Summer Review Packet
8th Grade Honors Science

Name:_____

Directions: Answer each of the following questions. Any specific instructions will be indicated.

Atomic Theory and the Periodic Table

1) The simplest pure substances that cannot be broken down into any other substances. _____

2) The smallest particle of an element is a(n) _____.

3) Which particles in an atom are in the nucleus? _____ & _____

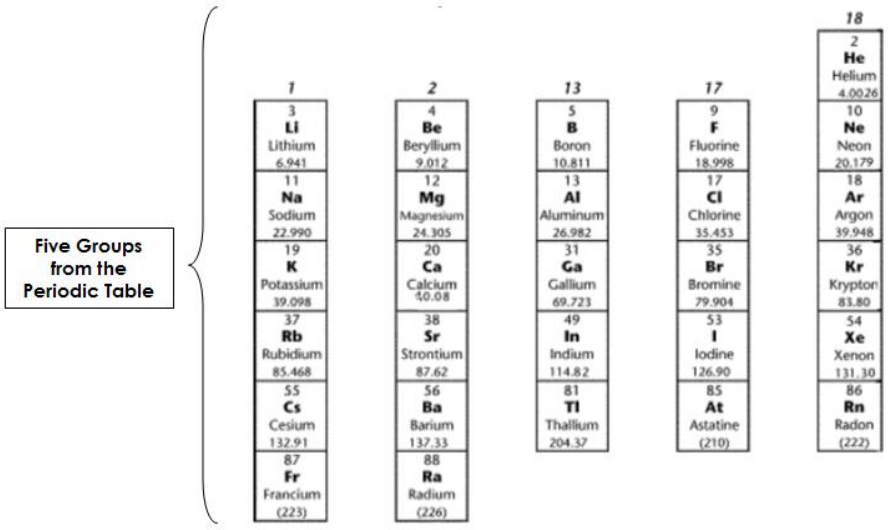
4) The atomic number is the number of _____ in the nucleus of the atom.

5) An atom has no overall charge because it has an equal number of protons and _____.

6) A row across the periodic table is called a(n) _____.

7) On the periodic table, elements with the same number of valence electrons are in the same _____.

8) Most elements are stable when they have _____ valence electrons.



9) Which group needs one valence electron to become stable? Group _____

10) Which group number contains elements with three valence electrons? Group_____

11) Which group number contains elements with 2 valence electrons? Group_____

Chemical Bonding

1) _____ are formed by atoms ***gaining electrons***.

2) The number of _____ in the _____energy level is most important in determining how an atom will bond.

3) A **molecule** contains _____ only.

4) What type of element tends to lose electrons when it forms bonds? _____

5) _____ are formed by atoms ***losing electrons***.

For questions 6 – 9, circle the word(s) that make the sentence true.

6) In an ionic bond, **metals** usually ***gain / lose*** electrons.
7) A **nonmetal** will either ***gain / lose*** or share electrons when it forms bonds.
8) When an atom becomes an **ion** with a **-2** charge, the atom ***gains / loses*** two ***protons / electrons***.
9) When an atom becomes an **ion** with a **+1** charge, the atom ***gains / loses*** one ***proton / electron*** **.**

10) Give three reasons that show **H_2O** is a **covalent molecule**.

a. _____

b. _____

c. _____

Chemical Reactions

1) _____ changes are observed without changing the substance into a new substance.

2) If a substance undergoes a _____ _____, it changes into a new substance with new _____.

3) All chemical reactions involve a change in _____.

True/False, circle the correct response.

4) The production of one or more new substances is the only sure evidence of a chemical reaction. **True/False**

5) Odor or smell is the only sure evidence of a chemical reaction. **True/False**

6) A change in state is the only sure evidence of a chemical reaction. **True/False**

7) A change in properties is the only sure evidence of a chemical reaction. **True/False**

8) In Calcium carbonate, $CaCO_3$ identify the following:

Chemical symbols	Element with the subscript	Chemical Formula
Number of Calcium atoms	Number of Carbon Atoms	Number of Oxygen atoms

9) According to the _____of _____of _____ the total mass of the _____ = the total mass of _____.

10) Identify each of the following terms in the chemical equation: $4H + O_2 \rightarrow 2H_2O$.

