

SOLUTIONS

SNC2D Exam Review Questions

CHEMISTRY

1. Fill in this chart using the periodic table:

Element	# Valence Electrons (no. of electrons in the outer shell)	Valence (number of electrons lost or gained to have a full outer shell)	Element	# Valence Electrons	Valence
potassium	1	1	sulphur	6	2

2. Fill in this chart using the periodic table:

Compound	Number of different elements	Total number of atoms	Compound	Names of elements	Number of atoms of each element
$Al_2(SO_4)_3$	2+3+9 = 14 * 3 elements	14	CH_3COOH	carbon hydrogen oxygen	2 4 2

3. Complete the table on ionic and covalent bonds making note of differences.

	Ionic Compounds (Ionic bonding)	Molecular Compounds (Covalent bonding)
Bonds (share or transfer of electrons)	transfer electrons to form ions	share electrons to form molecules
Naming FeO iron (II) oxide $MgCl_2$ magnesium chloride	Metal named first Non-metal name ends in 'ide'	use prefixes N_2O_5 → dinitrogen pentoxide
Properties	- crystalline, hard, no odour - metal and non-metal - good conductor when dissolved in water or melted - high boiling + melting points - soluble in water	- two non-metals - do not conduct - soft, not crystalline, odour - low melting + boiling points - not soluble in H_2O
Dot Diagrams (show an example)	$MgCl_2$ $[Mg]^{+2} [:\ddot{Cl}:]^{-1}_2$	NH_3 $H:\ddot{N}:H$ or $H-\ddot{N}-H$ H

4. Briefly summarize the properties of metals, non-metals and metalloids.

<u>Metals</u>	<u>Non-metals</u>	<u>Metalloids</u>
- most are solids - malleable + ductile - lustre - conduct in all states - usually grey	- solid, liquid or gas - do not conduct - brittle, lack lustre - not malleable/ductile	- semi-conductors - properties in between metals + non-metals

* Rows are called periods, Columns called groups or families

5. Write the names of the following:

FeSO_4 iron(II) sulphate Pb_3N_4 lead(IV) nitride
 SCl_6 sulfur hexachloride CCl_4 carbon tetrachloride
 KCl potassium chloride NaClO_3 sodium chlorate

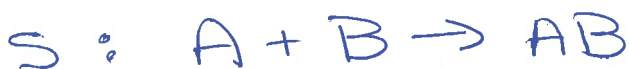
6. Write the formulas for the following:

Diphenororous pentoxide P_2O_5 Carbon monoxide CO
 Iron (III) oxide Fe_2O_3 Potassium Nitrate KNO_3
 Ammonium phosphate $(\text{NH}_4)_3\text{PO}_4$ Lead (IV) Nitride Pb_3N_4
 Magnesium sulfide MgS Manganese (IV) carbonate $\text{Mn}(\text{CO}_3)_2$

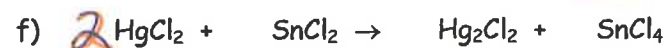
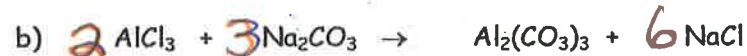
7. What are the names of the 5 basic types of chemical reactions.

Synthesis, Decomposition, Single Displacement, Double Displacement, Combustion

8. Write general equations of the 5 basic types of chemical reactions.



9. Identify the type of chemical reaction for each below, and then balance.



Type

Decomp.

Double D.

Synthesis

Single D.

Combustion

Double D.

10. What is another name for the rows in the periodic table? periods

What are the columns called? groups or families

11. Complete the table on Acid and Bases.

	Acid	Base
Ion produced	H^+ (in water)	OH^- (in water)
pH range	$pH < 7$	$pH > 7$
Properties	<ul style="list-style-type: none"> - Sour - feels like water - good conductor - reactive + corrosive 	<ul style="list-style-type: none"> - bitter - feel slippery - good conductors - corrosive - breaks down proteins

