

KEY

Science 9

Final Exam Review

Define the following terms:

Independent variable: the aspect of an experiment that is deliberately (allowed to) change.

Dependent variable: the aspect of an experiment that is measured to determine the results.

The 3 main functions of Cell Division

1. Growth
2. Repair
3. Reproduction

Make a table outlining the differences between prokaryotic and eukaryotic cells. Provide examples for each type of cell.

Prokaryotic	Eukaryotic
No membrane enclosed organelles	have membrane enclosed organelles
ex. bacteria	ex. plants, animals

Be able to identify the following organelles in a diagram of a plant or animal cell and state the function of each. Put a star beside three organelles that are only found in plant cells.

Nucleus ~ controls the cell; holds the DNA

Cytoplasm ~ fluid that fills the cell, transports materials

Ribosomes ~ produce proteins

List the 2 steps of the Cell Cycle:

1. Interphase
2. Cell Division

List the 2 steps of Cell Division:

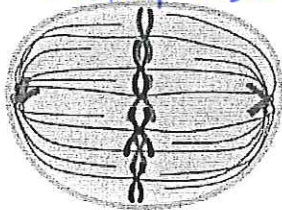
1. Mitosis
2. Cytokinesis

List the 4 steps of Mitosis and describe what is occurring at each stage

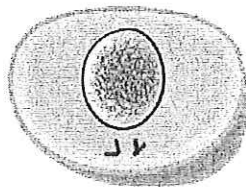
1. Prophase: the cell prepares by dissolving the nuclear membrane & forming spindle fibres
2. Metaphase: the sister chromatids line up in the middle of the cell, attached to the spindle fibres
3. Anaphase: the spindle fibres pull the sister chromatids apart to opposite ends of the cell.
4. Telophase: the cell is tidied up as the spindle fibres disintegrate & the nuclear membranes form

Identify each of the stages of Interphase, each phase of Mitosis, and Cytokinesis.

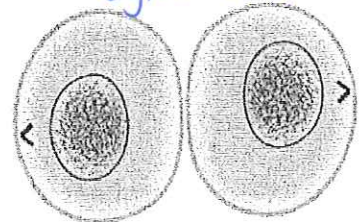
Metaphase



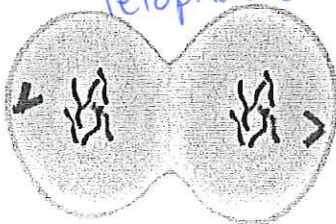
Interphase



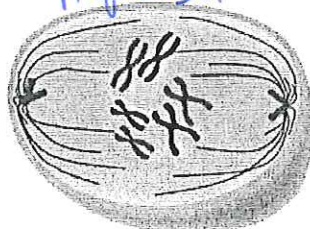
Cytokinesis



Telophase



Prophase



Anaphase



Define the following terms:

Metastasis ~ cancer cells spreading to new parts of the body.

Carcinogen ~ a substance that causes cancer

Benign ~ a tumor that isn't causing harm (not spreading/invading)

Malignant ~ a tumor that is causing harm (spreading & invading other organs)

Binary Fission ~ a type of asexual reproduction where a single celled organism splits into 2 individuals (by mitosis)

Fragmentation ~ a type of asexual reproduction where an organism may be broken into pieces, each of which regenerates into an individual

Budding ~ a type of asexual reproduction where a clone is grown & released to live independently

Spores ~ a type of asexual reproduction where a single cell (spore) is released to grow into a separate individual.

Vegetative Reproduction ~ a type of asexual reproduction where a plant sends out runners that grow a separate individual

Somatic cell ~ a body cell containing the full set of chromosomes

Gamete ~ a sex cell (sperm or egg) ~~containing~~ containing only half a full set of chromosomes.

Haploid ~ cells that have only half an organisms set of chromosomes.

Diploid ~ cells that have a full set of chromosomes.

Fertilization ~ the joining of gametes to produce a zygote.

Zygote ~ a single diploid cell made from the fusion of sperm & eggs; grows into the individual offspring.

Conjugation ~ where single celled organisms exchange pieces of DNA.

Hermaphrodite ~ an organism that produces both sperm & eggs.

Menstruation ~ the shedding of the endometrium; the flow phase.

Ovulation ~ the release of an egg cell from the ovary.

Karyotype ~ a picture of the number & type of an organisms chromosomes

Describe Meiosis and the end result of the process. What is the difference between Mitosis and Meiosis?

Meiosis is the production of haploid gametes. It involves splitting homologous chromosomes first & then splitting sister chromatids. Meiosis produces 4 haploid cells, Mitosis produces 2 cells identical to the parent.

