CONCEPT: CENTRAL DOGMA

●*Casually* refers to both the processes of _____ & _____.

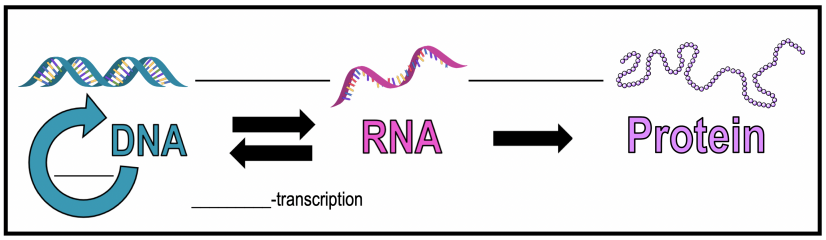
□ *Transcription*: builds _____ using _____ as the coding template.

□ *Translation*: builds _____ using the encoded messages of _____.

●Central dogma of molecular biology *directly* refers to the _____ flow of biochemical info from *DNA* to *protein*.

●DNA is *replicated* & RNA is _____-transcribed into DNA, but transfer of *nucleic acid* info to *protein* is *irreversible*.

EXAMPLE:



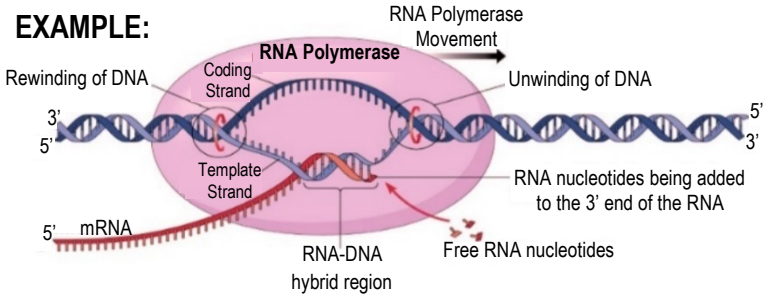
Transcription

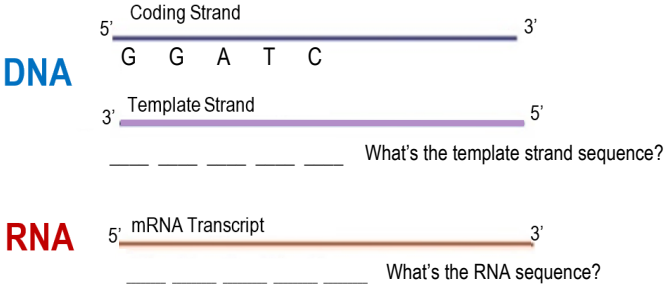
●*Transcription* uses an enzyme called _____ polymerase, which produces a *messenger RNA* (or *mRNA*).

□ RNA molecules built from the ____ to the ____ end by aligning *free RNA nucleotides* on a *DNA template*.

□ RNA molecules have *same sequence* as the _____ DNA strand (except *replacing* T's with U's).

EXAMPLE:





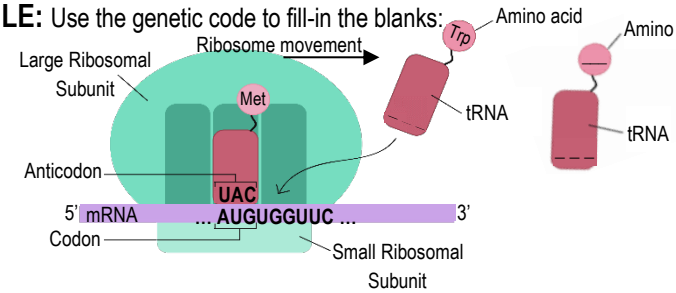
Translation

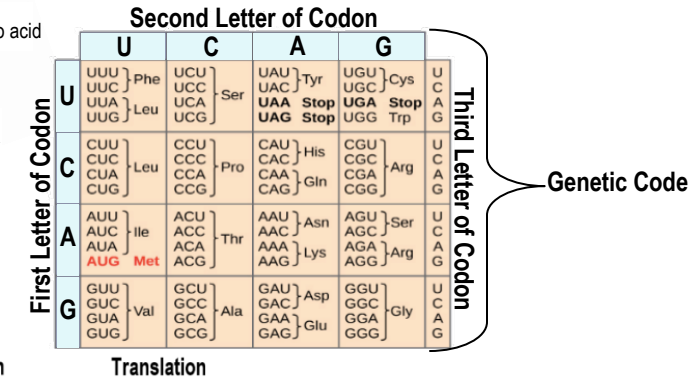
●*Translation* uses _____ & specialized RNA called _____ RNA (or *tRNA*).