Reactant(s):	Product(s):	Coefficient of H_2O
Coefficient of H	Coefficient of O_2	Which elements contain a subscript?

11) Does the chemical equation in #10 support the law of conservation of mass? Explain.

_____

_____

12) If the products formed from the burning candle are carbon (C), carbon dioxide (CO_2), and water (H_2O), what elements were in the reactants? Explain how you know?

_____

_____

13) In a(n) _____ reaction, heat energy is absorbed.

14) In a(n) _____ reaction, energy is released.

Solutions and Solubility:

1) The difference between a **solute** and a **solvent** in a solution is that the ***solute*** is present in a _____ amount.

2) When a few spoonfuls of sugar are mixed into a cup of water, **sugar** is the _____ and **water** is the _____.

3) A measure of how well a solute can dissolve in a solvent at a given temperature is that substance's _____.

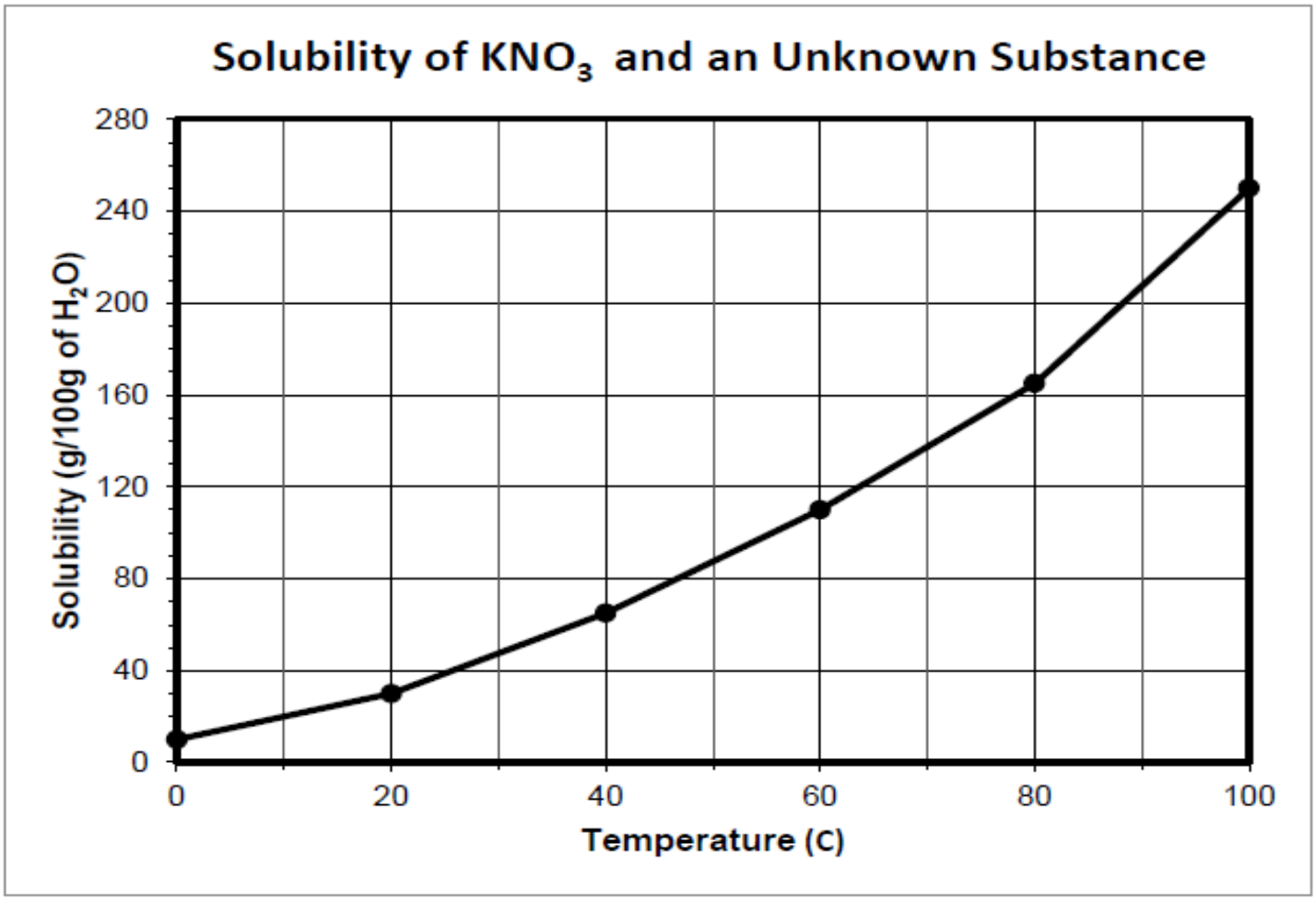
4) ***Salt / Sugar*** in water will conduct electricity when dissolved in water because it is a(n) ***ionic / covalent*** compound.