12. What is the general neutralization equation for a reaction between an acid and a base?



13. Name 3 household/common substances that are basic.

soap, drain cleaner, baking soda

14. Name 3 household/common substances that are acidic.

lemon juice, vinegar, tomatoes

15. What is an indicator? What colour are phenolphthalein and litmus paper in an acid? In a base?

↳ changes colour in an acid or a base

Phenolphthalein → Acid-colourless, Base-Pink
 Litmus → Acid-Red, Base-Blue

16. What is a chemical change? List the signs of a chemical change.

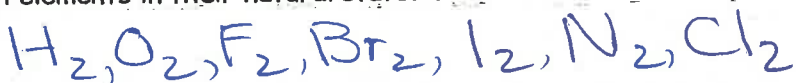
↳ new substance produced

Signs: change in colour, smell/taste, temperature, precipitate forms, gas produced, light or heat produced

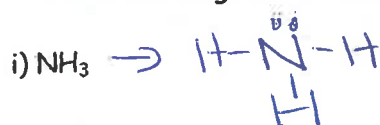
17. Complete the following table.

Element	Symbol	Atomic Mass No.	Atomic Number	Protons	Neutrons	Electrons
Fluorine	F	19	9	9	10	9
Calcium ion	Ca^{+2}	40	20	20	20	18

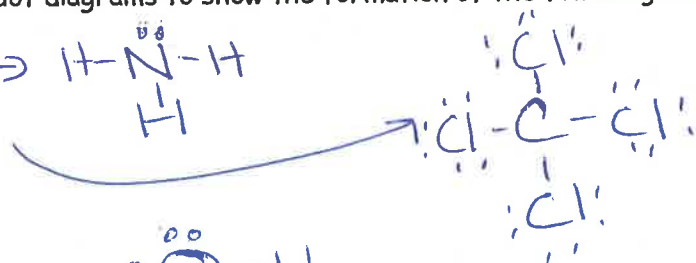
18. Which elements in their natural states exist as a diatomic molecules?



19. Use electron dot diagrams to show the formation of the following compounds.



ii) CCl_4



iii) H_2O



20. Which element has 9 protons? fluorine What is its mass number? 19

21. Which element has 26 neutrons? titanium (48 - 22 = 26)

22. What name is given to the elements in group #1? alkali metals group #2? alkaline earth metals
group #17? halogens

23. What is the charge on the ions of elements from group 17? -1 group 2? +2

24. Write a balanced chemical equation from the following word equations:

a. lithium + chlorine gas → lithium chloride



b. barium sulphate + sodium nitrate → barium nitrate + sodium sulphate



25. Chemical A has a pH of 3.2 and chemical B has a pH of 2.8. Which is more acidic and WHY?

2.8 is lower pH ⇒ more acidic (B)

26. Chemical A has a pH of 8.2, chemical B has a pH of 12.5, chemical C has a pH of 2.2, and chemical D has a pH of 6.8.

a) Which chemical is a weak acid? Strong base? → 12.5 (closer to 14)

b) Which chemical is a strong acid? weak base? → 8.2 (closer to 7)

↳ 2.2
(closer to 0)

OPTICS

1. Define each of the following methods of producing light (explain how each is produced) and give one example of each.

Bioluminescence, incandescence, fluorescence, phosphorescence, chemiluminescence, electric discharge, triboluminescence, LED

- Bioluminescence - ability of plant or animal to produce light ex. firefly
- Incandescence - light produced by heating a thin wire ex. light bulb
- Fluorescence - light emitted when exposed to electromagnetic radiation ex. fluorescent bulb
- Phosphorescence - store energy + emit slowly ex. glow in dark toys
- Chemiluminescence - light produced by chemical reaction ex. glow stick
- Electric Discharge - when an electric current passes through air or another gas ex. lightning
- Triboluminescence - producing light from friction ex. biting on a wintergreen mint candy

2. Rank the following sources of light in order of highest energy to lowest energy.

Radiowaves, Infrared waves, Gamma rays, X-rays, Microwaves, Ultraviolet Rays, Visible Light

Gamma Rays, X-rays, UV rays, Visible light, Infrared, Microwaves, Radiowaves

3. As the wavelength increases, what happens to the frequency? *It decreases.*

3. What are the two types of colour theory? What are the primary colours for each?

Additive - Red, Green, Blue

Subtractive - Cyan, Yellow, Magenta

4. When drawing light rays, how do you determine where the image is located?

where the reflected or refracted rays cross.

5. Where is the focal point located relative to the centre of curvature of the mirror?

halfway between C and the mirror

6. Give two examples of where concave mirrors are useful. What are two uses of convex mirrors?

*car headlights + flashlights
makeup mirror
fun house*

*store security
passenger side
of car mirror*

7. How does a convex lens differ from a concave lens?

converging rays diverging rays

8. What are uses for convex and concave lenses?

binoculars, glasses, contact lenses, telescopes

9. What conditions must be met for total internal reflection? Give an example of where this occurs.

*- all light is reflected internally
- diamonds, fibre optics, binoculars,*

10. Why does light bend when going from one material to another material?

- when it changes speed it bends (going through different materials)

11. What is refraction of light? Why does it occur? *ex. glasses,*

bending of light rays as they pass between 2 different media (substances with different optical densities)

12. What are the parts of the eye (structure and function)? Be able to label the eye and know the functions of the parts.

See eye booklet (note).

13. What type of lens would be used to correct far-sightedness? Near-sightedness?

converging lens (convex) diverging lens (concave)

14. Know how to locate the image for all of the mirrors and lenses.

review notes & see last page of review

15. The speed of light in quartz is 2.10×10^8 m/s. What is the index of refraction of quartz?

$$n = \frac{c}{v} = \frac{3 \times 10^8 \text{ m/s}}{2.1 \times 10^8 \text{ m/s}} = 1.43$$



16. If the index of refraction of a material is 1.8, what is the speed at which light will travel through it?

$$n = \frac{c}{v} \quad v = \frac{c}{n} = \frac{3 \times 10^8}{1.8} = 1.67 \times 10^8 \text{ m/s}$$

17. What is the law of Reflection? *angle of incidence =*

angle of reflection
18. Define opaque, translucent & transparent. *all light goes through*
no light goes through some light goes through

BIOLOGY

1. What is an organelle?

small cell part that maintains life processes of the cell

2. List the structure and function of the cell membrane, cell wall, cytoplasm, nucleus, mitochondria, vacuoles, lysosomes, golgi body, cell wall, ribosomes, endoplasmic reticulum, chloroplast

- cell membrane → protective barrier around cell
- cell wall → rigid frame around plant cell that provides strength, protection + support
- cytoplasm → jelly substance that surrounds the organelles
- nucleus → control centre
- mitochondria → powerhouse of the cell

- vacuole → stores nutrients, wastes, and water
- lysosomes → contains digestive enzymes
- golgi body → packages proteins for delivery throughout the cell
- ribosomes → make proteins
- endoplasmic reticulum → canals that transport materials
- chloroplast → found in plants where photosynthesis takes place

3. Be able to label the parts from 2. on a cell drawing.

4. List 4 differences between plant and animal cells.

Plant Cell

- cell wall
- chloroplasts
- large vacuole

Animal Cell

- lysosomes
- centrioles

5. Why do cells divide instead of simply growing larger?

- to improve efficiency after it gets too big

6. List each of the stages of mitosis in order and describe them.

Prophase (longest phase) - chromatin condenses to form chromosomes
- centrioles move toward the poles
- spindle fibres form and connect to chromosomes
- nuclear envelope breaks down

Metaphase - chromosomes line up at the centre of the cell

Anaphase - sister chromatids separate into individual chromosomes + move to opposite poles

Telophase (+ cytokinesis) - spindle fibres breakdown & 2 new nuclei form. Chromosomes change back to chromatin, cytoplasm + cell membrane pinches in half to form 2 daughter cells

7. What is a stem cell? Why are scientists studying stem cells?

stem cell is an unspecialized cell that can form specialized cells. They are used to treat diseases such as cancer, Parkinson's, etc.

8. What does the term tissue mean? List the form, function and location of the following tissues:

epithelial, connective, muscle, nervous, epidermal, ground, meristematic, vascular.

