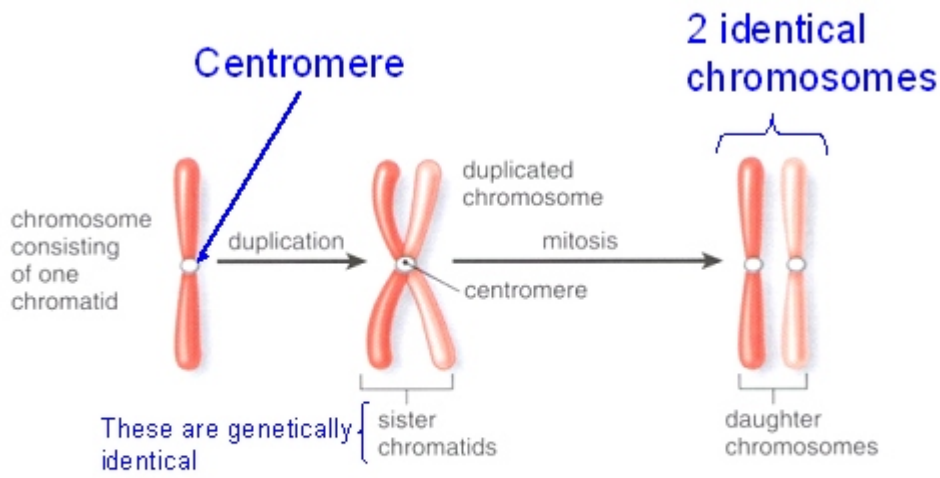


BIOLOGY 1

WORKSHEET III

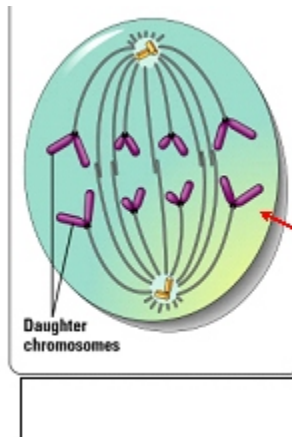
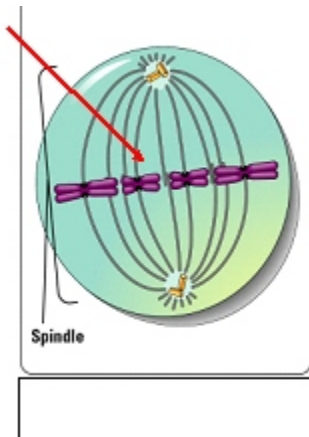
(SELECTED ANSWERS)

1. What is a karyotype? You did this in lab!
2. What are homologous chromosomes? How many pairs of homologous chromosomes are found in humans? Chromosomes that are similar in size, shape, and genetic material. One homologue is inherited from mom. One from dad. Homologous chromosomes are separated in meiosis when gametes form. Humans have 23 pairs of homologous chromosomes.
3. Label the diagrams below:



Counting the number of centromeres tells you the number of chromosomes.