What is the difference between sexual and asexual reproduction?

sexual ~ 2 parents (gametes)

asexual ~ 1 parent

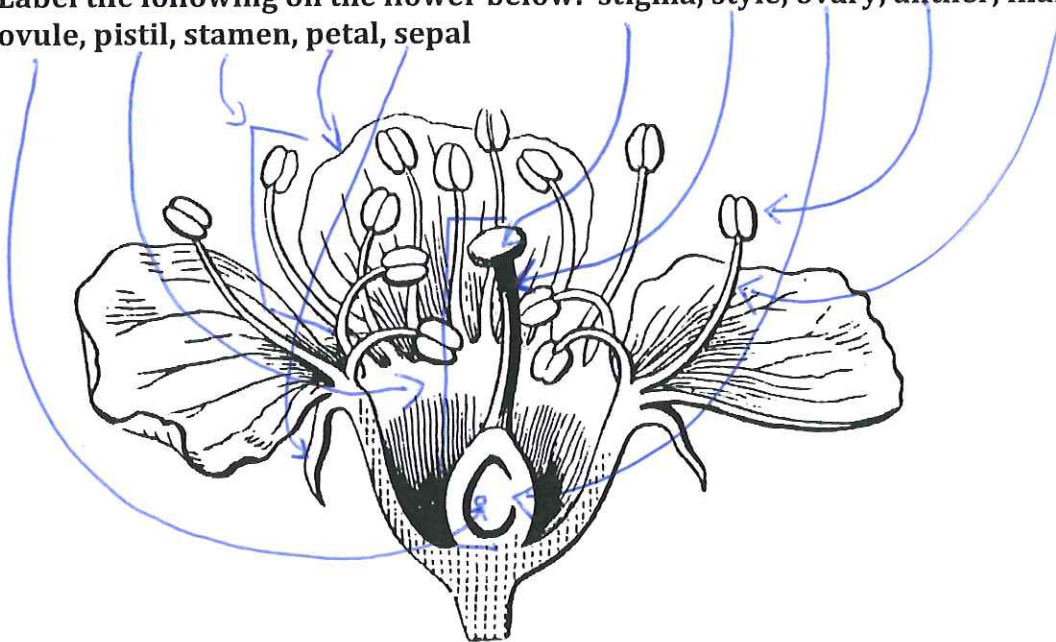
What is the relationship between the following terms: sperm, egg, and zygote?



What are homologous chromosomes, and what is their role in meiosis?

homologous chromosomes are chromosomes with the same types of genes (but possibly different versions); one is from the father, one is from the mother. They are split during Meiosis I.

