

Replication and Transcription and Translation, Oh My!

Preparation

1. Fold one sheet of paper in half width-wise as shown in Figure 1.
2. Divide each side in half again by folding each side *back* to the crease of the original fold. The paper should have an "M" shape when folded, as shown in Figure 2.
3. Lay the paper out in a landscape orientation.
4. Number the panels 1–4 from left to right as shown in Figure 3.
5. Fold the paper together so that only panels 1 and 4 are visible. (Fig 4)
6. On the edge of panel 1 that touches panel 4, write the following DNA sequence (vertically). (Fig 4)



Figure 1.

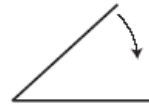


Figure 2.

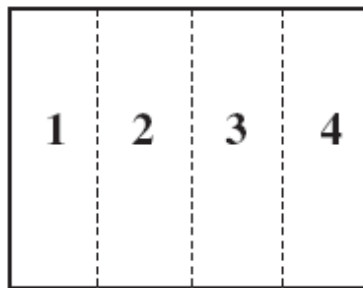


Figure 3.

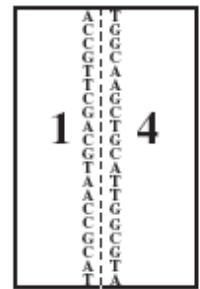


Figure 4.

T A C G T T C G A C G T A A C C G C A C T

7. Now write the complementary DNA sequence on the edge of panel 4 next to the letter on panel 1 as shown on Figure 4. The result is a double-stranded DNA sequence.

Procedure

Part I: Replication

1. Pull apart panels 1 and 4 to expose all panels, as if "unzipping" the double-stranded DNA.
2. On panel 2 write the complementary DNA for panel 1 and on panel 3 write the complementary DNA for panel 4 in the same manner as completed for step 7 in the preparation section. See Figure 5. The original double-stranded DNA has now been replicated to form two identical double-stranded DNA molecules.

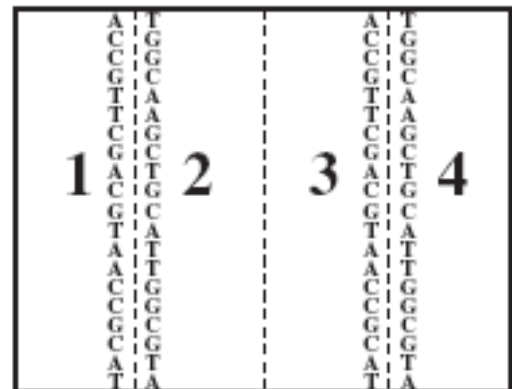


Figure 5.

Part II: Transcription

1. Fold panel 2 in half so that only panels 1, 3, and 4 show (the crease between panels 1 and 2 touches the crease between panels 2 and 3) as shown in Figure 6.

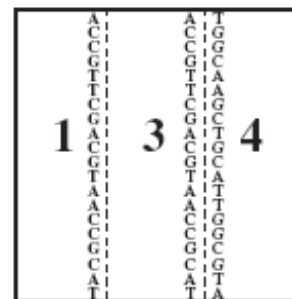


Figure 6.

2. On panel 3 write the complementary RNA strand for the DNA on panel 1 as shown in Figure 7. *Note:* RNA does not contain thymine; the complementary base for adenine is uracil.

3. Lay the paper out in a landscape orientation. The single strand on the left edge of panel 3 is mRNA—label the strand “mRNA.”

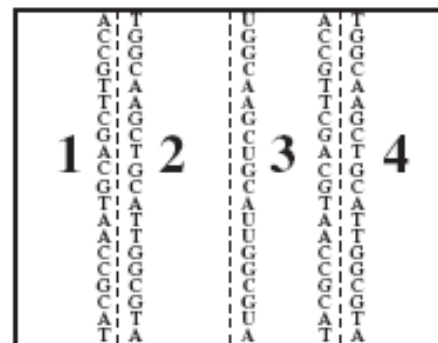


Figure 7.

Part III: Translation

1. Draw a line under every third base on the single strand of mRNA on panel 3 as shown in Figure 8. Each set of three mRNA bases is a codon.

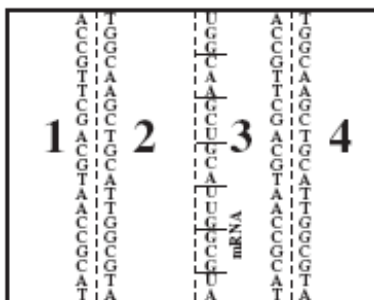


Figure 8.

2. Write the complementary tRNA strand on the edge of panel 2 next to the mRNA strand on panel 3—label this strand “tRNA.”

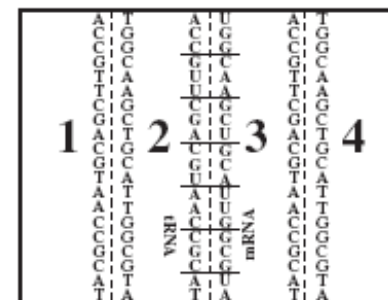


Figure 9.

3. Draw a line under every third base on the single strand of tRNA on panel 2 as shown in Figure 9. Each set of three tRNA bases is an anticodon.

Part IV: Protein Synthesis

1. Use the Genetic Code Chart on page 303 of your book, to determine the amino acid that is coded by each **mRNA codon**. Write the name of the amino acid underneath each codon on panel 3.