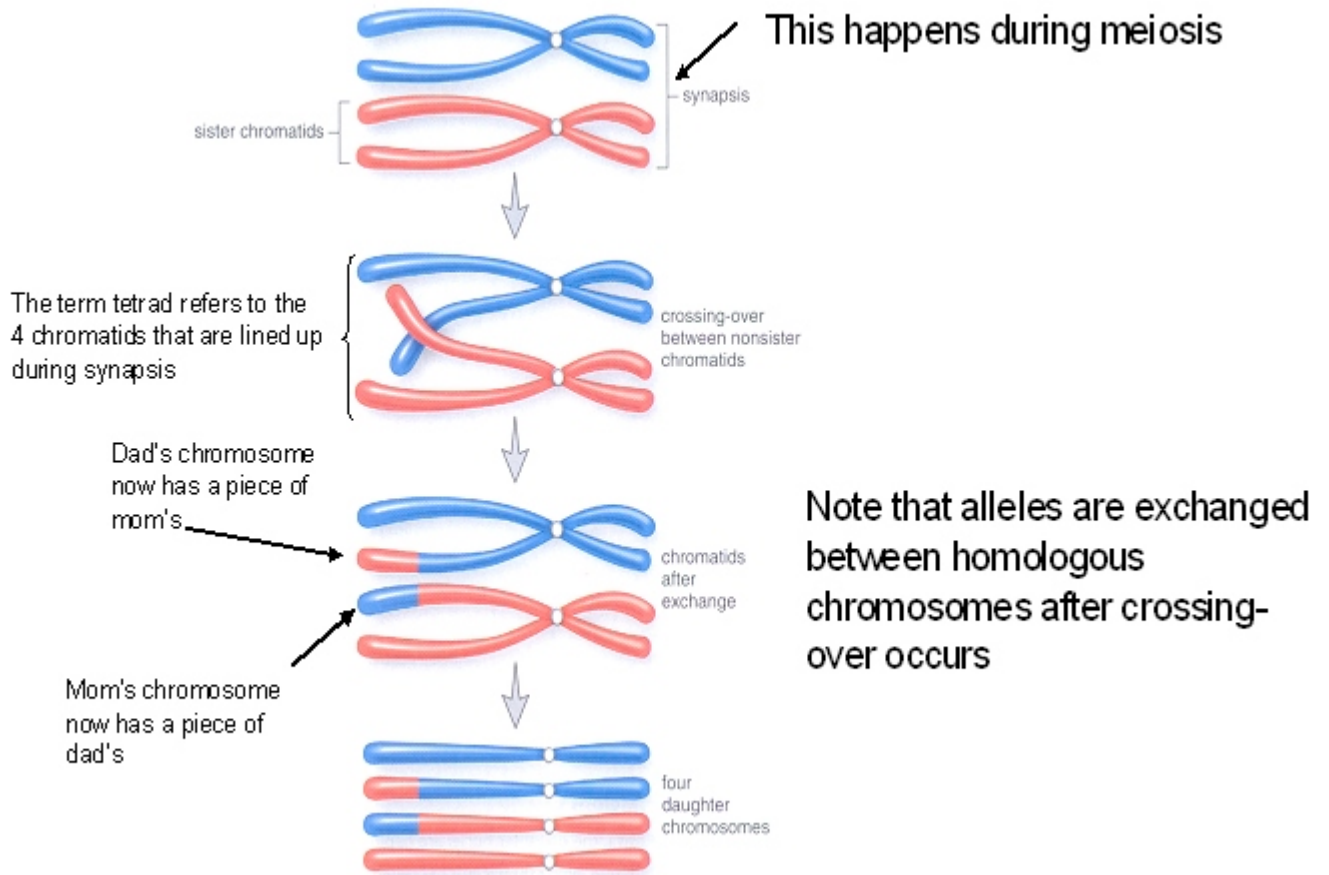
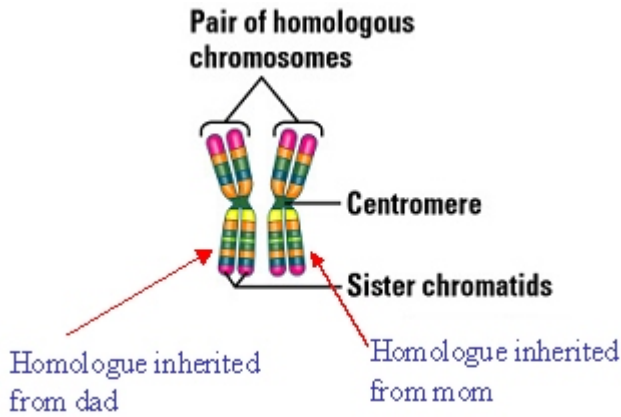
How many chromosomes are in this cell? _____



How many chromosomes are in this cell? _____

There are four chromosomes in the diagram on the left (count centromeres): Metaphase - Mitosis
 There are 8 chromosomes in the diagram on the right (count centromeres): Anaphase - Mitosis

4. Label the diagrams below:



5. What is the functional significance of the cell cycle (mitosis)?
- It enables growth and repair of tissues.
 - It is how organisms that reproduce asexually increase their numbers (*Amoeba* reproduces by simple cell division).

6. What is the functional significance of meiosis?

It creates haploid gametes from a diploid cell so the chromosome number remains constant in a species from one generation to the next.

It is a source of genetic variation for organisms that sexually reproduce.

Mitosis creates cells that are identical to the original cell. Thus it enables growth, maintenance, and repair of tissues. New skin cells are made via mitosis. Blood cells are created by mitosis. Hair and nails grow due to mitosis.

The function of meiosis is to produce haploid gametes from a diploid cell. Meiosis is a source of genetic variation due to crossing over when homologous chromosomes exchange parts.