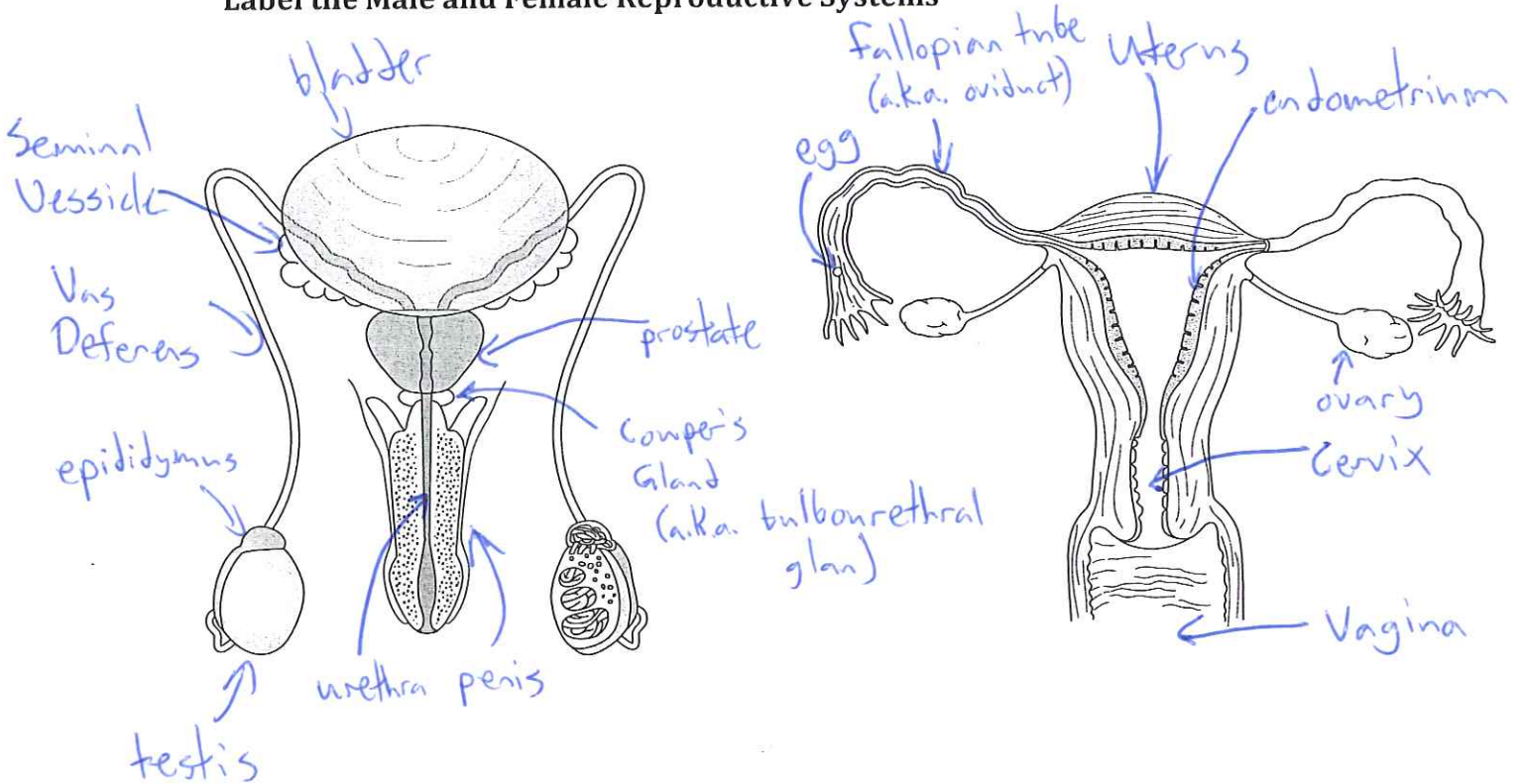
Label the following on the flower below: stigma, style, ovary, anther, filament, ovule, pistil, stamen, petal, sepal



List and describe the 4 phases of the Menstrual Cycle

1. Flow phase: shedding of endometrium
2. Follicular phase: follicle develops with mature egg (releases estrogen)
3. Ovulation: egg is released into fallopian tubes
4. Luteal phase: ruptured follicle becomes corpus luteum (releases progesterone)

Label the Male and Female Reproductive Systems



Define the following terms:

Matter - anything with mass & volume.

Valence electron(s) - the electrons in the outermost shell

Ion - an atom that has acquired a charge by gaining (-) or

losing (+) electrons.

Element - a pure substance made of only one type of atom. Cannot be decomposed any further

Period - a row on the periodic table; all atoms with the same # of shells.

Group - a column on the periodic table; all atoms with similar properties.

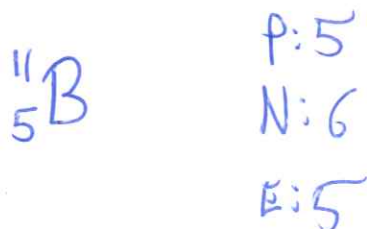
List and describe the properties used to classify the elements as metal or non-metal.

conductivity
Lustre
Malleability
Ductility

List and describe the three subatomic particles in an atom. Include the charges of each.

1. Proton, +
2. Neutron, 0
3. Electron, -

Write the Atomic Notation for Boron. How many protons, neutrons and electrons are in a Boron atom?

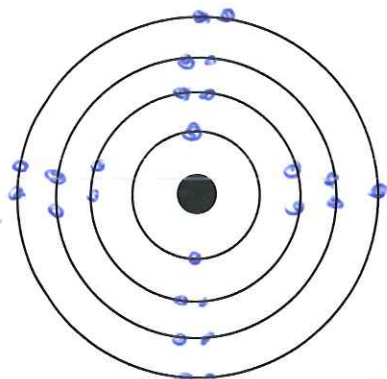


Practice.

should have said
↓ Charge! oops!
Charge

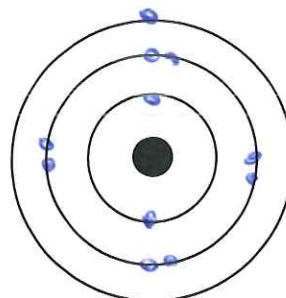
Symbol	Atomic Number	Protons	Electrons	Neutrons	Mass Number	Atomic Mass
Ta ⁵⁺	73	73	68	108	181	5+
Y ³⁺	39	39	36	50	89	3+
Tl ¹⁺	81	81	80	125	206	1+

For each ATOM, fill in the correct number of electrons for each shell. Also, determine the number of protons, neutrons and the number of valence electrons.



