

Name _____
Period _____

Date _____

Biology Keystone Exam Review

Chapter 1

1. Describe the characteristics of life shared by all prokaryotic & eukaryotic organisms.

List the eight characteristics that all living things share.

Chapter 7

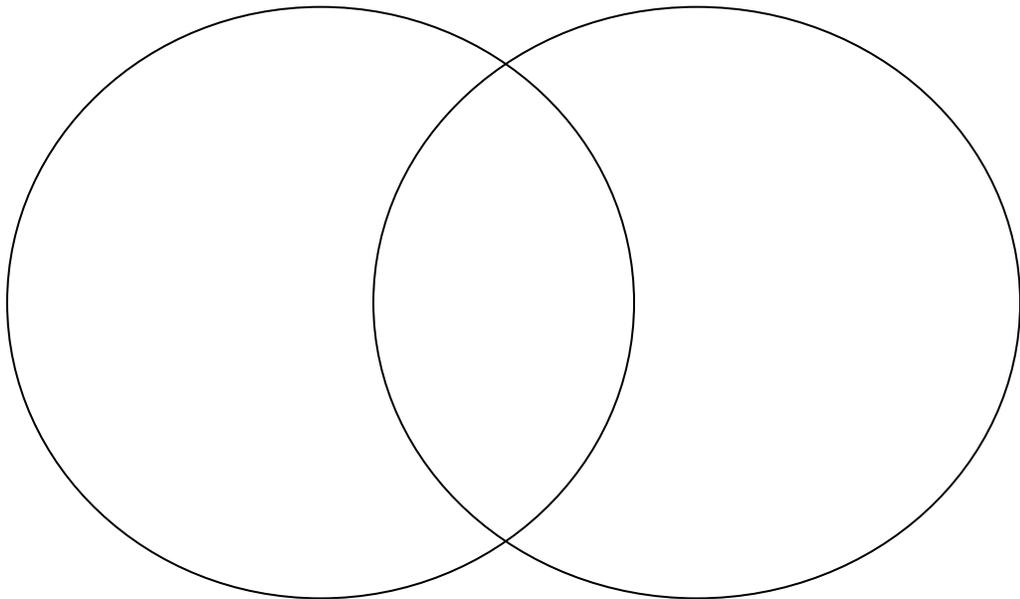
2. Compare cellular structures & their functions in prokaryotic & eukaryotic cells.

Identify three differences between **prokaryotic** and **eukaryotic** cells.

Complete the Venn Diagram comparing prokaryotic and eukaryotic cells.

Prokaryotic

Eukaryotic



Chapter 7

3. Describe and interpret the relationships between structure and function at various levels of biological organization.

Place the following terms in order from least complex to most complex:

Organs cells organ systems tissues organism

Chapter 2

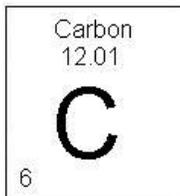
4. Describe the unique properties of water and how these properties support life on Earth (e.g. freezing point, high specific heat, cohesion)

What makes water polar?

Draw a water molecule and show how it is charged on both ends.

5. Explain how carbon is uniquely suited to form biological molecules.

What makes **carbon** unique as compared to other elements?



How many valence electrons does a **carbon** atom have?

What kind of bond(s) do **carbon** atoms readily form?

6. Describe how biological molecules form from monomers.

Identify the polymers that are made up by the monomers given below:

monomer	polymer
Monosaccharide (simple sugar) + monosaccharide(simple sugar)	
Fatty acids + glycerol	
Amino acid + amino acid + amino acid...	
Nucleotide + nucleotide...	

7. Compare the structure & function of carbohydrates, lipids, proteins, & nucleic acids in organisms.

Match each class of organic compounds with their appropriate function.

Carbohydrates

Proteins

Lipids

Nucleic Acids

_____ Stores and transmits genetic information

_____ Stores energy

_____ Help fight disease

_____ Move substances in and out of cells

_____ Quick energy

_____ Control the rate of reactions

8. Describe the role of an enzyme as a catalyst in regulating a specific biochemical reaction.

Define the following terms:

Enzyme-

Catalyst-

Activation energy-

True or False: All **enzymes** are proteins.