7. What are two ways that meiosis contributes to genetic variation?

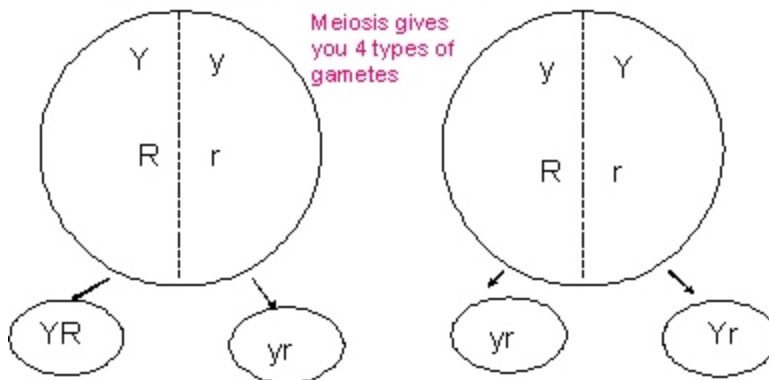
It shuffles alleles when crossing over occurs.

Genetic recombination: During metaphase I of meiosis, homologous chromosomes line up at the cell equator. It is random which homologue ends up on which side of the equator. Thus meiosis produces all the possible combinations of the haploid number of chromosomes.

$YyRr = \text{Foil}$ gives you 4 different gametes



Meiosis – it is random which homologue ends up on which side of the cell equator.

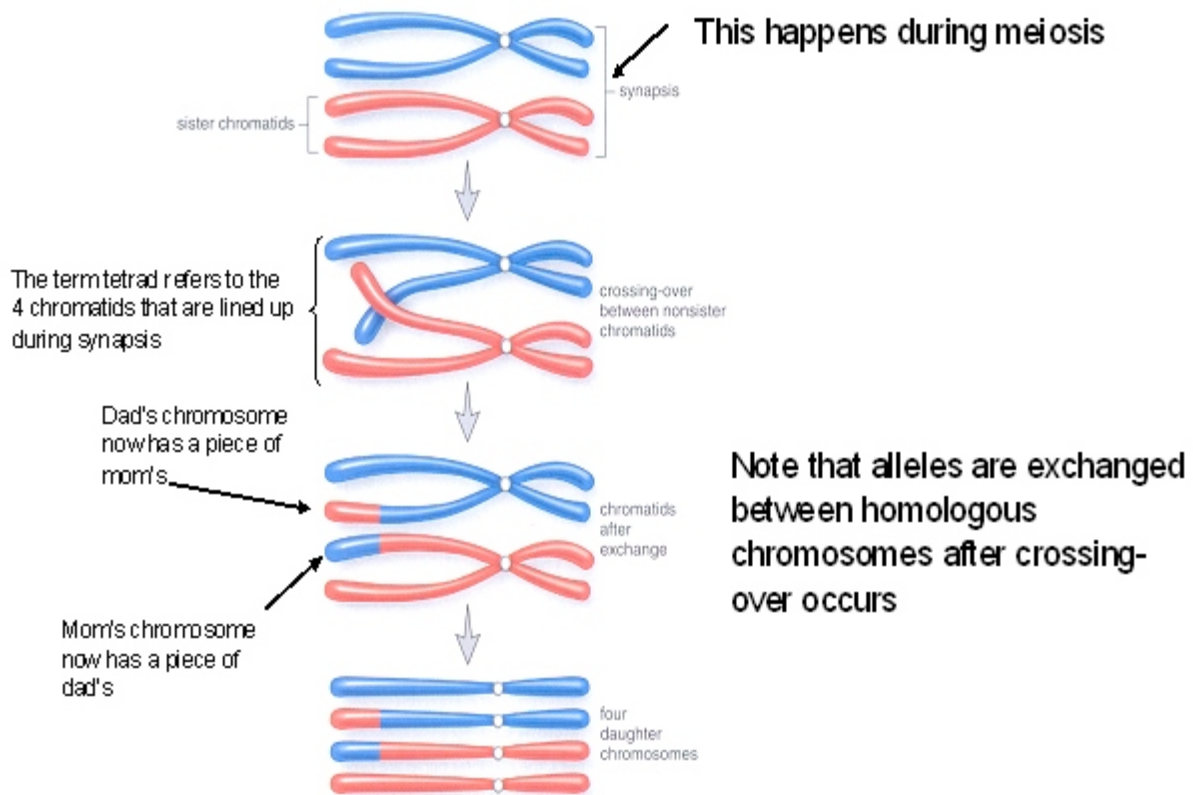


8. What is the functional significance of crossing over? (This happens in prophase of meiosis. Look this up in your text.)