P: 35 N: 45 Valence: 7

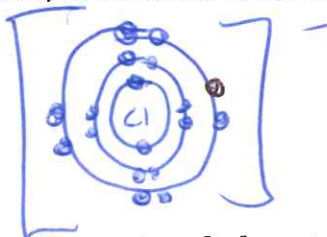
Bromine (Br) _____



P: 11 N: 12 Valence: 1

Sodium (Na) _____

For the chlorine ION, draw a Bohr model with the correct number of electrons for each shell. Also, determine the number of protons and neutrons.



P: 17 N: 18

What family does Magnesium belong to?

Alkaline Earth Metals

What family does Iodine belong to?

Halogens

What family does Cesium belong to?

Alkali Metals

What family does Xenon belong to? Why are these elements considered stable?

Noble Gases: they have what they want (a full valence shell)!

Write the names of the following compounds:

KCl Potassium Chloride

BaBr₂ Barium Bromide

CF₄ Carbon tetrafluoride

CuCl₂ Copper (II) Chloride

P₂S₆ Diphosphorus Hexasulphide

Fe(OH)₂ Iron (II) Hydroxide

NH₄OH Ammonium Hydroxide

Write the chemical formulas for the following compounds:

Trisulphur Pentoxide S₃O₅

Magnesium hydroxide Mg(OH)₂

Iron (III) oxide Fe₂O₃

Boron triiodide BI₃

Potassium sulfate K₂SO₄

Calcium fluoride CaF₂

Determine the number of atoms of each element in the compound Iron (III) oxalate Fe₂(C₂O₄)₃

Iron x 2

Carbon x 6

Oxygen x 12

Explain the Law of Electric Charges

Like charges (+, + or -, -) repel

unlike charges (- & +) attract

Describe the 3 ways of charging an object:

- Friction ~ when rubbed one material pulls e^- off the other
(-) (+)
- Conduction ~ when touched with a charged object, both objects will share the charge
- Induction ~ when a charged object is brought near, the electrons move, resulting in a separation of charge.

Define the following terms:

Static charge ~ an accumulation of charge on an object.

Induced charge separation ~ when the e^- move to one side of an object, leaving one end + & the other -.

Electric Force ~ the push or pull generated by charges on each other.

Load ~ the part of a circuit that converts electrical energy into another form (ex. heat, light, ...etc)

Current ~ the flow of charge per unit of time: $I = \frac{Q}{t}$

Voltage ~ the potential energy given to electrons in a circuit.⁺

Resistance ~ the amount that e^- flow is impeded. Measured in Ω

Series Circuit ~ a circuit where there is one path for e^- to flow.

Parallel Circuit ~ a circuit where there are multiple paths/branches where current can flow.

List the parts of an Electrical Circuit

1. Power source
2. Load
3. Conductive path

A high voltage transmission line has a charge of 2025C. Over 12 seconds, what is the current in the transmission line?

$$I = \frac{Q}{t} = \frac{2025\text{C}}{12\text{s}} = 168.75\text{A}$$

A stove has a current of 14A flowing through it. What quantity of charge flows through the load in 2 minutes?

$$Q = I \cdot t$$

↳ 120s

$$= 14\text{A} \cdot 120\text{s} = 1680\text{C}$$

Calculate the number of electrons pass through the stove in the above question.

$$6.25 \times 10^{18} \text{ electrons} = 1 \text{ Coulomb}$$

$$1680 \times 6.25 \times 10^{18} = 1.05 \times 10^{22} e^{-}$$

Explain the relationship between the voltages of each path in a parallel circuit, as well as a series circuit.

Voltages stay the same in each branch of a parallel circuit, but they add together for parts in series.

Explain how resistors combine in series compared to parallel.

Resistors add up in series but the total resistance decreases for pieces in parallel.

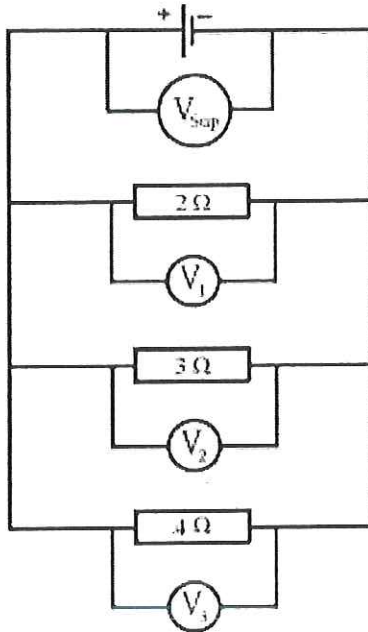
If identical resistors;

$$R_{\text{total}} = \frac{R}{n}$$

↑
how many

Calculate the voltage at each resistor in the parallel circuit below if $V_T = 7.2V$