True or False: All **catalysts** are enzymes.

True or False: **Enzymes** lower the energy of activation of a reaction by binding the substrate.

9. Explain how factors such as pH, temperature, & concentration levels can affect enzyme function.

Chapters 8 and 9

10. Describe the fundamental roles of plastids (e.g. chloroplasts) & mitochondria in energy transformation.

Complete the table.

	Photosynthesis	Cellular Respiration
Function		
Location		
Reactants		
Products		

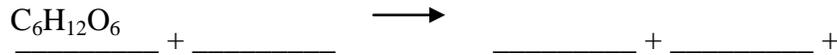
Which organelle converts chemical energy stored in food into compounds that are more convenient for the cell to use?

11. Compare the basic transformation of energy during photosynthesis & cellular Respiration.

Write the balanced equation for **Photosynthesis**:



Write the balanced equation for **Cellular Respiration**:



12. Describe the role of ATP in biochemical reactions.

What is the name of the energy currency molecule of the cell?

Chapter 7

13. Describe how the structure of the plasma membrane allows it to function as a regulatory structure and/or protective barrier for a cell.

Identify the function of the cell membrane.

How does facilitated diffusion differ from diffusion?

14. Compare the mechanisms that transport materials across the plasma membrane (i.e. passive transport- diffusion, osmosis, facilitated diffusion; and active transport- pumps, endocytosis)

Distinguish between **active** and **passive** transport.
How is **diffusion** different from **osmosis**?

Define the following terms and describe what would happen if you put a red blood cell in each type of solution.

a) Hypertonic-

b) Hypotonic-

c) Isotonic-

15. Describe how membrane-bound cellular organelles (e.g. endoplasmic reticulum, Golgi apparatus) facilitate the transport of materials within a cell.

Identify the function of the following organelles:

Endoplasmic Reticulum –

Golgi Apparatus –

16. Explain how organisms maintain homeostasis (e.g. thermoregulation, water regulation, oxygen regulation).

What is meant by the term **homeostasis**?

What is a contractile vacuole and how can it be used to maintain **homeostasis**?

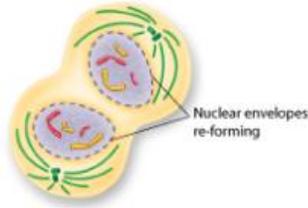
Chapters 10 and 11.4

17. Describe the events that occur during the cell cycle: interphase, nuclear division (i.e. mitosis or meiosis), cytokinesis.

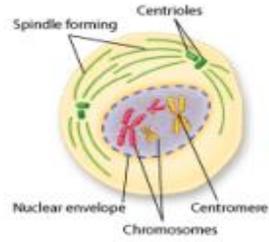
Name and describe the three parts of the cell cycle.

Identify mitotic phases:

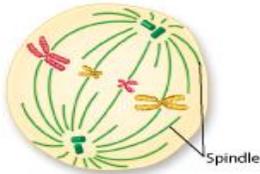
A



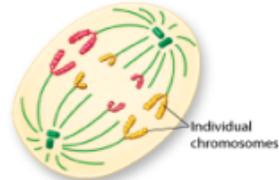
B



C



D



List the above phases of mitosis in order (use letters) _____, _____, _____, _____