Homologous chromosomes - You get one homologue from you fathers sperm cell and one homologue from you mothers egg cell. When a tetrad forms (homologous chromosomes line up) they exchange parts. Thus the chromosome inherited from dad gets some of mom's alleles. The chromosome inherited from mom gets some of dads alleles. Thus genes are shuffled. This is a source of genetic variation.

Synapsis is where homologous

Chromosomes line up in meiosis. This forms a tetrad. The term tetrad refers to the 4 chromatids of the lined up chromosomes.



9. Discuss two ways in which meiosis differs from mitosis.

Meiosis produces haploid gametes from a diploid cell. Meiosis is a source of genetic variation.

Mitosis produces identical cells. Mitosis is for growth, tissue repair, and asexual reproduction.

10. Define:

a. Somatic Cell

b. Gamete

c. Haploid

d. Diploid

e. Fertilization

f. Zygote

g. Mitosis

h. Cytokinesis

11. What is asexual reproduction?

Asexual reproduction is usually reproduction via cell division. Thus one cell becomes two identical cells. Amoebas can reproduce asexually - thus every member of the population is capable of reproducing (not just females!). It allows for very rapid population growth. However, it is associated with low genetic variability.

12. What are the advantages of sexual reproduction?

It is a source of genetic variation in a population. The more genetic variation a population has the lower its risk of extinction. Genetic variation gives a population resistance to disease and resistance to environmental changes.

13. Define the following terms:

a. Phenotype

b. Genotype

c. Heterozygous

d. Codominance

13. Define the following terms:

- a. **Homologous chromosomes:** Chromosomes that are similar in shape, size, and genetic material. One homologue is inherited from mom. One from dad. Homologous chromosomes are separated in meiosis when gametes form.
- b. **Phenotype:** Physical appearance. What you see. Yellow seed pea plants. Type A blood type.
- c. **Genotype:** Specific combination of alleles. Homozygous dominant, heterozygous, homozygous recessive.
- d. **Heterozygous:** Has a dominant and a recessive allele for a specific trait.
- e. **Codominance:** The genotype when an individual inherits two dominant alleles for a trait, both of which are expressed. Example ABO blood types.

14. A person with AB blood is crossed with a person with blood type O.

a. What are the genotypes and phenotypes of the parents and possible children?

Step 1 (Show cross):

AB X ii

Step 2 (Gametes):



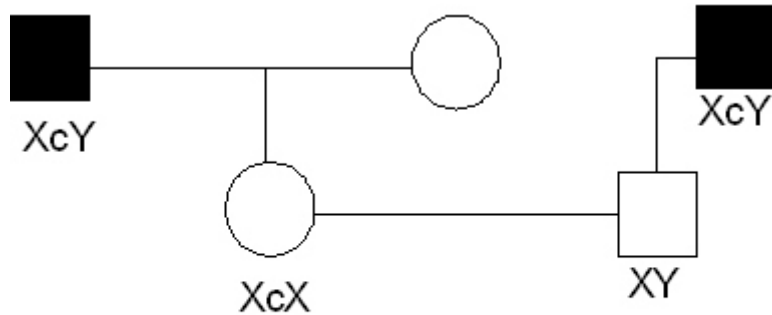
Step 3 (Punnet Square):

	A	B	
i	Ai	Bi	Genotypes ½ Type A ½ Type B
i	Ai	Bi	

- b. Which blood type exemplifies codominance? **Type AB**
- c. What is the recessive blood type? **Type O**
- d. Is this an example of multiple alleles? Explain.

Yes. There are three possible alleles to inherit in the ABO blood system. They are the A allele, the B allele, and the *i* allele. Although only two alleles determine the blood type, the pool of possible alleles to inherit is greater than two.

15. A woman of normal vision whose father was color-blind marries a man of normal vision whose father was also color blind. What types of vision will be expected among their offspring?



