

Cell Explorers	Grade 8 Cells
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Cell Algorithms

Part 1: Cell Membranes

The cell membrane protects the cell and controls molecules that enter into the cell (like nutrients) and exit the cell (like waste). Some of these molecules pass easily through openings in the membrane. Other molecules need to be paired with a carrier molecule to get help to move across the membrane.

Use pseudocode to describe the rules of the Cell Membrane Game. What decisions do you have to make to let some objects pass through the cell membrane and not others?

IF

IF





THEN

THEN

Part 2: Ribosomes

Ribosomes are responsible for making proteins out of chains of amino acids. The instructions for amino acids are written using four letters (A, C, G, U) in groups of three (codons).

Use the key below to translate the following string of 10 codons. What is the resulting sequence of amino acids? What is the resulting sequence of shapes?

Codon	Amino Acid	Shape
UUA	Phe	
AUG	Met	
CGC	Arg	
UCU	Ser	

AUGCGCCGCUCUUUAUCUUUACGCUUACGC

Amino Acid Sequence

Shape Sequence

What set of rules did you use to translate the codons into their amino acids? How would you write this as pseudocode?

Answer Key:

Part 1: Cell Membranes

*Note: adjust rules according to the objects that are being sorted in your classroom.

The goal of our cell membrane program is to check if a ball is blue or red or yellow*. It will let individual red balls pass, but not individual blue or yellow balls. Blue and yellow balls can only pass if they are paired (one blue ball + one yellow ball together).

So, as pseudocode:

```
if ball is red
    then pass through membrane

else if ball is (paired) blue AND yellow
    then pass through membrane

else
    then do not pass through membrane
```

Part 2: Ribosomes

Amino Acid Sequence:

Met-Arg-Arg-Ser-Phe-Ser-Phe-Arg-Phe-Arg

Shapes Sequence:

Circle – Star – Star – Square – Triangle – Square – Triangle – Star – Triangle – Star

Pseudocode:

```
Read nucleobases in groups of three starting from the first base on the left;
if grouping is AUG
    then place Met (or circle);

else if grouping is CGC
    then place Arg (or star);

else if grouping is UCU
    then place Ser (or square);

else
    place Phe (or triangle);
```