

**Translation:** “*Decoding*” :

- Change **Nucleotide language** into :

- **mRNA DECODER** =

Ribosome use “**DECODER KEY**”:

★ *Reads in* :

★ **3 Nucleotides** =

UUU = Phenylalanine

GUU = Valine

AAA = Lysine

- **CODON** : Sequence of *3 nucleotides*

- Ribosomes *Decode* mRNA :

⇒ **Match** :

ie : **mRNA sequence** :                    **UGG / UUU / GGC**

**Amino Acid Sequence** :                    /                    /

⇒ *Translate* mRNA into :

★ Ribosomes begin at :

⇒ **START CODON** =

⇒ AUG “codes” for Amino Acid :

⇒ **1<sup>st</sup> Amino Acid in ALL proteins** is :

- Ribosomes translate **entire GENE** :

- **Translation stops** : When a :

★ **3 STOP CODONS** : UAA, UAG, UGA

*How do ribosomes acquire Amino Acids ?*

**Transfer RNA : (tRNA)** :

- Ribosome “*workers*”

- Function :

a. Carry **AMINO ACIDS** to :

b. Correctly match **mRNA Codon** :

• **tRNA** : 2 *specialized regions* :

1. **ANTICODON** : **Binds** with :

2.

**Example :**

mRNA :

⇒ **Codon** :

tRNA : *Carries methionine* & binds w/ mRNA

⇒ **Anticodon** =

✓ Codon + Anticodon =

⇒ “Delivers” Package =

**mRNA Codon** : CCU

**tRNA carries** :

**tRNA Anticodon** :

**Process of Translation** :

**3 STEPS :**

1. **Initiation** : Begin with mRNA condon :

⇒ **tRNA** brings in :

✓

2. **Elongation**: Progressive addition of :

⇒ Repeated

✓

✓ **tRNA** bring in new :

⇒ Link adjacent :

✓ Building a :

Process cycles repeatedly : **UNTIL**

3. **Termination** : *Release* of NEW :

⇒ **STOP CODON** is :

✓ **UAA, UAG, UGA**

• **Ribosome** “*falls*” off :

• **NEW** :

## **MEIOSIS : Reductive Cellular Division**

- Cell division resulting in :

★ **4 haploid cells** :

**Gametes** :

- ★ Contain :

⇒ Diploid Human Cell :

⇒ Haploid Human Cell :

• **Fertilization**: Union of :

• *One chromosome* from each :

## **Meiosis : Basis of Sexual Reproduction**

★ *2 Part Division*

> Meiosis I & Meiosis II

### 1. **MEIOSIS I** :

**Goal : Separate** :

*Starting Cell* :            **4** :

**2** :

**1<sup>st</sup> Division Result** :

•

*Resulting Cells* :        **2** :

**0** :

### 2. **MEIOSIS II** :

**Goal : Separate** :

• **2**

★ **Separate Replicated Chromosomes** at :

*2 Starting Cells* :

**2<sup>nd</sup> Division Result** :

**4 Resulting cells** :

Human Sex Cells :

Result : **4 Haploid Cells** :

## **Errors in Meiosis** :

*Abnormal Meiosis* :

1. **Homologous chromosomes DO NOT** :

2. **Sister Chromatids DO NOT** :

⇒ Sex cells contain either :

### ⇒ **NON-DISJUNCTION**

★ Most common human non-disjunction :  
(*Down Syndrome*)

Cells have **3** of the :

- 1/700 births
  - Mental Retardation
  - Abnormal facial development
  - Heart Defects
  - Increased aging process

⇒ Sex Chromosomes Trisomy:

a. **Klinefelter Syndrome:**

✓ 1 out of 1,000 live male births

b. **Turner Syndrome:**

✓ One of every 2500 newborn girls

### **Errors in Mitosis :**

• Cellular division is :

★ Cell Cycle Regulation :

• Unregulated Cell division :

*Cancer cells are your own body cells dividing in :*

⇒ **Benign Tumor** : Unregulated Cells grow in a :

⇒ **Malignant Cancer** : Cancerous Cells *move* to :

★ Problem : *Cancerous Cells interfere w :*

### Study Questions:

1. What is a gene? What is the ribosome and what is its function?
2. Define is translation? (What “languages” are we using in this translation?)
3. What is the function of tRNA? Where do the tRNA reside within the cell?
4. What is the difference between codons & anticodons? Which is composed of mRNA and which is tRNA?
5. How does the ribosome know where on the mRNA to start decoding?
6. What is the sequence for the start codon? What is the corresponding mRNA, tRNA, and anticodon?
7. What are the 3 overall steps of translation?
6. If the original strand of DNA had the sequence : TACATCGCA a. What is the corresponding mRNA,  
b. what is the resulting amino acid sequence? c. What are the anticodons which will complementarily bond with the mRNA? What bond links amino acids together? What eventually stops translation?
7. How is translation signaled to stop?
8. What is the overall goal of translation?
9. What is RNAi? What does RNAi do in your own cells – what is its function? How can RNAi be used to treat disease?
10. What is the functional significance of Meiosis? Where does meiosis occur in your body
11. What is the main difference between Meiosis & Mitosis ?

12. What is the difference between a diploid cell and a haploid cell? How many chromosomes does a human diploid cell have? How many chromosomes does a human haploid cell have?
13. What is the overall goal for meiosis I? If a cell had 4 chromosomes at the beginning of Meiosis I; How many homologous chromosomes does the cell have? How many *pairs* of homologous chromosomes does this cell have? At the END of Meiosis I, how many chromosomes will the daughter cells have? How many pairs of homologous chromosomes will they have?
14. What is the overall goal of Meiosis II? If a cell had a total of 4 chromosomes at the beginning of Meiosis I how many chromosomes will the resulting 4 daughter cells have? Will there be any homologous pairs remaining? What do you call the cell resulting from the second meiotic division?
15. What is non-disjunction? What is the most common non-disjunction related birth defect in the US? Can non-disjunction occur with the sex chromosomes?
16. In general, what is cancer? Describe what cellular processes are not functioning correctly in a cancerous cell.
17. In general what is the difference between malignant and benign cancer?