$X^cX \times XY$

Step 1: Show Cross: $X^cX \times XY$

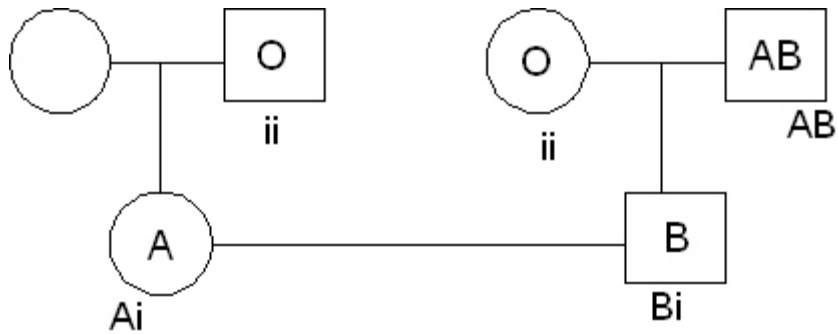
Step 2: Show Gametes



Step 3: Punnett Square

	X	Y
X^c	X^cX Carrier – Normal Vision	X^cY Color Blind
X	XX Normal	XY Normal

16. A woman with type A blood whose father had type O blood marries a man with type B blood whose father was AB and whose mother was type O. What are the genotypes of this man and woman? Would it be possible for this couple to have a type O child? Explain.



Step 1: Show Cross: $Ai \times Bi$

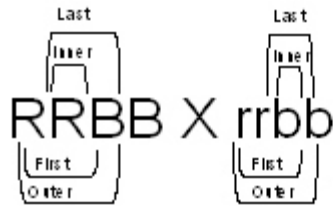
Step 2: Show Gametes



Step 3: Punnett Square

	A	i
B	AB Type AB Codominant	Bi Type B Heterozygous B
i	Ai Type A Heterozygous A	ii Type O Homozygous recessive

17. Rough coat (R) is dominant over smooth coat (r) in guinea pigs, and black coat (B) is dominant over white (b). The F₁ from a mating of homozygous individuals for rough black and smooth white is mated with a smooth white guinea pig. What is the phenotypic ratio of their offspring?

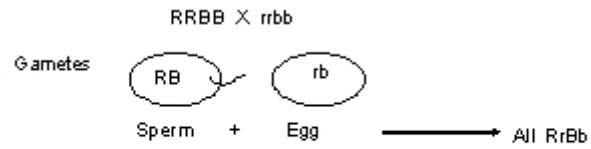


First: RB
Outer: RB
Inner: RB
Last: RB
One type of gamete

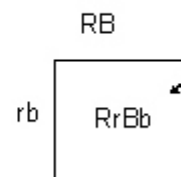


First: rb
Outer: rb
Inner: rb
Last: rb
One type of gamete

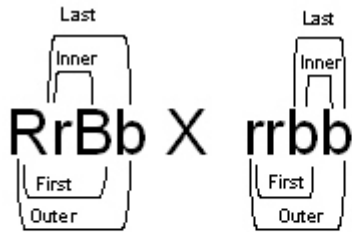
You will only need a 1 X 1 table for this cross



The one by one Punnett Square



The F₁ generation is heterozygous for both traits

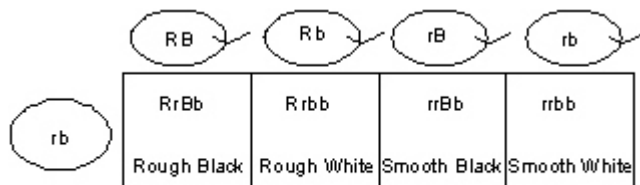


First: RB
Outer: Rb
Inner: rB
Last: rb
Four types of gametes



First: rb
Outer: rb
Inner: rb
Last: rb
One type of gamete

You will only need a 4 X 1 table for this cross



Phenotypic Ratio is 1:1:1:1

18. What is the Cretaceous - Tertiary Boundary? What event happened at this boundary? How long ago did this event happen?

