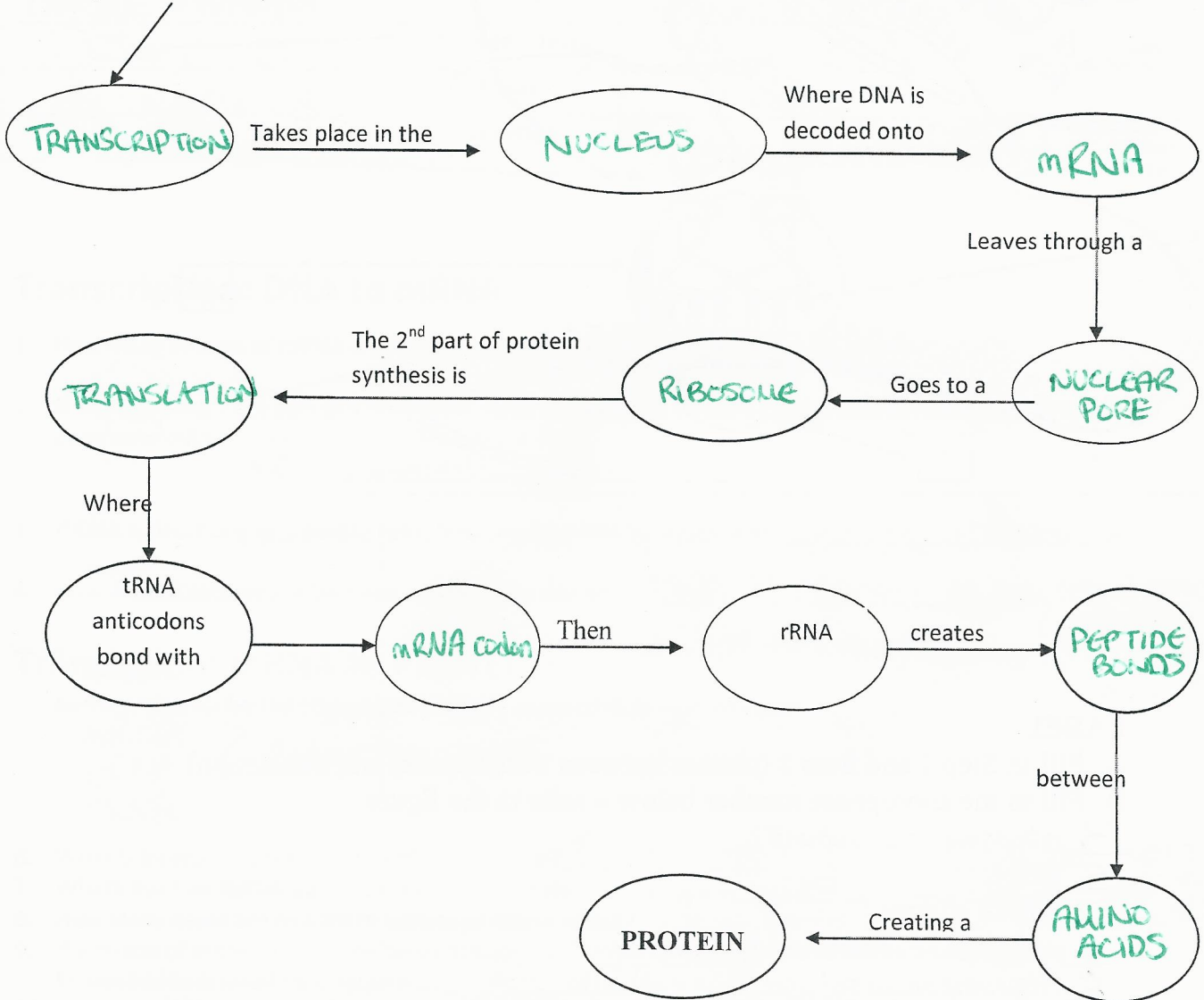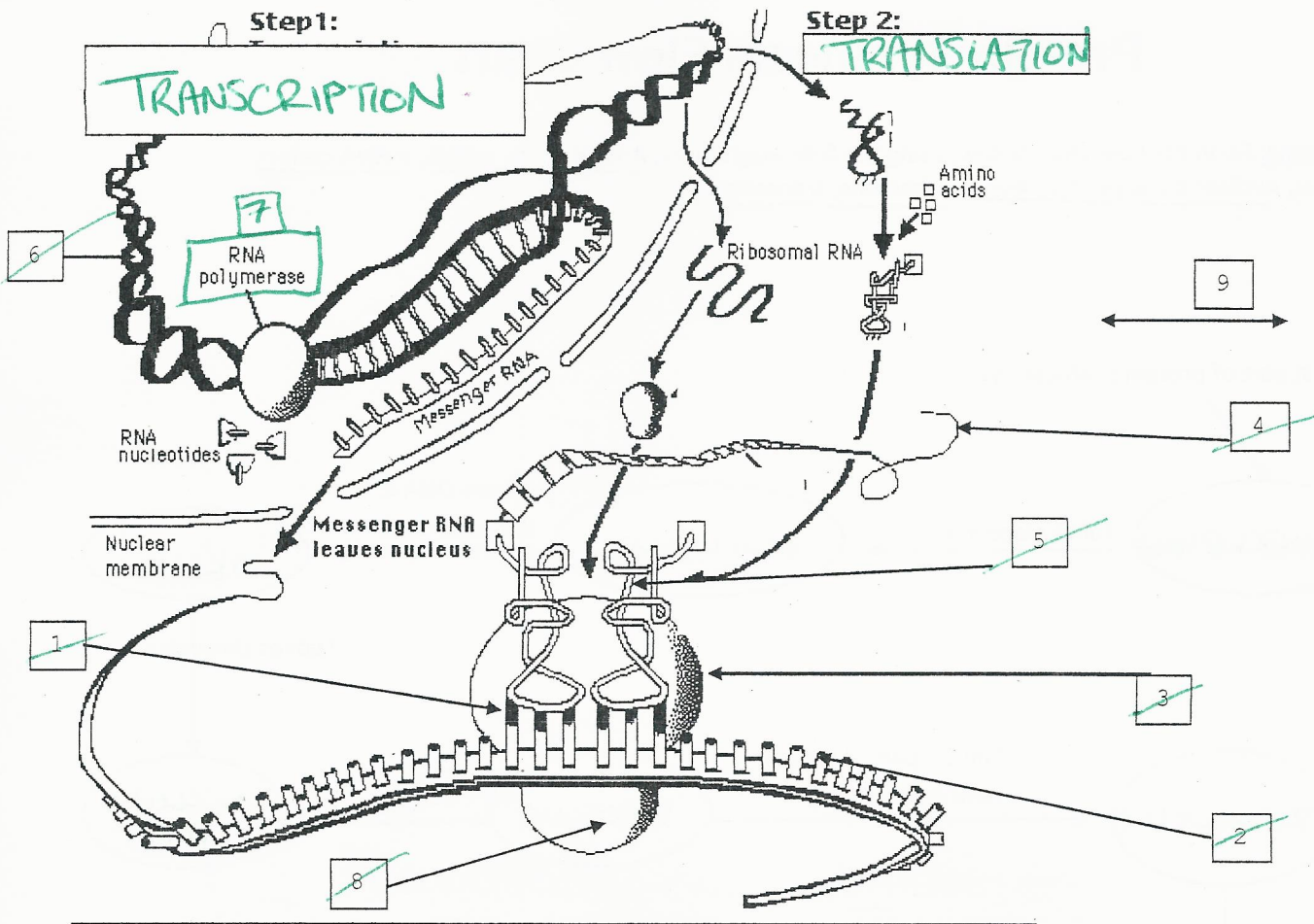# Protein Synthesis Flow Chart