- | | | |
|-------------------|--|---|
| <u>Animal</u> | | <u>Plant</u> |
| <u>Epithelial</u> | - lines + protects structures
- forms glands to make hormones, etc. | <u>Meristematic</u> - unspecialized found in root tips & grows new parts for plant |
| <u>Connective</u> | - supports + protects structures
- blood forming + stores fat | <u>Epidermal</u> - protective outer coating - allows exchange of materials + gases |
| <u>Muscle</u> | - allows for movement | <u>Ground tissue</u> - in stem; provides strength + support in roots; stores food + water in leaves; photosynthesis |
| <u>Nervous</u> | - responds to stimuli
- transmits + stores information | <u>Vascular</u> - moves substances throughout (roots to leaves and sugars from leaves to other parts) |
| <u>Tissue</u> | - groups of cells performing specialized task | |

9. What are the major events during interphase?

- 1) Cell grows & repairs itself
- 2) cell makes a copy of its DNA

10. What are the functions of xylem and phloem?

xylem - movement of water + minerals from roots → stems → leaves
phloem - transports sugar from leaves to other parts of

11. List the following terms in order from biggest to smallest: cell, organelle, organ, molecule, tissue, plant, organism, organ system

organism → organ system → organ → tissue →
cell → organelle → molecule

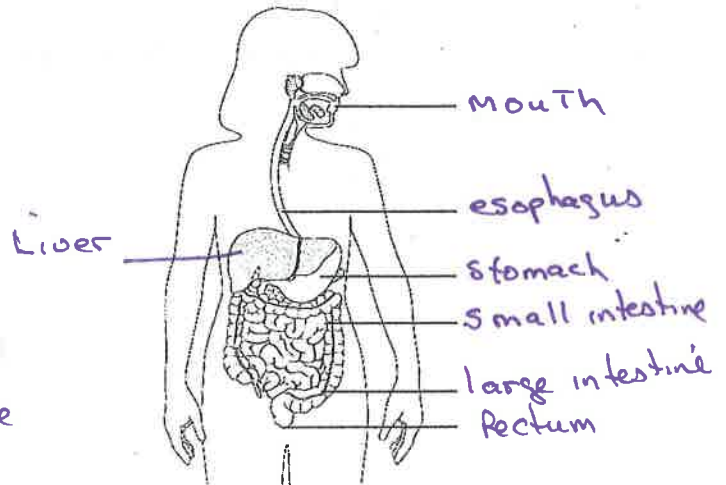
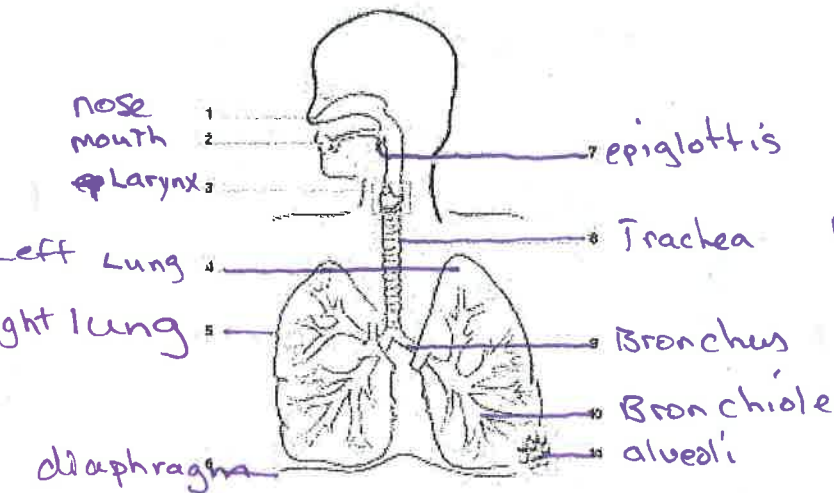
12. What are three substances linked to a higher risk of cancer?

tobacco smoke/cigarettes, UV radiation,
X-rays

13. What are 4 body systems? What is the main function of each system?

skeletal - supports & protects body / allows movement
muscular - provides movement
digestive - absorption of nutrients
respiratory - exchange of gases
circulatory - transports materials
nervous - responds to stimuli
excretory - elimination of wastes
reproductive - reproduction

