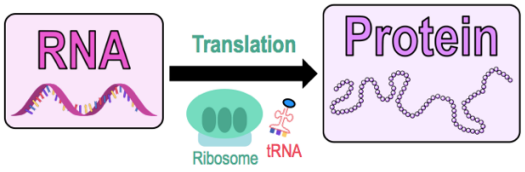
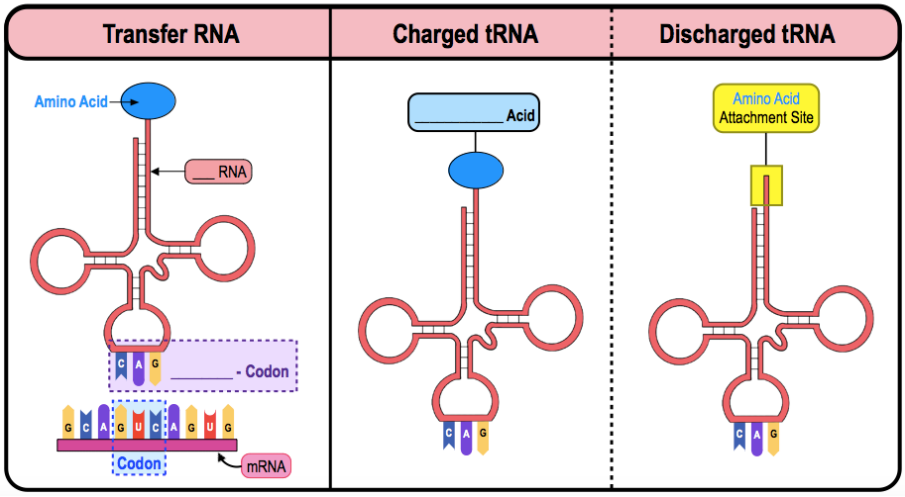
CONCEPT: INTRODUCTION TO TRANSLATION

- *Recall:* **Translation**: process that builds _____ using the encoded messages of mRNA.
  - □ **Ribosomes**: complex structure that builds _____ & performs _____.
  - □ **Transfer RNA** (**tRNA**): RNA structure that carries/transfers _____ *acids* to ribosomes.
    - □ tRNA contains _____-codons that pair with mRNA codons during translation.
    - □ *Charged* tRNA is attached to an amino acid; *Discharged* tRNA is _____ attached to an amino acid.

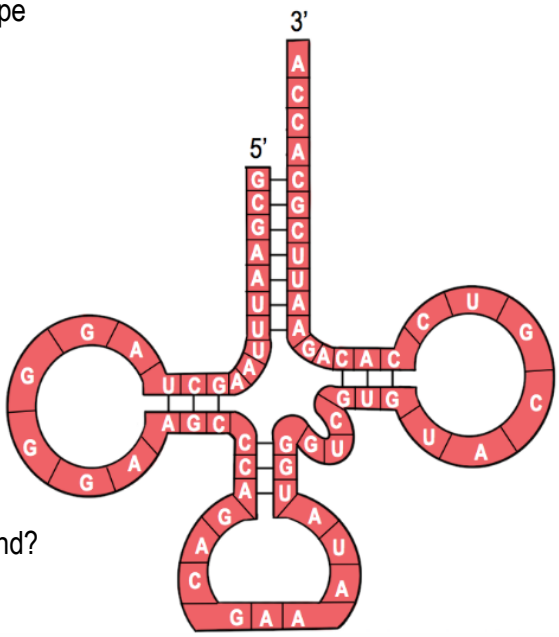
EXAMPLE: The different variations of transfer RNA (tRNA) during translation.





PRACTICE: What type of bonding is responsible for maintaining the shape of the tRNA molecule shown in the figure?

a) Ionic bonding between phosphates.
b) Hydrogen bonding between base pairs of nucleotides.
c) Van der Waals interactions between hydrogen atoms.
d) Peptide bonding between amino acids.



PRACTICE: The tRNA shown in the figure has its 3' end projecting beyond its 5' end. Which of the following processes will occur at this 3' end?

a) The amino acid binds covalently.
b) The excess nucleotides (ACCA) will be cleaved off at the ribosome.
c) The small and large subunits of the ribosome will attach to it.
d) These nucleotides represent the anti-codon.

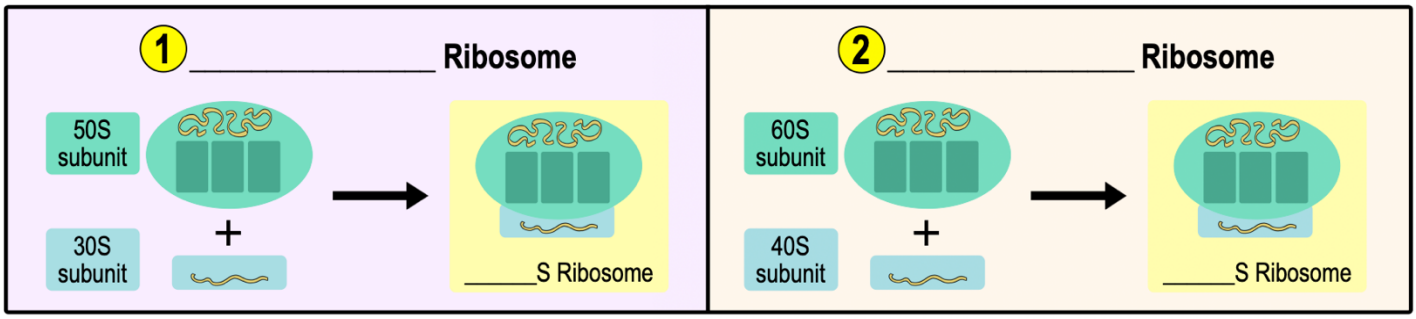
CONCEPT: INTRODUCTION TO TRANSLATION

Ribosome Subunits

●Ribosomes consist of a small & large ribosomal _____, each made of proteins & rRNA.