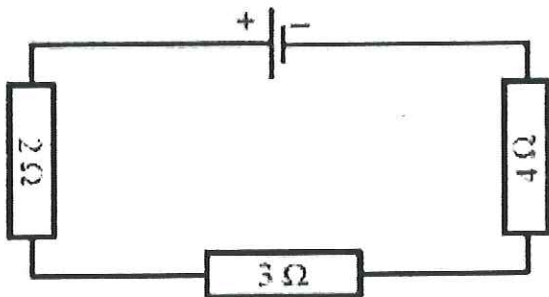
Parallel Circuit



each has 7.2V

Calculate the voltage at each resistor in the series circuit below if $V_T = 7.2V$. Round your answer to the nearest tenth.

Series Circuit



$$R_T = 9\Omega$$

$$I_T = \frac{V}{R} = \frac{7.2}{9} = 0.8A$$

$$V_4 = IR = 0.8A \cdot 4\Omega = 3.2V$$

$$V_3 = IR = 0.8A \cdot 3\Omega = 2.4V$$

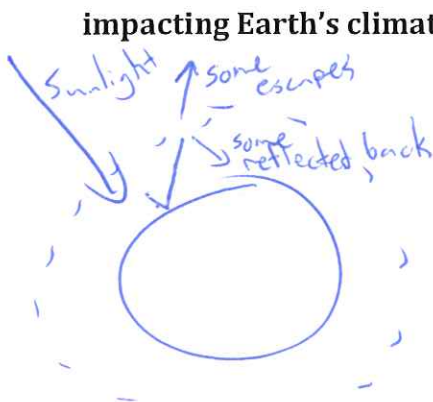
$$V_2 = IR = 0.8A \cdot 2\Omega = 1.6V$$

Note
total
of 7.2V

A toaster uses a current of 14A when plugged into a 120V outlet. What is the resistance of the toaster? Round your answer to the nearest tenth.

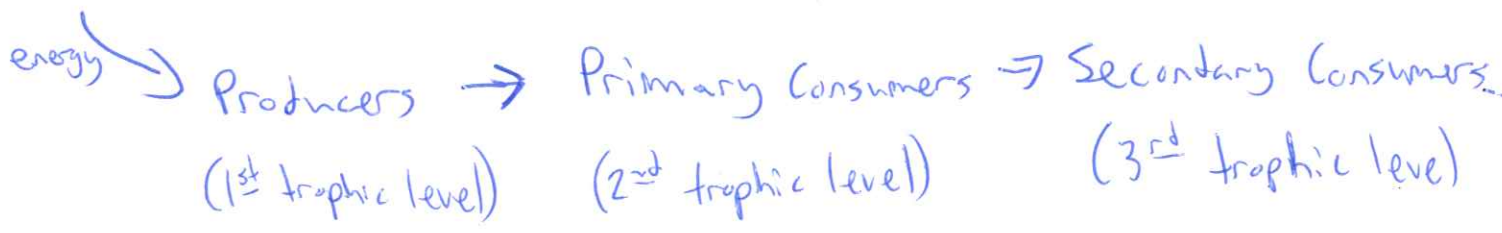
$$R = \frac{V}{I} = \frac{120V}{14A} = 8.57\Omega$$

What is the Greenhouse effect? Draw a diagram and explain it. How is it impacting Earth's climate?



The amount of energy trapped in the atmosphere increases the more "greenhouse gases" there are. This results in an increase in average temperature.

Describe the "trophic levels" in a food chain. How does energy first enter the food chain?



What are 4 substances (that are very important to life) that the Earth CYCLES continuously? Briefly explain each cycle.

Water: Cycles between ocean, atmosphere, & water on land, which flows back to ocean.

Carbon: CO_2 in atmosphere is absorbed by plants, which are eaten by animals, & CO_2 is breathed back out. Fossil Fuels & ocean also play a big role.

Nitrogen: N_2 in atmosphere is "fixed" into NH_4^+ & NO_3^- in soil where plants absorb it. Animals eat plants & remains of both decay putting NH_4^+ & NO_3^- back in soil.

Phosphorus: PO_4^{3-} trapped in rock is slowly weathered (released) into soil & water where it is absorbed by plants. Animals eat the plants & the remains of both decay, putting PO_4^{3-} back into the soil.