14. Review the labeling of the different organ systems. Label the diagrams. Which organ system is depicted in each?



15. What does it mean to respire? exchange of gases (O_2 in and CO_2 out) (breathing)

16. Compare cell division of plants vs animal cells and how they differ. (differences are found mainly in the splitting of the cell) animal cells pinch together & separate into 2 daughter cells

plant cells form a cell plate which changes into a cell wall when forming 2 daughter cells

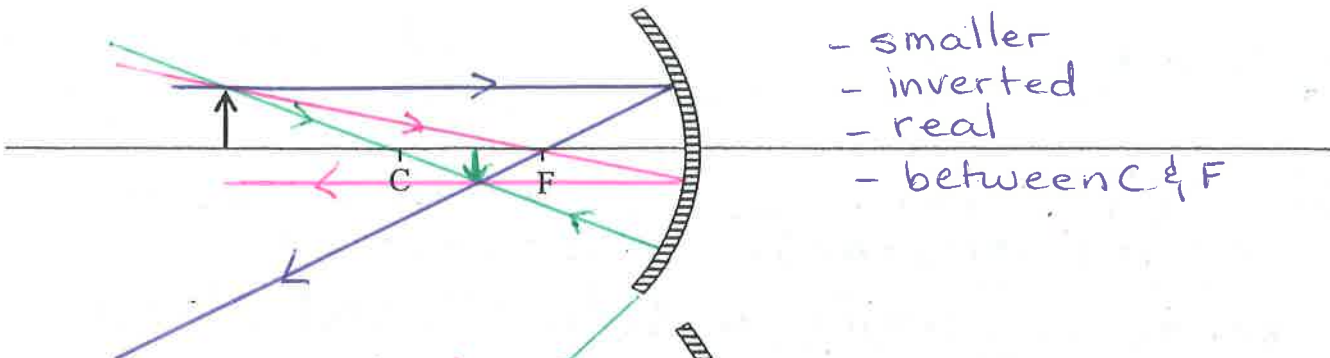
1. What are some impacts of climate change? Identify the major changes that occur from 1° - 6° temperature changes according to the movie "Six Degrees Could Change the World".