5) When you add so much solute that no more dissolves, you have a _____ solution.

6) If a compound has a solubility of 18 g in 100 g of water, this means that _____ g of the compound will dissolve in _____ g of water.

7) The presence of a solute makes it harder for solvent molecules to escape when heated, so the boiling point of a solution is ***higher / lower*** than that of the pure solvent.

8) A _____ is any mixture that appears uniform throughout and whose particles cannot easily be separated.



9) The table shows the solubility for an unknown substance. Using the graph for KNO_3 above, plot the data for the unknown substance and label the new line.

Unknown Substance	
Temperature (^{O}C)	Solubility (g/100g of H_2O)
0	**20**
20	**50**
40	**70**
60	**90**
80	**130**
100	**150**

After plotting the unknown substance, answer questions 10 – 12.

10) At **80°C**, what is the difference in solubility between the two substances? _____

11) At approximately what temperature is the solubility of these substances the same? _____

12) What does the graph show about the solubility of the two substances? _____

_____

_____

Cell Structure and Function

1) _____ are the basic unit of structure and function in living things.

2) The levels of organization in a multi-cellular organism are cells, _____, organs, and organ systems.

3) The _____ states that cells are produced from other cells.

4) Two structures that are found in plant cells but not in animal cells are the _____ and _____.

5) The grain-like organelles on which proteins are made are called _____.

6) The region between the cell membrane and the nucleus: _____

7) The nucleus of a cell has thin strands of _____ that contain genetic material.

8) Chloroplasts are found only in the cells of _____ and some other organisms.

9) The _____ packages and distributes materials to parts of the cell.

10) The _____ converts energy from food molecules into energy the cell can use. It is also known as the Power House of the cell.

Circle the correct response for numbers 11 – 13.

11) In cells, water is stored in organelles referred to as **vacuoles / lysosomes / mitochondria.**

12) A structure found in plant and bacterial cells but not in animal cells is called a **lysosome/ cell membrane / cell wall .**

13) The **nucleus / mitochondria / chloroplast** captures sunlight and converts it into chemical energy.

Cell Environment and Energy

1) Movement of molecules from an area of higher concentration to an area of lower concentration is _____.

2) The diffusion of water molecules through a selectively permeable membrane is _____.

3) Movement of materials through a cell membrane ***without*** using the cell's energy is called _____transport.

4) Movement of materials through a cell membrane when the cell's energy is required is called _____transport.

5) If a freshwater organism is placed in a saltwater solution, the cells will **shrink/swell** due to osmosis.

6) During photosynthesis, a cell uses the energy in _____ to make food.

7) What are the products of photosynthesis? _____ and _____

8) The function of chlorophyll is to **capture/repel** the sun's energy.

9) **Chloroplast/mitochondria** is the organelle directly involved in cellular respiration.

Circle the correct response in numbers 10 – 16.

10) Carbon dioxide enters plants through the **chlorophyll / pigments / stomata**.

11) The energy-releasing process that does **NOT** require oxygen is called **photosynthesis / respiration / fermentation**.

12) The stage of respiration that releases most of the energy in glucose occurs in the **cytoplasm / chloroplast / mitochondria**.

13) Photosynthesis and respiration are related because they **both produce carbon dioxide / both produce oxygen / have opposite equations**.

14) Almost all living things depend on the process **photosynthesis / osmosis / diffusion** to supply them with the energy they need.

15) During respiration, molecules of **glucose / oxygen / carbon dioxide** are first broken down in the cytoplasm.

16) The main difference between respiration and fermentation is that respiration uses **water / carbon dioxide / oxygen** to obtain energy from food.

Cell Cycle and DNA

1) During cytokinesis in animal cells, two new _____ are formed.

2) The stage of the cell cycle that follows mitosis is called _____.