18. Compare the processes and outcomes of mitotic and meiotic nuclear divisions.

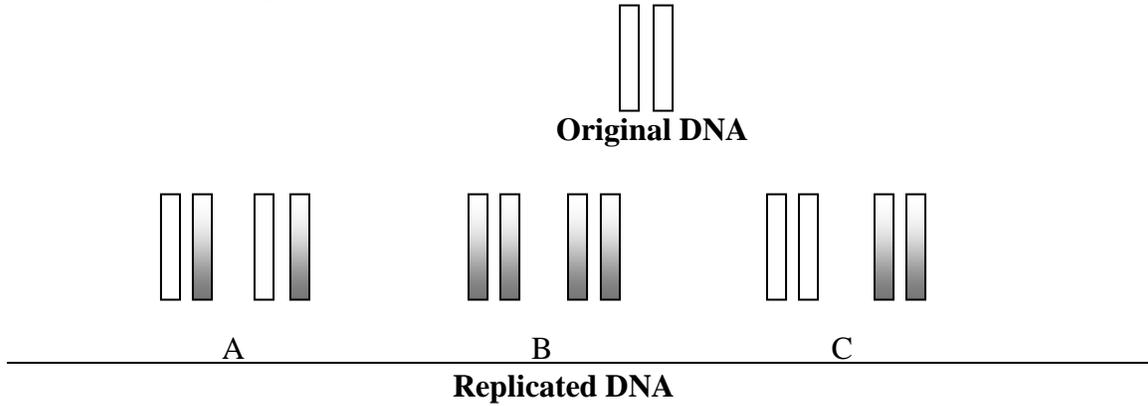
Compare mitosis and meiosis:

	Mitosis	Meiosis
Number of cell divisions		
Number of daughter cells		
Number of chromosomes in daughter cells (2N/N)		
Daughter cells are genetically (identical/different) than parent cell		
Occurs in what type of cell		

Chapter 12

19. Describe how the process of DNA replication results in the transmission and/or conservation of genetic information.

Circle the DNA strands below that would represent the new DNA molecules that would result from replication.



20. Explain the functional relationships between DNA, genes, alleles, & chromosomes and their roles in inheritance.

Describe the relationship between DNA, gene, allele, chromosome, and nuclei.

Chapter 11

21. Describe and/or predict observed patterns of inheritance (i.e. dominant, recessive, co-dominance, incomplete dominance, sex-linked, polygenic, and multiple alleles).

Define and give an example of each of the following patterns of inheritance:

Codominance –

Incomplete Dominance –

Multiple Alleles –

Polygenic Traits –

Japanese four o'clock flowers come in three varieties: red, pink, and white. Cross two pink Japanese four o'clock flowers. Show a Punnett Square and give the phenotypic ratio of the offspring produced by the cross.

Chapter 14

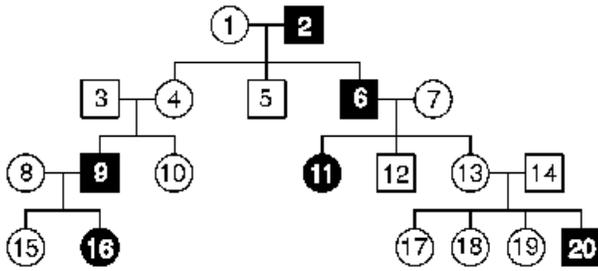
One parent is heterozygous for type A blood and the other is heterozygous for type B blood. What are the possible blood types of their children? Include the parents' genotypes in your answer.

A female carrier does not have the disease. Her genotype is $X^H X^h$, where X indicates the alleles are on the X chromosome. The carrier female mates with a normal male.

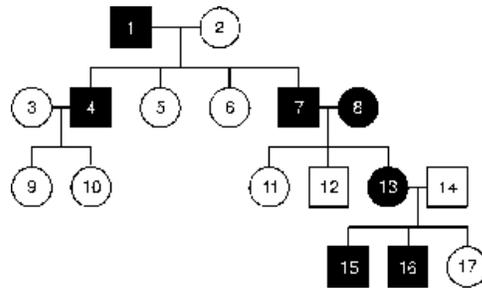
a) What is the probability that a female offspring will be normal? Will be a carrier?

b) What is the probability that a male offspring will inherit hemophilia?

Use the pedigrees below to answer the next six questions.



Pedigree A



Pedigree B

What is the pattern of inheritance for the trait in pedigree A?
(autosomal dominant or autosomal recessive)

What is the pattern of inheritance for the trait in pedigree B?
(autosomal dominant or autosomal recessive)

What must be the genotype of individual 20 in pedigree A?

What must be the genotype of individual 17 in pedigree B?

What must be the genotype of individual 1 in pedigree A?

What must be the genotype of individual 1 in pedigree B?