Refer to Movie Question Sheet

2. What are some ways climate change can be stopped?

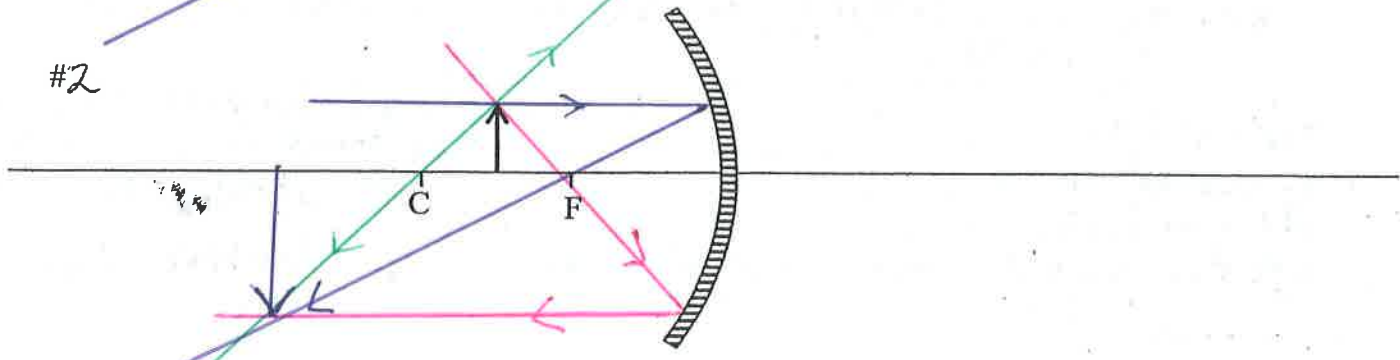
Ray Diagrams

#1



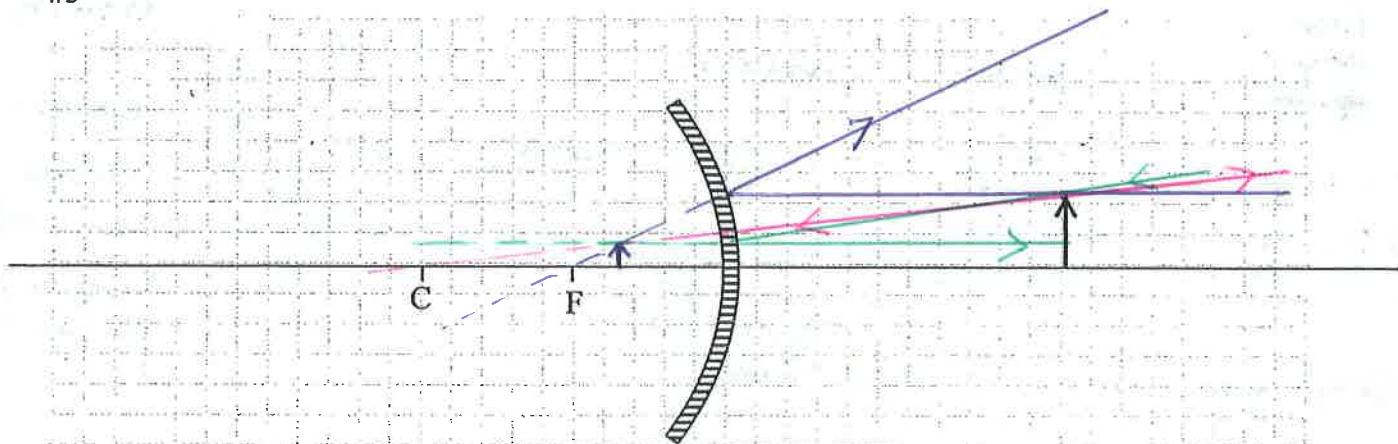
- smaller
- inverted
- real
- between C & F

#2



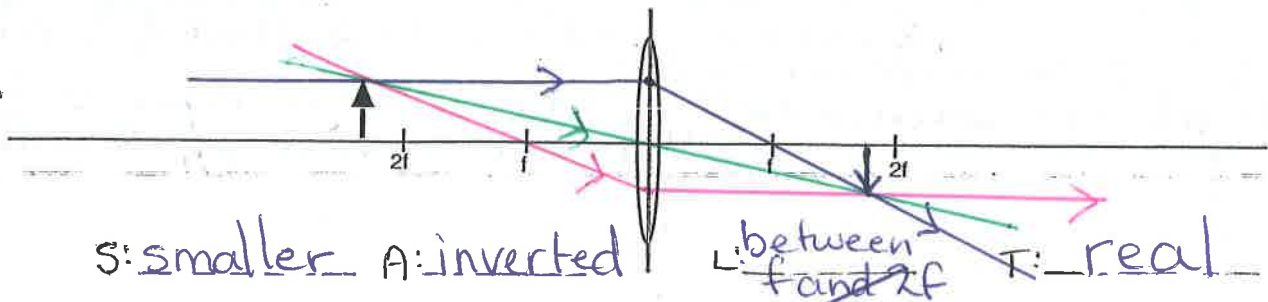
S: larger A: inverted L: beyond C T: real

#3



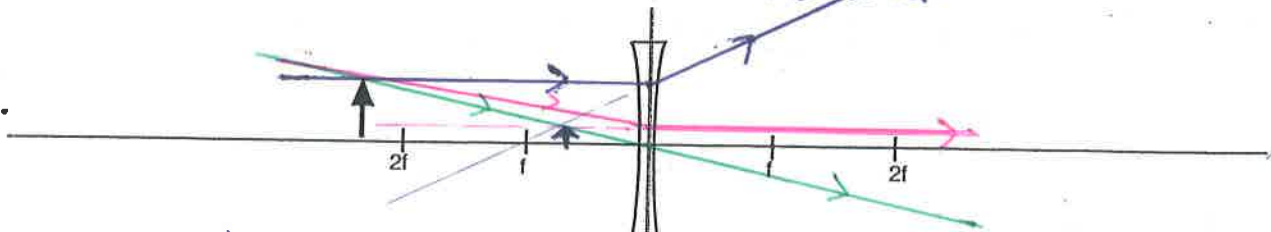
S: smaller A: upright L: behind mirror T: virtual

#4.



S: smaller A: inverted L: between f and 2f T: real

#5.



S: smaller A: upright L: between f and lens T: virtual