyme activation
<u>P</u>	- leaf and stem growth	- growth and repair of tissue
<u>cellulose</u>	- cell wall structure	- blood clotting
<u>K</u>	- root and flower growth	- metabolic reactions

6. Explain the process of **diffusion** (include a labeled diagram)

Movement from ~~low~~ high to ~~high~~ low concentration

7. Explain the process of **osmosis** (include a labeled diagram)

Movement of  $H_2O$ , across a membrane, towards a solute (salt).

8. Identify what each **number** on the fertilizer bag stands for

N, P, K ~~less than~~ (IN ORDER).

9. Explain the process of **bioaccumulation** (also referred to as **biomagnification**)

Small amount of toxin @ bottom of food chain, more @ next level, most @ top due to eating.

10. What are the harmful effects of using **DDT**?

Cases death & mutation.

11. Identify the properties and give 3 examples of acids, bases and neutral substances

Acids

Sour,  $\text{pH} < 7$

Neutral Substances

$\text{pH} = 7$ , tasteless.

Bases

Bitter,  $\text{pH} > 7$ .

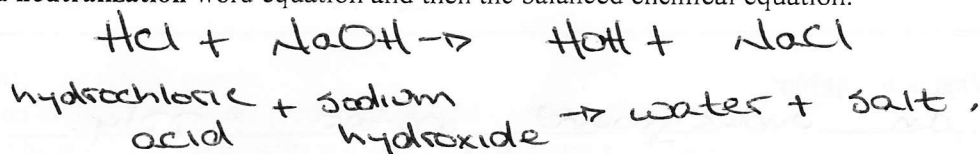
12. What is **pH** a measure of?

Percent Hydrogen.

13. How does an **indicator** work?

it reacts with the solution & changes colour to show a  $\text{pH}$ .

14. Write a **neutralization** word equation and then the balanced chemical equation.



15. Calculate, in **ppm** (parts per million), the amount of 1 milligram of mercury that was found in a barrel containing 30 Litres of water.

$$\frac{1 \text{ mg}}{30 \text{ kg}} = 1/30 \text{ ppm}.$$

16. What are **catalytic converters** used for and how effective are they?

more  $\text{O}_2$  into an engine to  $\uparrow$  fuel efficiency.

17. What is a **scrubber** and why is it used?

Takes out toxins on top of factories.

18. Explain the difference between **acute** and **chronic** toxicity.

acute = one dose is deadly  
chronic = many doses to be deadly.

19. What does **LD 50** stand for?

Lethal Dose 50% (amount to kill 50% of population).

20. What types of aquatic organisms would you likely be able to find in polluted water?

Small invertebrates.

21. Explain the difference between **point** and **non-point** sources of pollution.

Point = from one location

Non-point = spread out.

22. What is the 'thinning of the ozone layer' above the Earth caused by, and why is it a concern?

CFC's. This causes more harmful UV rays to come through.

23. Describe the difference between **permeable** and **impermeable** soil zones.

Permeable  $H_2O$  goes through.

Impermeable, nothing goes through.

24. What is an **aquifer**?

an underground water supply.

25. What does WHMIS stand for? **W** workplace **H** hazardous **M** materials **I** information **S** system

26. What does MSDS stand for? **M** aterials **S** afety **D** ata **S** heets.

27. Identify the **4Rs** and give an example of how you can practice each one.

**R** educe, \_\_\_\_\_

**R** euse, \_\_\_\_\_

**R** ecycle, \_\_\_\_\_

**R** esponsibility, \_\_\_\_\_

27. What problems can occur at sanitary landfill sites and how are these landfills secured?

leaching is prevented with layers of plastic & clay below landfill.

## MATCHING

Match the description to one of the following terms.

a.	1	Herbicide
b.	3	Fungicide
c.	4	Insecticide
d.	2	Pesticide

- Controls weeds by killing them.
- Includes three other terms from the above list.
- Controls fungus pests by killing them.
- Controls insects by killing them.

Match the description to one of the following terms.

a.	4	Pollutant
b.	2	Pollution
c.	3	Acceptable risk
d.	5	Thalidomide
e.	1	No match

- Used to determine risk to people.
- An alteration of the environment producing harmful conditions.
- Determined by assessing the benefits and drawbacks of using a chemical.
- Any substance that can cause harm to an organism.
- A sleeping drug that is linked to birth defects.

## COMPLETION

1. Two of your body's major energy sources are the nutrients called lipids, which store energy, and Protein, which are the energy source for metabolism. Both of these are classed as essential nutrients.

2. A chemical has chronic toxicity if it causes symptoms only after it accumulates to specific levels in an organism's tissues. A chemical that causes serious symptoms to appear after a single exposure is described as having acute toxicity. Some of the most toxic known substances are produced by radiation.

3. Litmus turns Red when it comes into contact with an acid, and Blue in contact with a base. The pH scale is a more specific way of comparing the relative acidity of different substances.

4. Unlike wastes that can be broken down naturally into simple, non-polluting compounds, pesticides and petroleum products are examples of Non-Biodegradable pollutants.