Chapter 11.4, 13, 14.2

22. Describe processes that can alter composition or number of chromosomes (i.e. crossing over, nondisjunction, duplication, translocation, deletion, insertion, and inversion).

What is crossing over, and when does it occur during meiosis?

Distinguish between a chromosomal mutation and a gene mutation and give two examples of each type of mutation.

23. Describe how the processes of transcription and translation are similar in all organisms. Transcribe the given DNA sequence into a complementary mRNA:

A T G C A A G T C A T T C C A G C T

Chapter 7

24. Describe the role of ribosomes, endoplasmic reticulum, Golgi apparatus, and the nucleus in the production of different types of proteins.

Identify the function of each of the following organelles:

Ribosomes –

Endoplasmic Reticulum –

Golgi Apparatus –

Nucleus –

Chapter 13

25. Describe how genetic mutations alter the DNA sequence and may or may not affect phenotype (e.g. silent, nonsense, frame-shift)

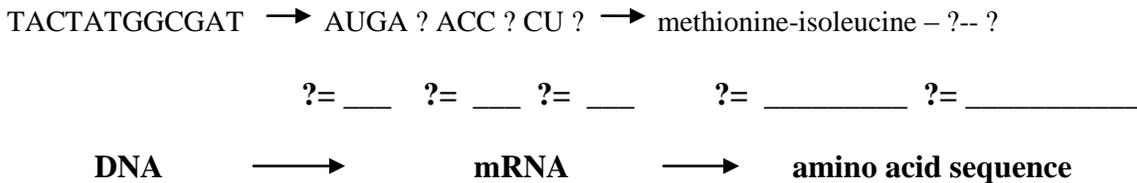
How are **frameshift** and substitution mutations similar? How are they different?

Use the tables below to answer the next two questions.

Amino acid sequence	Protein Produced
Methionine-isoleucine-proline-leucine	Protein A
Methionine-isoleucine-valine-leucine	Protein B
Methionine-isoleucine-proline-alanine	Protein C

codon	Amino acid
AUG	methionine
CUA	leucine
CCG	proline
AUA	isoleucine
CCC	proline

Follow the given sequence of DNA below through transcription and translation resulting in a protein. Fill in the missing information indicated by the question marks.



Protein produced above (A, B, or C) (circle one)

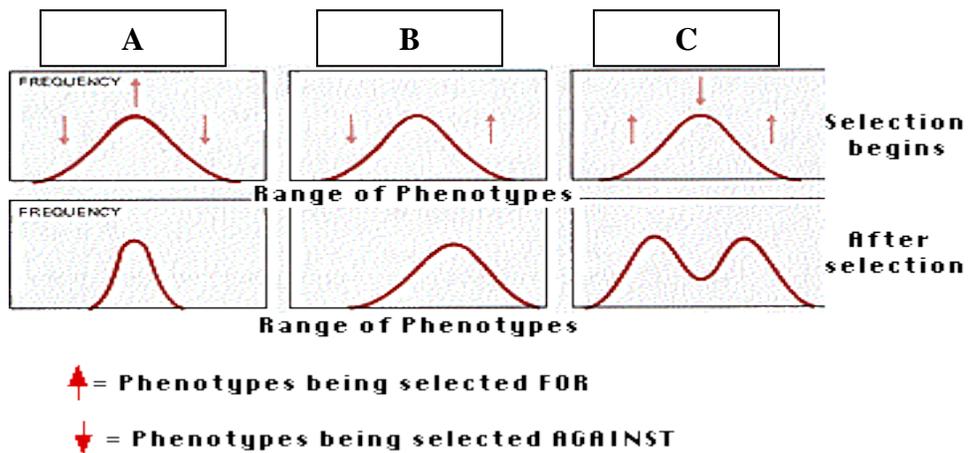
If the above sequence of DNA had a **substitution** mutation so that the mutated sequence was TACTATGGGGAT, which protein (A, B, or C) will be produced?

Chapter 15

26. Explain how genetic engineering has impacted the field of medicine, forensics, and agriculture (e.g. selective breeding, gene splicing, cloning, genetically modified organisms, gene therapy)

Chapter 17

27. Explain how natural selection can impact allele frequency of a population. Distinguish between stabilizing, disruptive, and directional selection.



Identify the type of selection in graph A _____

Identify the type of selection in graph B _____

Identify the type of selection in graph C _____

In a species of snail, dark individuals are better hidden (from bird predators) in the shady forest, while lighter individuals are better hidden in well lit brushy edge areas. There are no areas of intermediate brightness; therefore, _____ acts on shell color in these snails.

- a. directional selection
- b. disruptive selection
- c. stabilizing selection

Small *Aristelliger* lizards have difficulty defending territories, but large lizards are more likely to be preyed upon by owls. This situation results in _____ on adult body size.

- a. directional selection
- b. disruptive selection
- c. stabilizing selection

Long necks make it easier for giraffes to reach leaves high on trees, while also making them better fighters in "neck wrestling" contests. In both cases, _____ appears to have made giraffes the long-necked creatures they are today.

- a. directional selection
- b. disruptive selection
- c. stabilizing selection

28. Describe the factors that can contribute to the development of new species (e.g. isolating mechanisms, genetic drift, founder effect, migration)

Types of Reproductive Isolation:

Behavioral Isolation	
Geographic Isolation	
Temporal Isolation	

Populations of the same species of seal live on islands too far apart to swim between them for mating.

- a. behavioral isolation
- b. temporal isolation
- c. geographic isolation

Species of birds have elaborate courtship dances, and females select the best dancers as mates.

- a. behavioral isolation
- b. temporal isolation
- c. geographic isolation

Varieties of oak tree produce pollen during different seasons, so they can't pollinate one another.

- a. behavioral isolation
- b. temporal isolation
- c. geographic isolation

Herds of caribou misinterpret each other's mating behavior, so they fight instead of mating

- a. behavioral isolation
- b. temporal isolation
- c. geographic isolation

What is **genetic drift**?

29. Explain how genetic mutations may result in genotypic and phenotypic variation within a population.

Chapter 16

30. Interpret evidence supporting the theory of evolution (i.e. fossil, anatomical, physiological, embryological, biochemical, & universal genetic code)

Define and give an example of each of the following terms:

Vocabulary	Description	Example(s)
Homologous Structure		
Analogous Structure		
Vestigial Structure		

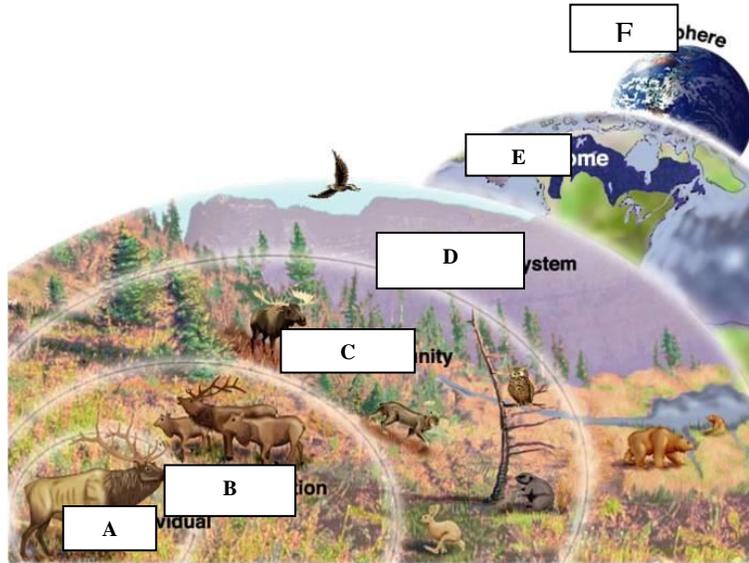
Chapter 1

31. Distinguish between the scientific terms: hypothesis, inference, law, theory, principle, fact observation

Describe the relationship between a hypothesis, an inference and a theory.

Chapter 3

32. Describe the levels of ecological organization.



Use the terms below to identify the six levels of ecological organization in the diagram above. Then define each term.