Directions: Fill in the flow chart below, using the following words: Amino acids, mRNA, mRNA codon, nucleus, nuclear pore, peptide bonds, ribosome, transcription.

The first part of protein synthesis is

TRANSCRIPTION → Takes place in the → **NUCLEUS** → Where DNA is decoded onto → **mRNA**

Leaves through a

TRANSLATION ← The 2nd part of protein synthesis is ← **RIBOSOME** ← Goes to a ← **NUCLEAR PORE**

Where

tRNA anticodons bond with → **mRNA codon** → Then → rRNA → creates → **PEPTIDE BONDS**

between

AMINO ACIDS → Creating a → **PROTEIN**

PROTEIN SYNTHESIS

Step 1:

TRANSCRIPTION

Step 2:

TRANSLATION

7

RNA polymerase

6

Amino acids

Ribosomal RNA

9

RNA nucleotides

4

Nuclear membrane

Messenger RNA

Messenger RNA leaves nucleus

5

1

3

2

8

LABEL
A. Fill in Step 1 and Step 2 (choose between transcription and translation)
B. Fill in the appropriate number below – refer to the figure.

_3_ *ribosome large subunit*

_5_ *tRNA*

_2_ *mRNA codons*

_4_ *polypeptide (amino acid polymer)*

_8_ *ribosome small subunit*

_1_ *tRNA anticodon*

_6_ *DNA*

_7_ *RNA polymerase enzyme*

_9_ *cytoplasm*

Protein Synthesis Review Worksheet

1. How are DNA and mRNA alike?
   - contain A, C, G bases
   - can be found in the nucleus
   - etc...
   Answers may vary.

   * mRNA is an "exact" "copy" of the coding strand except U replaces T.

2. How are DNA and mRNA different? Fill in the table below.

DNA		mRNA
DOUBLE STRANDED	Shape	SINGLE STRANDED
A, T, C, G	Nitrogen bases	A, U, C, G
deoxy ribose	Sugars	ribose
NUCLEUS	Location	NUCLEUS / CYTOPLASM

Transcription: DNA to mRNA:

1. How many strands of mRNA are transcribed from the two "unzipped" strands of DNA? __One.__

2. If the following were part of a DNA chain, what mRNA bases would pair with it to transcribe the DNA code onto mRNA? G-G-A-T-C-G-C-C-T-T-A-G-A-A-T-C
   __CCUAGCGGAAUCUUAG__

3. If DNA is described as a double helix, how should mRNA be described? __Single stranded__

4. How are the accuracy of DNA and mRNA codes assured? __DNA Replication → proofread and corrected__
   __mRNA transcription → no accuracy measures__

Translation: mRNA to PROTEIN:

5. Name and describe the three types of RNA's involved in protein synthesis?
   mRNA
   tRNA   } Refer to notes.
   rRNA

6. What is located at EACH end of a tRNA molecule? __3' end → amino acid, bottom loop → anticodon__
7. Where must an mRNA attach before protein production can begin? __mRNA binding site on small ribosomal subunit__
8. How many bases are needed to specify an mRNA codon? __3__
9. If a strand of mRNA contain the sequence, U-A-G-C-U-A-U-C-A-A-A-U, what tRNA anticodons would be needed to translate the sequence? __AUC GAU AGU UUA__
10. How does mRNA get out of the nucleus? __Through the nuclear pore__
11. What is the difference between an amino acid and a protein? __An amino acid is the smallest function unit (monomer) of a protein. Amino acids link to form a polypeptide. Polypeptides join and fold to produce a functional protein__
12. What type of bond is formed between amino acids? __Peptide Bond__