3) The regular cycle of growth and division that cells undergo is called _____.

4) Each rung or step of the DNA ladder is made of how many nitrogen bases? _____

5) Scientists think cancer begins when a _____ occurs in DNA.

6) Which nitrogen base is only found in RNA? _____

7) The order and number of DNA bases along a gene specifies the type of_____ that will be produced.

Circle the correct response in number 8-9.

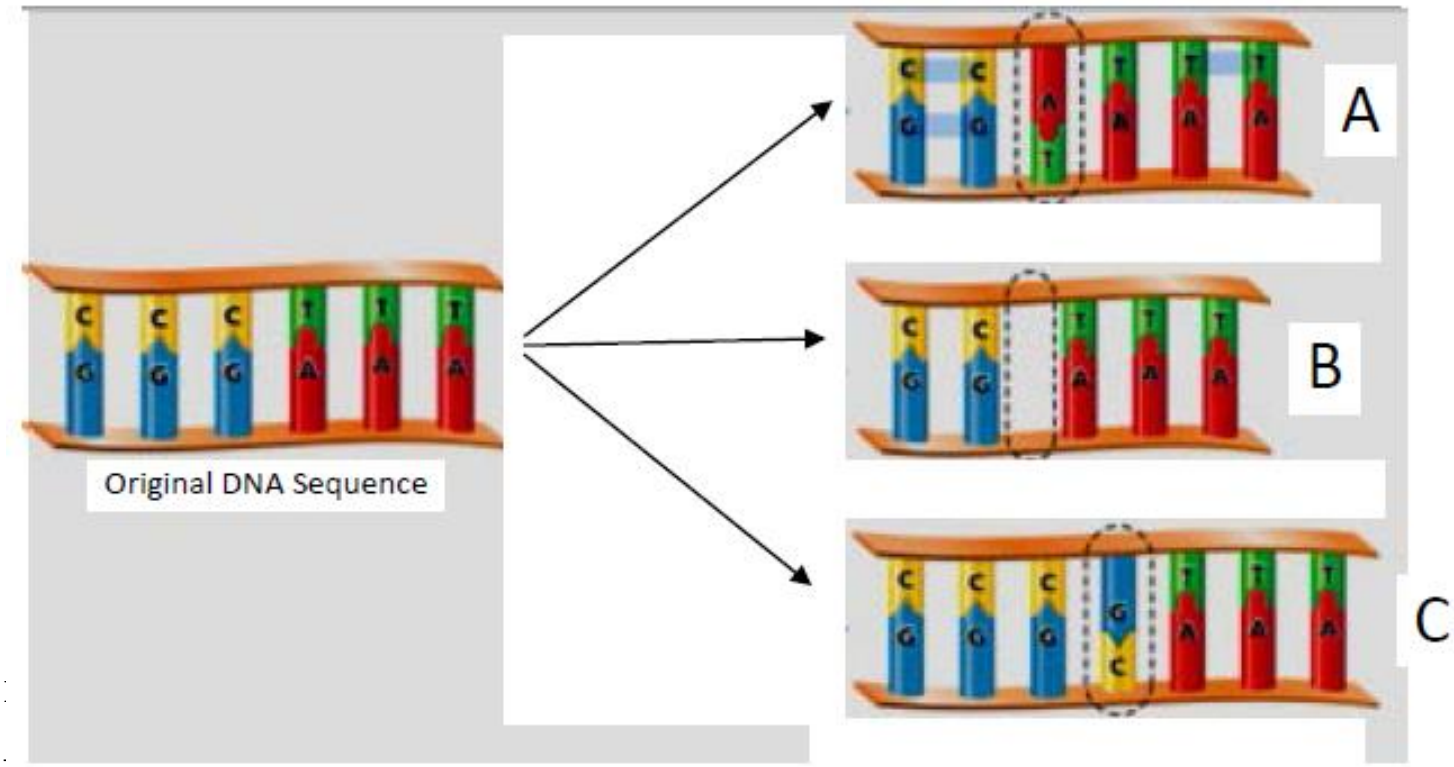
8) The substitution of one base for another during DNA replication is an example of a(n) **addition / mutation / nucleotide**.

9) During cytokinesis in plant cells, a(n) **cell wall / cell membrane / cell plate** forms across the middle of the cell.