Community
Population

Ecosystem
Species/Organism

Biosphere
Biome

A – _____ -

B – _____ -

C – _____ -

D – _____ -

E – _____ -

F – _____ -

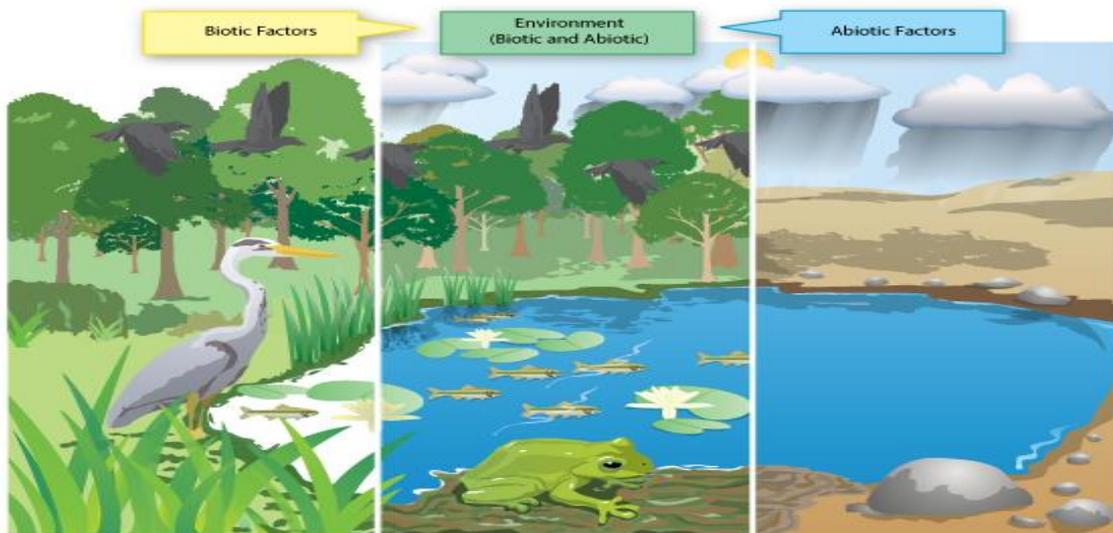
33. Describe characteristic biotic and abiotic components of an ecosystem.

Define the following terms:

Biotic Factors –

Abiotic Factors -

Identify four **biotic** and four **abiotic** components of the aquatic and terrestrial **ecosystems** shown below.



Biotic Factors	
Abiotic Factors	

34. Describe how energy flows through an ecosystem (e.g. food chains, food webs, and energy pyramids)

Use the food chain below to answer the next two questions.



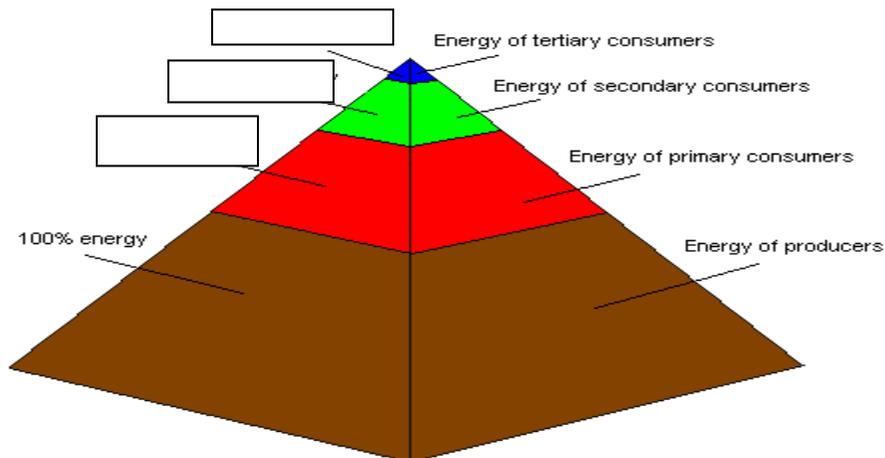
Identify the original source of energy in this food chain.

What percent of energy is transferred from the second **trophic level** (deer) to the third **trophic level** (lion)?

Energy in an ecosystem (flows in one direction / cycles). (circle one)

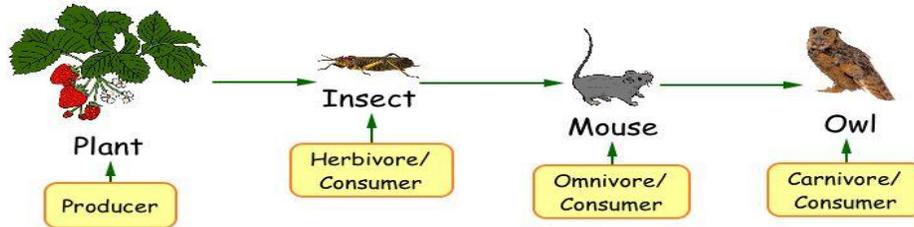
Nutrients in an ecosystem (flow in one direction / cycles). (circle one)

Identify the percent of energy available for organisms in each **trophic level** of the **ecological pyramid** below.



35. Describe biotic interactions in an ecosystem (e.g. competition, predation, symbiosis)

Use the **food chain** below to answer the next two questions.



If the size of the insect **population** were to decrease, what effect would that have on the size of the mouse **population**? Explain your answer.

If the size of the owl **population** were to decrease, what effect would that have on the size of the mouse **population**? Explain your answer.

Use the **food web** below to answer the next question.



If the size of the rabbit **population** were to decrease, which of the following would most likely happen?

- The snake population will decrease.
- The plant population will decrease.
- The wild cat population will increase.
- The jackal population will decrease.

Describe each of the **community** interactions in the table below.

Interaction	Description
Competition	
Symbiosis	
Predation	
Parasitism	
Mutualism	
Commensalism	

Match each example with the correct type of community interaction.

- a. Competition
- b. Parasitism
- c. Mutualism
- d. Commensalism

- _____ A leech feeds on the blood of a human.
- _____ A clownfish lives among the sea anemone's tentacles and protects the sea anemone by chasing away would-be attackers. A sea anemone, in turn, protects the clownfish from predators.
- _____ A cow and a sheep feed on the same grass.
- _____ A tree provides nutrients and a sunlit location for the orchid living on it.

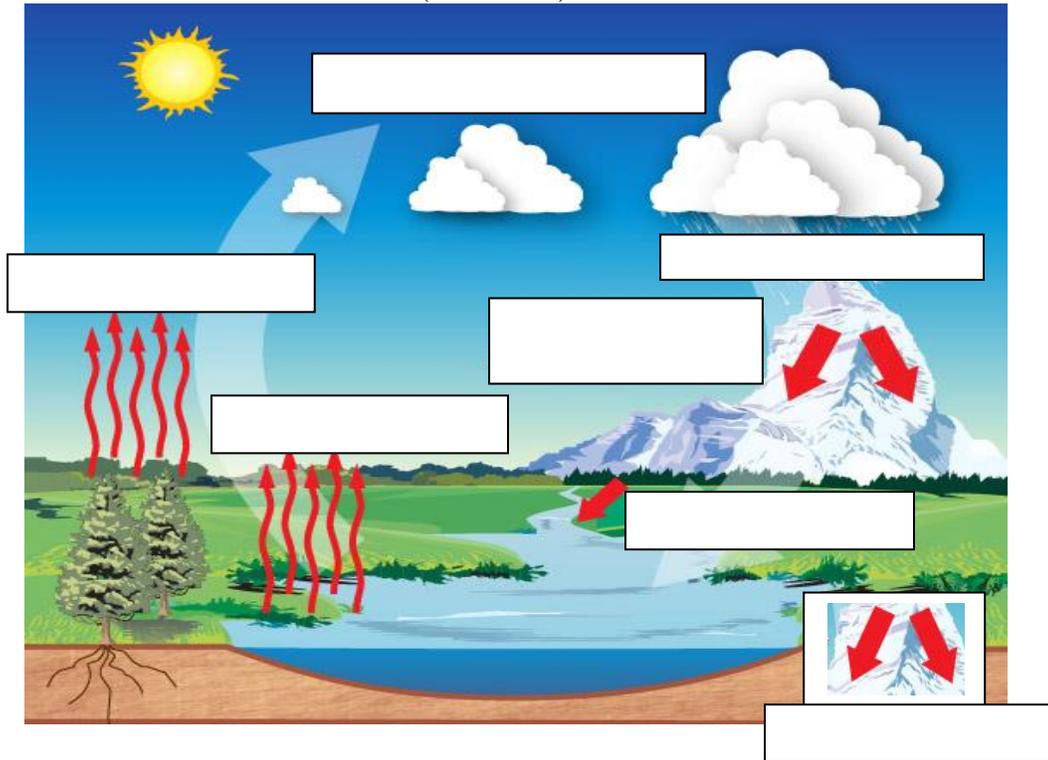
36. Describe how matter recycles through an ecosystem (i.e. water cycle, carbon cycle, oxygen cycle, and nitrogen cycle)

Complete the diagram of the **water cycle** using the words below:

Evaporation
Transpiration

Precipitation
Condensation
(Snowmelt) Runoff

Groundwater
Seepage



Describe each of the following types of organisms:

Autotroph –

Heterotroph –

Herbivore –

Carnivore –

Omnivore –

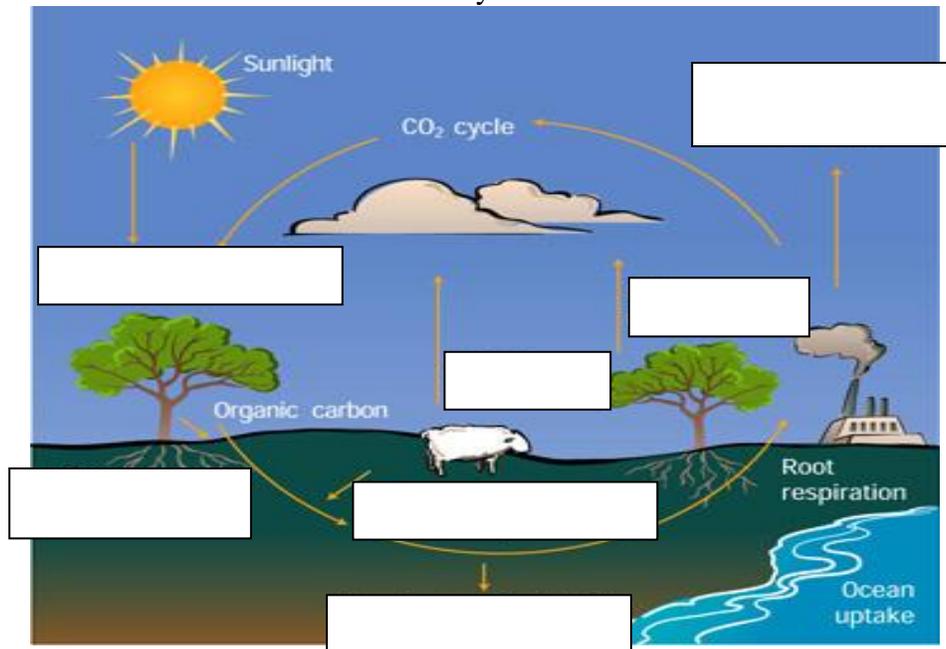
Decomposer –

Complete the diagram of the **carbon cycle** using the words below:

Fossils and fossil fuels
Factory emissions

Animal Respiration
Plant Respiration
Photosynthesis

Decomposition
Decomposition



Chapter 4

37. Describe how ecosystems change in response to natural and human disturbances (e.g. climate change, introduction of nonnative species, pollution, fires).

What is ecological succession?

Distinguish between primary and secondary succession.

Chapter 6

Identify five ways that humans reduce biodiversity in an ecosystem.

How does the introduction of nonnative species threaten biodiversity?

Chapter 5

38. Describe the effects of limiting factors on population dynamics and potential species extinction.

What is a limiting factor?

Distinguish between density-dependent and density-independent limiting factors and give two examples of each type of limiting factor.