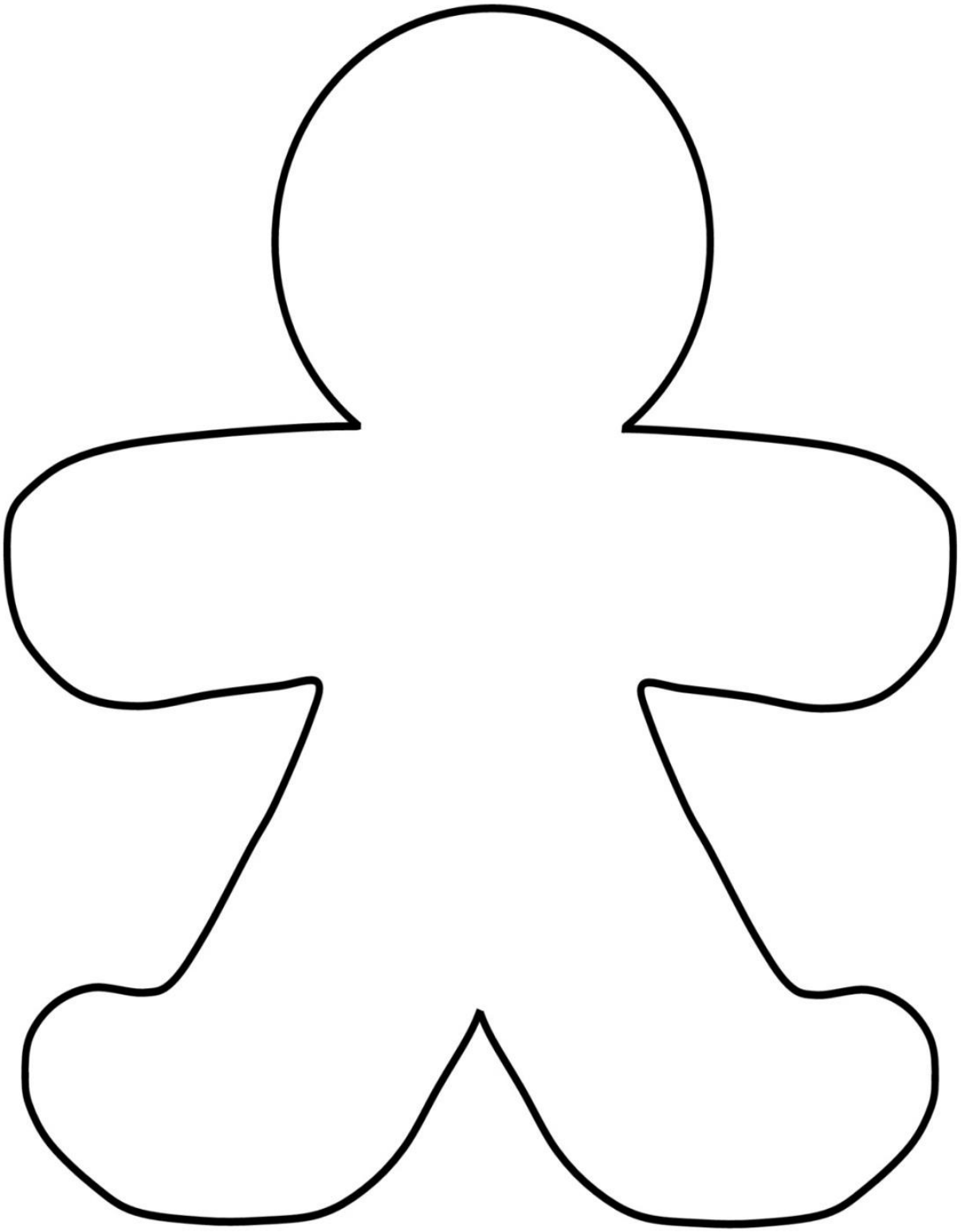

Name: Period:

Gingerbread Man Mutations

Introduction: Mutation is a change in DNA, the hereditary material of life. An organism's DNA affects how it looks, how it behaves, and its physiology—all aspects of its life. So a change in an organism's DNA can cause changes in all aspects of its life.

Mutations are random. Mutations can be beneficial, neutral, or harmful for the organism, but mutations do not "try" to supply what the organism "needs." In this respect, mutations are random—whether a particular mutation happens or not is unrelated to how useful that mutation would be.

Not all mutations are shown. Since all cells in our body contain DNA, there are lots of places for mutations to occur; however, not all mutations are passed on**.** Somatic mutations occur in non-reproductive cells and won't be passed onto offspring.

There are two main types of gene mutations:

- **Substitution**: Occurs when one base is exchanged for another
  - Ex) THE CAT ATE THE RAT = THE HAT ATE THE RAT
- **Frame shift Mutation**: An insertion or deletion that results in the amino acid chain changing.
  - *Insertion*: Occurs when a base pair is inserted
    - Ex) THE CAT ATE THE RAT = THE CAT EAT ETH ERA T
  - *Deletion*: Occurs when a base pair is deleted
    - Ex) THE CAT ATE THE RAT = THE CTA TET HER AT

Gene mutations can have three different results.

1. The mutation can make no change. The new codon codes for the same amino acid as the original one.
2. A missense. In this case the new amino acid sequence does not work therefore the gene cannot be made.
3. A new allele. In rare cases the new amino acid sequence will code for a new allele.

Procedure:

1. Transcribe and translate the following 10 genes.
2. Follow the instructions of the amino acid sequence.
3. Lastly, compare your gingerbread man to the original. Decide what if any mutations your gingerbread man has.
4. Answer the follow up questions.

#1

1.	
DNA	TAC AAA GAG ATC
RNA	
Amino Acid	

2.	
DNA	TAC TAG TGC ATT
RNA	
Amino Acid	

3.	
DNA	TAC AGA ATG ATT
RNA	
Amino Acid	

4.	
DNA	TAC AAG GGC ATC
RNA	
Amino Acid	

5.	
DNA	TAC CAA GGG ATT
RNA	
Amino Acid	

6.	
DNA	TAC GTA CCC ATC
RNA	
Amino Acid	

7.	
DNA	TAC TTG GAA ATT
RNA	
Amino Acid	

8.	
DNA	TAC TTT CTG ATC
RNA	
Amino Acid	

9.	
DNA	TAC CGT CTC ATT
RNA	
Amino Acid	

10.	
DNA	TAC GCT TCA ATT
RNA	
Amino Acid	

Assessment Questions:

1. Why did you have to change your DNA strand into RNA?

2. What is the term for the sets of three base pairs found on the mRNA?

3. How many mutations were in your gingerbread man?

4. How do you know these are mutations?

5. Are these mutations chromosomal or gene mutations?

6. Which type of mutation affects the most genes, chromosomal or gene?

7. What decides when a mutation will happen?

8. What does an organisms' DNA do?

9. Why are mutations that occur in somatic cells not passed on?

10. What are the two main types of mutations according to this activity?