10) Complete the chart with the matching section of an RNA molecule for each RNA base sequence listed below.

Section of **RNA base sequence in** mRNA	**U G A A**	**A U G U**	**C A U A**
Matching sequence of **RNA in** transfer RNA	____ , ____, ____, ____	____ , ____, ____, ____	____ , ____, ____, ____

11) Label and describe the three types of mutations shown in the diagram:



Mutation B is a(n) _____. This is when _____

_____

Mutation C is a(n) _____. This is when _____

_____

12) Describe the three effects a mutation could have on an organism?

a. _____

b. _____

c. _____

Genetics and Heredity

1) Gregor Mendel's work was the foundation for understanding why _____ have traits similar to those of their parents.

2) Factors that control traits are called _____.

3) The passing of physical characteristics from parent to offspring is called_____.

4) A _____ organism has two different alleles for a trait.

5) An allele whose trait always shows up in an organism when the allele is present is a _____.

6) The process by which the number of chromosomes is reduced by half to form sex cells is _____.

7) When sex cells combine to produce offspring, each sex cell will contribute _____ the number of chromosomes in body cells.

8) An organism's physical appearance is its _____.

9) A _____ shows the type of genetic make-up a person has.

10) The different forms of a gene are called _____.

11) A purebred chicken with white feathers is crossed with a purebred chicken that has black feathers. Each of their offspring has both black and white feathers. This happens because the alleles for feather color are _____.

Circle or write in the best response for numbers 12 – 14.

12) When a plant has two dominant alleles for tall stems, its alleles are written as _____.

13) To geneticists, the notation **Tt** means ***two dominant alleles / homozygous alleles / one dominant allele and one recessive allele*.**

14) What is the probability of producing a **tall pea plant** from a genetic cross between two hybrid tall pea plants? _____ ***in*** _____ ***or*** _____ **%**

Using Science Skills

Complete the Punnett square. Then circle the correct answer for # 15 – 17 using the completed genetic cross.

Inheritance of Fur Color in Guinea Pigs

B = brown fur
b = white fur

Construct a Punnett square where one parent is a heterozygous (hybrid) guinea pig with brown fur and the other parent is a homozygous (purebred) guinea pig with white fur.

	Parent B	
Parent A		

15) For the punnett square above, list the probability of the possible offspring **genotypes**.

Genotype	Probability %
BB	
Bb	
bb	

16) For the punnett square above, list the probability of the possible offspring **phenotypes**.

Phenotype	Probability %
Brown fur	
White fur	

Modern Genetics

1) An egg (**X**) that is fertilized by a sperm with a(n) _____ chromosome will develop into a female.
2) Genetic disorders are caused by DNA _____ or changes in chromosomes.
3) A karyotype can be used to determine the number of_____ in a person's cells.
4) A _____ would most likely be used to diagnose Down Syndrome

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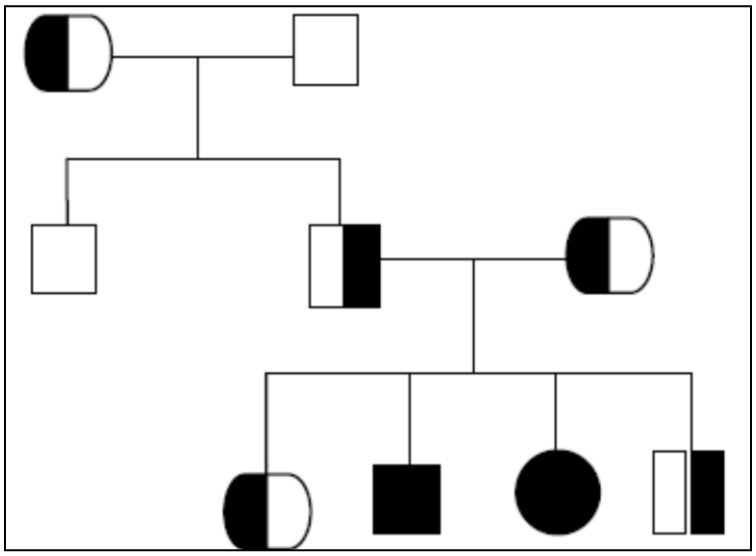
Circle the best response in numbers 5 & 6.