1. Prokaryotes have _____S ribosomes consisting of a large _____S & small _____S ribosomal subunits.
2. Eukaryotes have _____S ribosomes consisting of a large _____S & small _____S ribosomal subunits.

EXAMPLE: Prokaryotic vs. Eukaryotic Ribosomal Subunits.

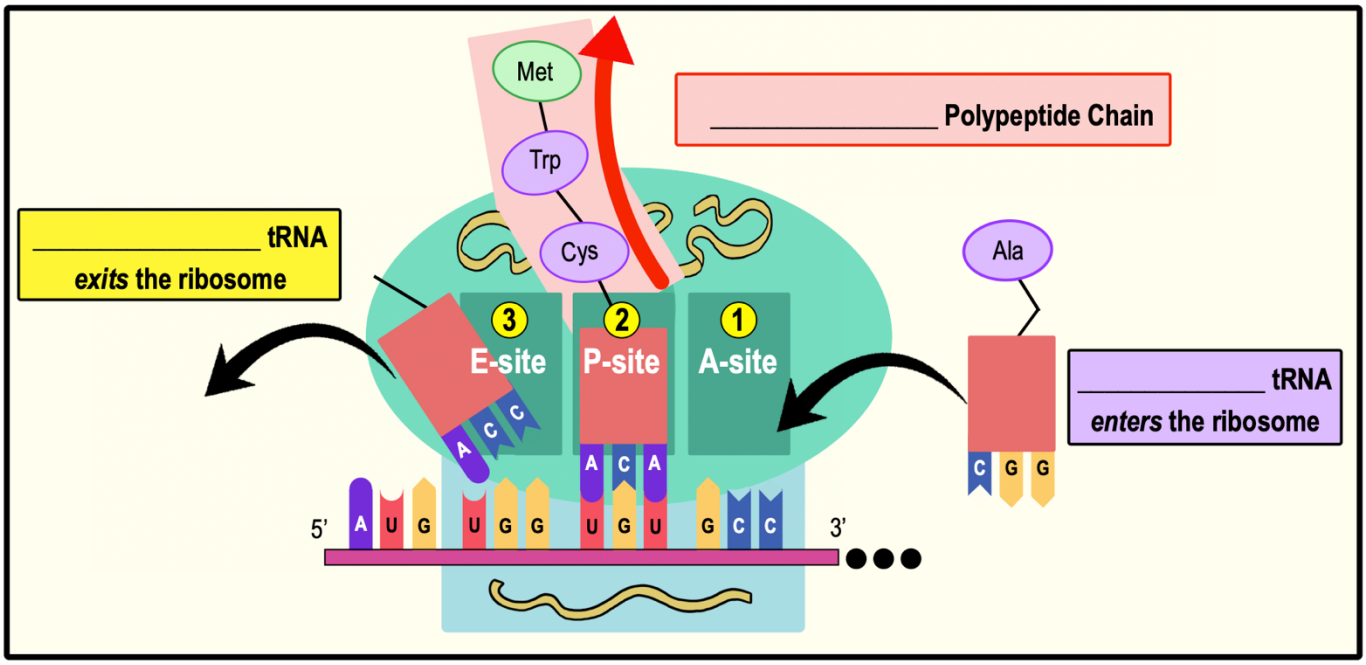


Ribosomal tRNA Binding Sites

●Each ribosome has _____ tRNA binding sites:

1. _____**minoacyl-tRNA Binding Site** (_____**-Site**): holds the tRNA carrying the next amino acid to be added.
2. _____**eptidyl-tRNA Binding Site** (_____**-Site**): holds the tRNA carrying the *growing* polypeptide chain.
3. _____**xit Site** (_____**-Site**): discharged tRNAs leave the ribosome from this site.

EXAMPLE: Overview of tRNA binding sites.



CONCEPT: INTRODUCTION TO TRANSLATION

PRACTICE: A ribosome has three tRNA binding sites. Which answer matches the tRNA binding site with the correct function:

a) The A-site acts as the loading site, holding the tRNA with the next amino acid in the polypeptide sequence.
b) The E-site releases charged tRNA from the ribosome.
c) The P-site is holding the growing strand of amino acids making up the polypeptide.
d) A and B are correct.
e) B and C are correct.
f) A and C are correct.
g) All of the above are correct.

PRACTICE: Which of the following statements concerning ribosomes are true?

a) Several ribosomes are often attached to and translating the same mRNA.
b) Ribosomes join amino acids to form a polypeptide.
c) Ribosomes have a binding site for mRNA and three binding site for tRNA molecules.
d) No protein synthesis within a cell would occur without ribosomes.
e) All of the above statements are true.

PRACTICE: The direction of ribosome movement during translation is in the _____.

a) 3' → 5' direction of DNA.
b) 5' → 3' direction of tRNA.
c) 3' → 5' direction of mRNA.
d) 5' → 3' direction of mRNA.

PRACTICE: Many antibiotics work by blocking the function of ribosomes. Therefore, these antibiotics will:

a) Block DNA synthesis in eukaryotic cells.
b) Block protein synthesis in prokaryotes.
c) Block RNA synthesis in prokaryotes.
d) Block viral DNA in prokaryotes.
e) Block protein synthesis in eukaryotes.