Name: _____ Period: _____

Genetics Study Guide

Key vocabulary terms:

DNA	Gene	Genetic Probability
RNA (mRNA, tRNA)	Genotype	Pedigree
Codon	Phenotype	Sex-linked trait (or X-linked)
Amino acid	Chromosome	Trisomy / Monosomy
Protein	Recessive	Karyotype
Transcription	Dominant	Autosomes
Translation	Homozygous	Sex Chromosomes
Nucleus	Heterozygous	Selective breeding
Ribosome	Allele	GMOs
Mutation	Punnett Square	Clone

DNA and RNA Structure

What is the shape of a DNA? What are the shapes of mRNA and tRNA?

RNA:

a. What is the sugar? _____
b. Where do you find RNA in a cell? _____
c. Is RNA single-stranded or double stranded? _____
d. What are the 4 bases used in RNA? _____

DNA:

e. What is the sugar? _____
f. Where do you find DNA in a cell? _____
g. Is DNA single-stranded or double stranded? _____
h. What are the 4 bases used in DNA? _____

Protein Synthesis: DNA→RNA→ protein

Explain Protein synthesis (Describe the basic steps of transcription and translation)

Transcription: Part One

What molecules are involved?
Where in a cell does this occur?
What are the resulting molecules called?

Translation: Part Two

What molecules are involved?
Where in a cell does this occur?
What is the resulting molecule called?

Place a checkmark in the box if the statement applies to that kind of RNA.

	mRNA	tRNA
Made in the nucleus		
Used in protein production		
Carries amino acids		
Nucleic Acid (RNA)		
Has codons		
Has anticodons		
Made of nucleotides		

If any of these lines of code are known, the others can be determined:

DNA	TAC	ATG	CTA	GGT	ATC	GCT	CAC	GGT
mRNA								
tRNA								
protein								

DNA								
mRNA	UAC	AUG	CUA	GGU	AUC	GCU	CAC	GGU
tRNA								
protein								

Mutations

Explain the differences between the 2 types of mutations
Chromosomal

Point (or gene)

Below is a string of nucleotides. With the string of nucleotides, you are going to create mutations to show how the sequence of DNA would be altered.
Nucleotide sequence: A G G C G T C C A T G A

Make 3 point mutations-insertion, deletion, substitution

Insertion:

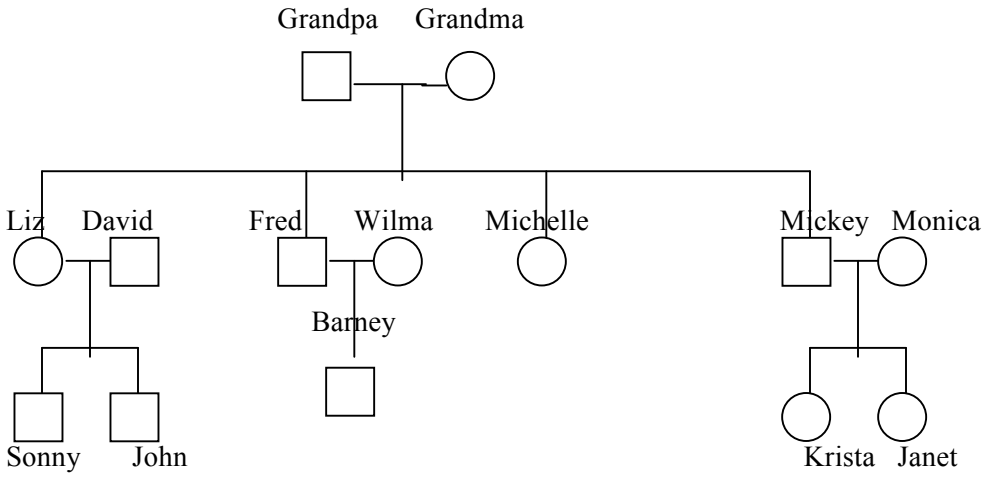
Deletion:

Substitution:

Pedigrees
Create a pedigree showing the following members of a family for the Sickle Cell Disease (recessive disease, NOT sex-linked)

Mother – carrier (heterozygous) for Sickle Cell Disease
Father – carrier (heterozygous) for Sickle Cell Disease
Son – affected by Sickle Cell Disease
Son – carrier for Sickle Cell Disease
Son – affected by Sickle Cell Disease
Daughter – no Sickle Cell Disease

Color in the pedigree below using the following information:
Colorblindness is a recessive, sex-linked disorder.
Grandma and Grandpa are NOT colorblind.
Mickey is colorblind; all of their other children have normal color vision.
Sonny and John both inherited colorblindness, as did their cousins Barney and Janet.



What are the **genotypes** of Barney, Krista, and Janet?

Barney' genotype:_____ Krista's genotype: _____
Janet's genotype: _____

Sex-linked genes
What are the sex chromosomes in a human female? _____ male? _____

In humans, the gene for muscular dystrophy is **sex-linked** (X-linked) and recessive. Cross a normal muscle toned heterozygous female with an affected male.

Parents: _____ x _____

a. What are all of the possible genotypes of the offspring?

_____

b. What are the possible phenotypes of the offspring?

_____

c. What is the probability they will have a colorblind son? _____% chance

d. What is the probability they will have a colorblind daughter? _____% chance

	X^B	Y
X^B	X^BX^B	X^BY
X^b	X^BX^b	X^bY

Refer to the Punnett square above. Color-blindness is an X-linked recessive trait.

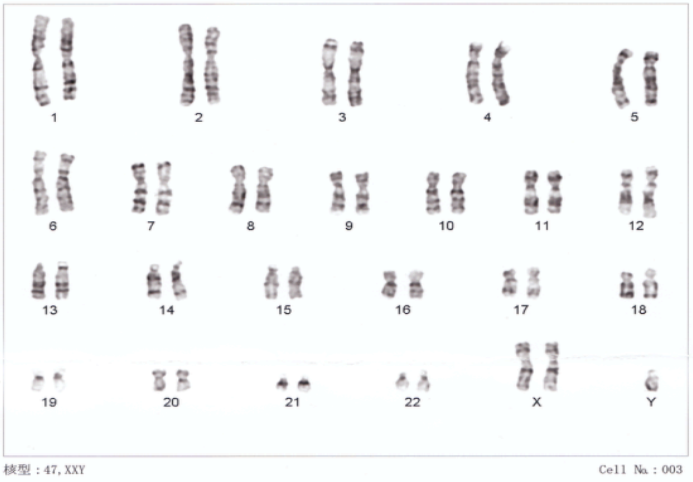
Does the father have color blindness?

Does the father have a recessive allele?

State whether the only child that could have color blindness is male or female.

Karyotypes

Using the karyotype to the below to answer the following questions:



Is this a normal karyotype?

If you answer was no, circle the abnormality in the karyotype.

If there are extra chromosomes in this karyotype, what effect would this have on an individual?

What is the gender of this individual?

For a normal karyotype, how many chromosomes would you see?