5) Cloning results in two organisms that are **genetically similar / exactly the same**.
6) Height in humans has such a wide variety of phenotypes because height is controlled by ***sex-linked genes / a recessive allele / many genes / only two alleles.***

7) According to the pedigree at the right, which statement is true about the **third generation**?

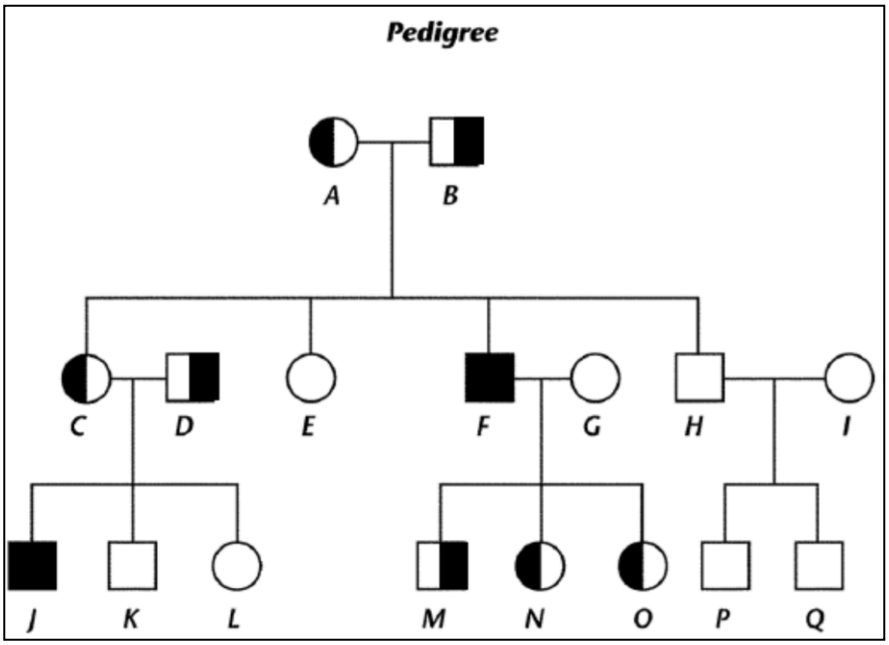
A) No one has sickle-cell disease. ***B) Everyone has sickle-cell disease.***

C) Everyone has at least one allele for sickle-cell disease.



8) Using the pedigree, name the couples who have children.

_____, _____, _____, & _____



9) Which individuals are carriers of the trait that is traced by this pedigree?

_____, _____, _____, _____, _____, _____, _____

10) Which individuals show the trait?

_____

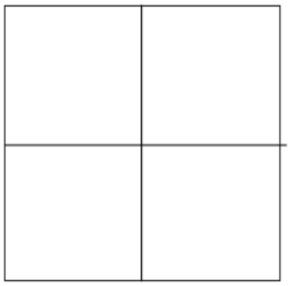
11) Could this be a sex-linked trait? _____ How do you know?

_____

Make a punnett square (to the right) to help you answer the next question.

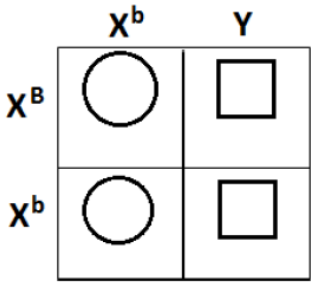
A man has cystic fibrosis. His wife does not have the disease, but is heterozygous for the disease.

H = No disease **h = Cystic fibrosis**



12) The probability that their child will have cystic fibrosis is _____ %

Complete the Punnett square for colorblindness and shade it appropriately. Then use it to answer the next two questions.



13) What must be true about each parent in order for a girl to be colorblind?

_____

_____

14) Is it possible for a son to inherit an allele on an X chromosome from his father? Explain why or why not.

Use the diagram to answer question 15.

Blood type	Alleles
A	$I^A I^A$ $I^A i$
B	$I^B I^B$ $I^B i$
AB	$I^A I^B$
O	ii

15) A person with blood type **AB** has the alleles $\boldsymbol{I^A}$ and $\boldsymbol{I^B}$. A person with blood type **O** has the alleles ***ii***. Is it possible for a person with blood type **AB** to have a child with blood type **O**? Explain why or why not.

_____

_____

_____

_____

_____

_____