19. The age of mammals is the _____.

20. The age of reptiles is the _____.

21. The age of fishes and amphibians is the _____.

22. How did the following people, places, or things influence Darwins' thinking?

a. Charles Lyell:

Principles of Geology

He presented the concept of geological time - That gave Darwin the time frame he needed for organisms to gradually change over time and speciation to occur

b. Lamark:

Hypothesized that evolution occurs and that adaptation to the environment is the cause of species diversity. However, his explanation of how evolution occurs is not valid. His mechanism was "inheritance of acquired characteristics". His examination of fossils led him to believe that evolution occurs.

c. Animal breeders:

Pigeons- Variation exists in populations. Variation is inherited.

d. Galapagos finches:

e. Alfred Wallace:

He came up with the exact same mechanism for evolution to occur - That is - natural selection. His paper describing how evolution occurs forced Darwin to his book. *Origin of Species*

f. Thomas Malthus

23. List and explain 4 different lines of evidence in support of evolution. (See your text)
1. The fossil record - Example transitional forms like *Archaeopteryx*. See your take home quiz.
 2. Biogeographical evidence. - Endemic finches on the Galapagos Islands. Marsupials in Australia - See your take home quiz.
 3. Anatomical evidence: Vestigial structures and homologous structures
 4. Biochemical evidence: DNA makes RNA makes Protein works pretty much the same in all organisms. ATP is the universal energy molecule.
24. What are four ways that changes in gene frequencies can occur?
- See the web section of your take-home quiz.
25. What is **genetic drift**?
26. What is the **Bottleneck Effect**? What are three animal populations that have experienced population bottlenecks?
27. What is the **Founder Effect**? (See your text)
28. Explain the events that led to allopatric speciation of:
- a. Flightless birds: The separation of continents
 - b. Squirrels at the Grand Canyon: The creation of the Grand Canyon
 - c. Pupfish: Climate change - the drying of Pleistocene lakes and creation of Deserts which isolated different populations of pupfish.
29. Define the term **Adaptive Radiation**.

30. How does natural selection result in changes in gene frequencies in a population?

Natural Selection - You should be able to summarize the main points of evolution by natural selection.

1. The members of a population have variation which can be passed down to their offspring (Pigeon Breeders)
2. Populations produce more offspring that the resources of the environment can support. (Malthus)
3. The individuals that are better adapted to the environment have a higher probability of survival reproducing. They pass their adaptive traits to their offspring.
4. Given time, and many generations, a larger proportion of the population becomes adapted to the environment (Thus the allele frequencies in the population have changed!).

31. Define the term *Homology*.

32. Define the following terms:

- A. Biological species:
- B. Allopatric speciation:
- C. Polyploidy:
- D. Sympatric speciation
- E. Carrying capacity

33. Define the following terms:
- A. Abiotic
 - B. Biotic
 - C. Producer
 - D. Primary Consumer
34. Define **and give an example** of the following:
- A. Ecological island
 - B. Extirpation
 - C. Inbreeding
 - D. Endemic species
 - E. MVP
35. Thomas Lovejoy worked in Brazil on the project called *The Minimum Critical Size of Ecosystems Project*. What were the results of his study?
36. List at least two reasons that mountain lions in the Santa Ana Mountains are at risk of extinction.

37. What are some of the problems associated with inbreeding?
38. Draw a **Species - Area Curve**. Label the X and Y axis. Discuss some of the reasons why large islands have more species.



39. What is **Biological Magnification**? Name a chemical that has been biologically magnified and an animal it has affected.
40. What are some of the problems associated with inbreeding?

41. Name two animals that have specialized feeding habits. What do they eat?

Animal	Diet
_____	_____
_____	_____

42. Name two animals that have specific habitat requirements. What type of habitat do they require?

Animal	Habitat
_____	_____
_____	_____

43. What is a **Keystone Species**? Give two examples of keystone species

Definition: _____

Examples: _____

44. Define
- A. Epiphyte
 - B. Mycorrhizal Fungi
 - C. Lichen
 - D. Cavity Nester
 - E. Snag
45. List three bird species found in old growth forests.
46. List three mammal species found in old growth forests.
47. Describe at least 8 characteristics of old growth forests.
- A. E.
 - B. F.
 - C. G.
 - D. H.
48. Why are downed logs important to old growth forests?

49. What is meant by “slash and burn agriculture”. Why did it work in the past, yet it is a major cause of tropical deforestation today?

50. List at least 5 consequences of deforestation

A.

B.

C.

D.

E.

51. List 5 characteristics of Tropical Rainforests

Go through my online lecture and think about how tropical forests differ from the hills, mountains, and deserts near Mount Sac.

A.

B.

C.

D.

E.

52. Clear-cutting is associated with forest fragmentation. What is *clear-cutting*? What are some of the problems associated with forest fragmentation?

Think about ecological islands