□ Ribosomes read the mRNA strand in 3-nucleotide "chunks" called _____ (interpreted with a *genetic code*).

□ tRNAs pair with _____ _____ & contain _____-codons that are *complementary* to the *mRNA codons*.

EXAMPLE: Use the genetic code to fill-in the blanks:





Second Letter of Codon

First Letter of Codon	U	C	A	G	Third Letter of Codon
U	UUU Phe, UUC Phe, UUA Leu, UUG Leu	UCU Ser, UCC Ser, UCA Ser, UCG Ser	UAU Tyr, UAC Tyr, UAA Stop, UAG Stop	UGU Cys, UGC Cys, UGA Stop, UGG Trp	U C A G
C	CUU Leu, CUC Leu, CUA Leu, CUG Leu	CCU Pro, CCC Pro, CCA Pro, CCG Pro	CAU His, CAC His, CAA Gln, CAG Gln	CGU Arg, CGC Arg, CGA Arg, CGG Arg	U C A G
A	AUU Ile, AUC Ile, AUA Ile, AUG Met	ACU Thr, ACC Thr, ACA Thr, ACG Thr	AAU Asn, AAC Asn, AAA Lys, AAG Lys	AGU Ser, AGC Ser, AGA Arg, AGG Arg	U C A G
G	GUU Val, GUC Val, GUA Val, GUG Val	GCU Ala, GCC Ala, GCA Ala, GCG Ala	GAU Asp, GAC Asp, GAA Glu, GAG Glu	GGU Gly, GGC Gly, GGA Gly, GGG Gly	U C A G

Genetic Code

Transcription vs. Translation

●Let's compare/contrast transcription & translation:

	Transcription	Translation
Product Formed	RNA Molecule	
Macromolecule Change?	____ Nucleic acid → Nucleic Acid	Yes. Nucleic acid → Protein
Major Enzyme/Structure	RNA Polymerase	
Location		Cytoplasm
Direction of Synthesis	5' to 3'	

CONCEPT: CENTRAL DOGMA

PRACTICE: What is the central dogma of molecular biology directly referring to?

a) Unidirectional Translation
b) Multidirectional Translation
c) Unidirectional Transcription
d) Multidirectional Transcription & Translation

PRACTICE: Consider a DNA template strand of the following sequence: 5'-A C T G C C A G G A A T-3'.

A) What is the sequence of the corresponding DNA coding strand? Include directionality.

DNA Template Strand: 5'-A C T G C C A G G A A T-3'.

DNA Coding Strand:

B) What is the sequence of the corresponding mRNA strand? Include directionality.

mRNA Strand:

PRACTICE: Consider a DNA coding strand with the following sequence: 3'-C T T C A T A G C T C G-5'.

Use the genetic code to determine the corresponding amino acid sequence of the translated protein.

	U	C	A	G	
U	UUU Phe UUC Phe UUA Leu UUG Leu	UCU Ser UCC Ser UCA Ser UCG Ser	UAU Tyr UAC Tyr **UAA Stop** **UAG Stop**	UGU Cys UGC Cys **UGA Stop** UGG Trp	U C A G
C	CUU Leu CUC Leu CUA Leu CUG Leu	CCU Pro CCC Pro CCA Pro CCG Pro	CAU His CAC His CAA Gln CAG Gln	CGU Arg CGC Arg CGA Arg CGG Arg	U C A G
A	AUU Ile AUC Ile AUA Ile AUG Met	ACU Thr ACC Thr ACA Thr ACG Thr	AAU Asn AAC Asn AAA Lys AAG Lys	AGU Ser AGC Ser AGA Arg AGG Arg	U C A G
G	GUU Val GUC Val GUA Val GUG Val	GCU Ala GCC Ala GCA Ala GCG Ala	GAU Asp GAC Asp GAA Glu GAG Glu	GGU Gly GGC Gly GGA Gly GGG Gly	U C A G

DNA Coding Strand: 3'-C T T C A T A G C T C G-5'

mRNA Strand:

Protein Sequence: