

Genetics:

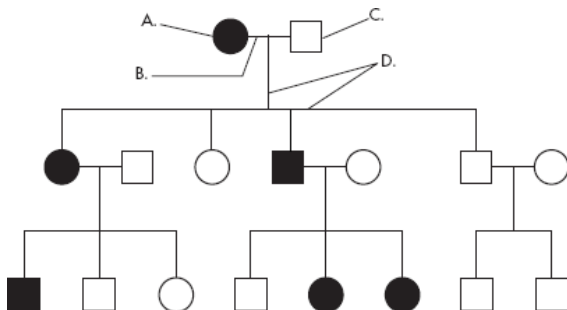
1. Define the following words and give an example: Gene, Allele, Homozygous, Heterozygous, Genotype, Phenotype, Hybrid, Purebred, Dominant, Recessive
11. Using F's, what is the genotype for a person that is:
 - a. Homozygous dominant:
 - b. Heterozygous:
 - c. Homozygous recessive:
12. Blood type is controlled by what 2 types of dominance?
13. What do we call traits carried on the X chromosome (#23 in humans)?
 - a. What is the normal genotype of a female?
 - b. What is the normal genotype of a male?
 - c. Can men be carriers of sex-linked disorders and why?

Define and solve a sample problem for each type of Inheritance that we learned about in the Genetics Unit:

(Solving a problem includes: showing the Punnett Square, genotype ratio, and phenotype ratio of offspring)

14. Regular Dominance: Tall plants are dominant over short plants. What are the genotype and phenotype ratio for 2 plants that are both heterozygous tall?
15. Dihybrid Crosses: These crosses are for 2 traits that follow a regular dominance pattern. For Guinea pigs, long hair is dominant to short hair and brown fur is dominant over white fur. What are the genotype and phenotype ratios if you mate a guinea pig with long, white fur with another guinea pig who has short, brown fur?
16. Incomplete Dominance: Brown horses are incompletely dominant over white horses. The heterozygous horses are tan (aka palomino). What are the genotype and phenotype ratios when you breed a white horse with a tan horse?
17. Codominance: Black feathers in chickens is codominant to white feathers, hybrid chickens are called Speckled because they have black feathers with white spots. What is the genotype and phenotype ratios for a black chicken and a speckled chicken?
18. Multiple Alleles: Blood Types A and B are codominant and Type O is recessive. What is the genotype and phenotype ratios if a person who is heterozygous for Type A and a person who is heterozygous for Type B were to have children?
19. Sex-Linked: Hemophilia is a sex-linked recessive trait. To be normal is dominant. What is the genotype and phenotype ratio for a female carrier with a male who has hemophilia?
20. What are polygenic traits? Give 2 examples of polygenic traits.
21. Answer the following the following questions for the pedigree below:

For Questions a-d, use the pedigree chart shown below. Some of the labels may be used more than once.



Refer to letters A-D for the answers:

- a. Which person is a female
 - a. D
 - b. C
 - c. B
 - d. A
- b. A person who does not express the trait
 - a. B
 - b. D
 - c. A
 - d. C
- c. A marriage
 - a. A
 - b. B
 - c. C
 - d. D

Assuming the chart above is tracing the autosomal dominant trait of "White Forelock (F)" through the family. F is a tuft of white hair on the forehead.

- d. What is the most likely genotype of individual "C"? (FF, Ff or ff?)
 - a. FF
 - b. Ff
 - c. ff

DNA and Protein Synthesis:

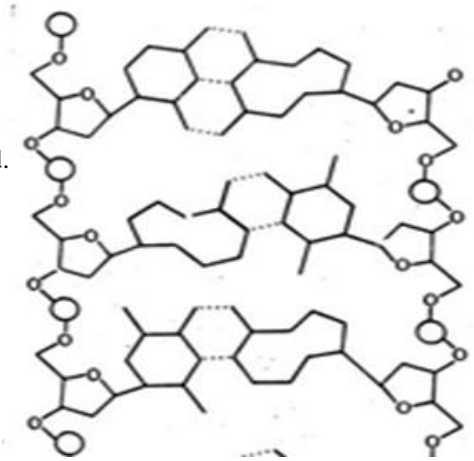
22. Define DNA & explain its function
23. Explain the Semi-conservative model: (new DNA that gets made has what kinds of strands?)
24. What is a Triplet or Codon?
25. Define mRNA and explain its function

26. Define tRNA and explain its function
27. Define rRNA and explain its function
28. What is a Mutation?
29. What are 2 kinds of mutations? Draw out a picture of a sequence and explain what happened.
30. Draw and Label the 3 parts of a nucleotide

b. Label the following picture

Be sure to Include:

- Sugar Phosphate Covalent bonds Hydrogen bonds
 A G T C



31. What are the 4 differences between DNA & RNA? (sugar, location, strands, bases used)
32. Why do we need DNA Replication?
33. Why do we need Protein Synthesis?
34. The Central Dogma states that information flows from: _____ to _____ to _____
35. a. Define Replication and explain where it takes place

b. Practice: DNA: ATGCCTGATCGAGGT

REPLICATED: _____

36. Define transcription: Process where DNA is transcribed into _____

b. where does transcription take place?

c. Using the replicated DNA from above, write the mRNA: _____

37. Define Translation & explain where it takes place

b. Practice: Amino Acids: _____

38. How many amino acids are there? Explain how can they make many different proteins?

39. Genes contain instructions for assembling _____.

	U	C	A	G	
U	Phe	Ser	Tyr	Cys	U
	Phe	Ser	Tyr	Cys	C
	Leu	Ser	stop	stop	A
	Leu	Ser	stop	Trp	G
C	Leu	Pro	His	Arg	U
	Leu	Pro	His	Arg	C
	Leu	Pro	Gln	Arg	A
	Leu	Pro	Gln	Arg	G
A	Ile	Thr	Asn	Ser	U
	Ile	Thr	Asn	Ser	C
	Ile	Thr	Lys	Arg	A
	Met	Thr	Lys	Arg	G
G	Val	Ala	Asp	Gly	U
	Val	Ala	Asp	Gly	C
	Val	Ala	Glu	Gly	A
	Val	Ala	Glu	Gly	G

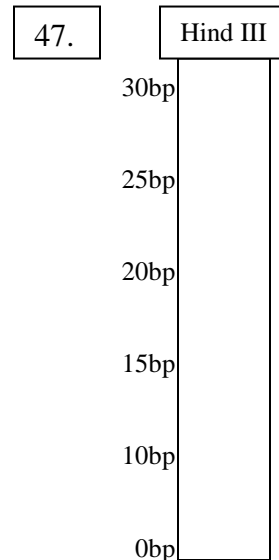
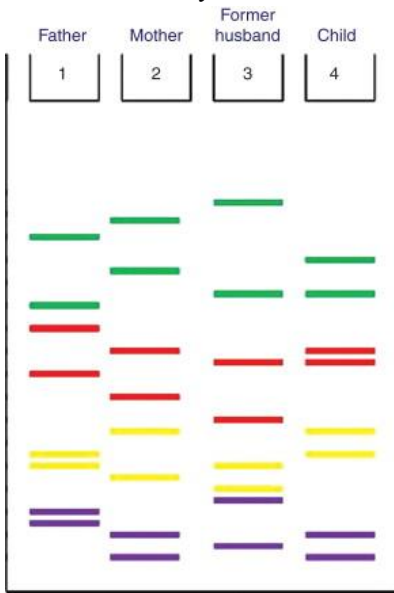
Biotechnology:

40-44: Create a few sentences explaining Recombinant DNA using the following words: (underline or highlight them): Restriction Enzyme, Plasmid, Ligase, Bacteria, & Gene of Interest

45. What is a DNA Fingerprint and what are 2 uses for them?

a. Describe how the fingerprint would be analyzed: (which one needs an exact match and which one do you look for half and half matches)

b. Who's the Daddy?



Directions: Cut the following strands of DNA using the following restriction enzyme and then answer the questions.

46. Hind III 5'...A|AGCTT...3'
 3'...TTCGA|A...5'

- a) # of cuts: _____
- b) # of fragments made by cuts: _____
- c) Lengths of segments: _____

GCTAAGCTTCGGAGAGTTGAAGTAAGCTTT
 CGATTCGAAGCCTCTCAA CTTCATTCGAAA

47. Now create your DNA fingerprint in the box above for the restriction enzyme used above. Draw horizontal lines to represent each fragment's length in base pairs (bp) for each enzyme (as if you are graphing the lengths).

48. There are several different ethical issues with biotechnology. Pick 2 from the list, explain what the issue is and give 2 pros and 2 cons and give your opinion.

Designer babies, organ farming, germ warfare, human cloning, stem cell research, GMO food, genetically modified animals and plants, gene ownership, animal testing, and prosthetics.

Physiology:

49. Explain how stem cells differentiate

50. What is homeostasis?

b. Explain 3 things that your body keeps in balance

51. Give an example of a negative feedback:

52. Give an example of positive feedback:

53-63. What are the 11 body systems and their main functions & how do they help maintain homeostasis?

System	Function	How it Maintains Homeostasis

64. Explain how 2 or more systems interact/work together to maintain homeostasis.

(For example, if you break your arm, the ___ system will ...)

65. Scientific Method: **Define** & be able to identify the independent variable, dependent variable, and control (controlled variable) in an experiment.