5. The reaction that has led to a hole in the ozone layer is as follows: CFCs react with ultraviolet sunlight to produce chloride ions. These ions then speed the breakdown of ozone gas into oxygen.



## Biological Diversity and Survival

These questions should guide you through the topic on chemistry. You will need to be able to call up all of the following information and use it.

### MATCHING

Match the description to one of the following terms.

a.	2	Diversity index
b.	5	Behavioural adaptations
c.	4	Speciation
d.	1	Biological diversity
e.	6	Structural adaptations
f.		Species
g.	3	Variation

1. The number and variety of organisms in an area.
2. A mathematical expression of the number of different kinds of organisms in an area.
3. The differences between individuals of the same or different species.
4. The evolution of different species from a single ancestor.
5. The habits of a species that have been developed over time.
6. A physical characteristic that helps an organism to survive in its environment.

Identify as a characteristic of mitosis, meiosis, or both.

a.	7, 10	Mitosis
b.	6, 8	Meiosis
c.	9, 11	Both mitosis and meiosis

6. Involves two rounds of cell division.
7. Results in daughter cells that are identical to the parent cell.
8. Creates gametes.
9. Happens only in certain kinds of cells in the body.
10. Happens more often in stomach lining cells than brain cells.
11. Involves duplication of genetic material.

### SHORT ANSWER

1. Explain why some organisms, such as the cactus or the polar bear, are able to survive in very harsh environments.

Adaptations such as to water loss & ↑ storage & fat.

2. Explain the difference between structural and behavioural adaptations. Provide an example of each.

Structural = feet to walk in humans.

vs flippers in seals

behavioural = hunt @ night (owl) or day (hawk)

- X Identify the form of asexual reproduction represented by each of the diagrams above, and give one example of an organism that uses this form of reproduction.

omit.

You are a genetic counsellor working with two different couples. Dan and Jan are Couple A; Juan and Rhea are Couple B. Their traits are summarized below.

Name	Hair colour	Eye colour	Tongue roller
Dan	brown	blue	no
Juan	black	brown	no
Jan	blond	blue	yes
Rhea	red	blue	yes

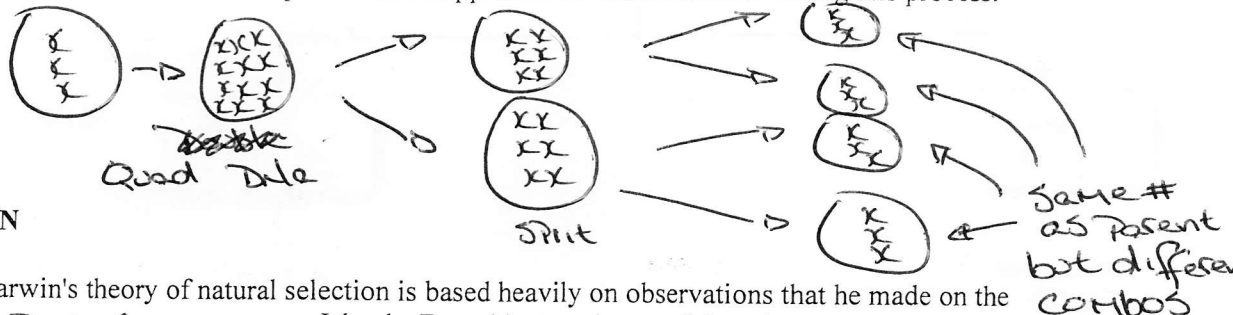
4. A few months after you have finished your counselling sessions, one of the couples described above proudly brings in their new baby girl. She has brown eyes and can roll her tongue. Whose baby is she? Explain.

Juan + Rhea → Juan has brown eyes (dominant) & passes them on.

5. Identify where in your body mitosis takes place, and where meiosis takes place.

Somatic (body) cells → Gametes (sex cells aka sperm & egg)

6. A cell that contains three pairs of chromosomes divides to produce egg cells. Draw the stages of cell division. Include labels that explain what happens to the chromosomes during this process.



## COMPLETION

- Charles Darwin's theory of natural selection is based heavily on observations that he made on the Galapagos Islands. From his experience raising pigeons, Darwin knew that variation could produce great diversity within a species. His theory of natural evolution explained how a similar process in nature could give rise to changes in a species.
- People have used deliberate breeding, or artificial selection, to produce domestic plants and animals with particular characteristics. One example of this is the interbreeding breeding program that has been used to create a specific variety of Canadian wheat by bringing together the positive characteristics from two different varieties of wheat.
- In his theory of natural selection, Darwin argued that the fittest or strongest organisms of each species were most likely to survive to reproduce. Over time, this could lead to changes in the adaptations of a species.
- In the last 600 million years, there have been 5 major declines in Earth's biodiversity. Today, human activity is causing so many changes in the environment that many species do not have time to recover and instead become extinct.

5. Seed banks are established to gather and store seeds from plants that are threatened with extinction. One of the largest seed collections is housed at the Royal Botanical Gardens in London, England. Their goal is to collect samples of 100% percent of the world's seed-bearing plants.