Grade Level/Course:
Grade 7 / Life Science

Lesson/Unit Plan Name:
Building a DNA Model Chapter 5

Rationale/Lesson Abstract:
Introduce students to DNA Helix. The students will be able to manipulate the nucleotides (basic building blocks) of DNA and get a feel of how the molecule is produced.

Timeframe:
1 to 2 class periods.

Standard(s):

Genetics

2. A typical cell of any organism contains genetic instructions that specify its traits. Those traits may be modified by environmental influences. As a basis for understanding this concept:

a. *Students know* the differences between the life cycles and reproduction methods of sexual and asexual organisms.
b. *Students know* sexual reproduction produces offspring that inherit half their genes from each parent.
c. *Students know* an inherited trait can be determined by one or more genes.
d. *Students know* plant and animal cells contain many thousands of different genes and typically have two copies of every gene. The two copies (or alleles) of the gene may or may not be identical, and one may be dominant in determining the phenotype while the other is recessive.
e. *Students know* DNA (deoxyribonucleic acid) is the genetic material of living organisms and is located in the chromosomes of each cell.

Instructional Resources/Materials:

a) Cut Outs of basic subunits of DNA (provided below)
b) Scissors
c) Elmer's glue (do not use tape)

Activity/Lesson:

Each student will make eight nucleotides from the handout below.

1. Cutouts need to be color-coded: Nitrogenous bases (Adenine, Guanine, Thymine, Cytosine) and Phosphates & Sugars (Deoxyribose).
2. Using the small squares and stars as guides, line up the bases, phosphates and sugars.
3. To show replication you will need to get with another pair of students to combine your nucleotides.
4. Glue entire class nucleotides together to form a helix.
5. You may attach this to your ceiling and save for Open House.

Assessment:

Look at the DNA model constructed to make sure the nucleic acids, phosphates and sugars follow the correct pairing model [G=C & A=T]. Phosphate attaches to the sugar and the sugar attaches to the bases.

Name: _____ Date: _____ Period: _____

Building a DNA Model!

What is today's objective?	

Building a DNA Model!

1. You will be making your own DNA molecule, but sharing materials with your group.

2. To start with, your DNA molecule will need to be 4 base pairs long. Start by deciding what base pairs you will use.

   a. What will the sequence of your FIRST STRAND (one half of the ladder)? Remember, the four bases are A, T, G, & C. You can use them in any combination you want, and you can repeat them if you want. Write the bases for one strand below:

      _____ - _____ - _____ - _____

   b. Look at the puzzle. What pieces do you need on the SECOND STRAND (other half of the ladder)? Make sure the pieces match up! Once you figure out what pieces match with the letters above, write down the second strand.

      _____ - _____ - _____ - _____

3. For each base pair, you will need to cut out 2 sugars, 2 phosphates, and 2 nucleotide bases. Your molecule will have 4 base pairs. (Use your answer in #2 above to figure out which bases you need to cut out).

   Before you cut, how many of each piece do you need?

   I need to cut out…

   Sugars: _____ Phosphates: _____ Adenine: _____

   Thymine: _____ Guanine: _____ Cytosine: _____

4. Cut out the pieces you need.

5. Tape the pieces of your FIRST STRAND together in the correct order. (Look at #2a to get it right.) Use the small dots, stars, and squares on the pieces to line them up correctly.

6. Tape the pieces of your SECOND STRAND together and attach them to the FIRST STRAND to make a complete DNA ladder. (You will need to turn these new pieces upside down to make them fit correctly). Make sure the bases match up correctly!

7. Write your name on the back (blank) side of your finished DNA ladder.

8. Answer the questions on the back of this paper, which you will turn in before you leave class today.

Questions

Directions: After you've built your DNA model, answer these questions in COMPLETE sentences.

1. What 2 molecules (pieces) make up the *sides* of your DNA molecule?

   _____

   _____

2. What 4 molecules make up the *rungs* of your DNA molecule?

   _____

   _____

3. Examine your DNA model; write two patterns that you notice about the base pairs.

   a. Pattern 1: _____

   _____

   b. Pattern 2: _____

   _____

4. If you have 10 Adenosine (A) on your DNA strand, how many Thymine (T) would you have on your strand? _____ How do you know? _____

   _____

5. What was at least one hard or surprising thing about making your DNA model?

   _____

   _____

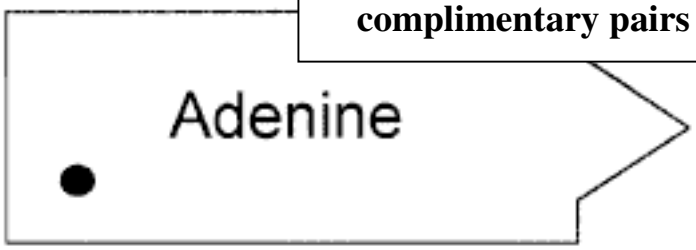
6. If you finish early you may make your DNA model longer or combine it with someone else's.

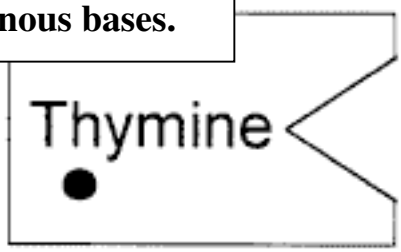
7. **BONUS**: Draw a picture of your DNA model in the box below. Make sure to label the sides and the base pairs!

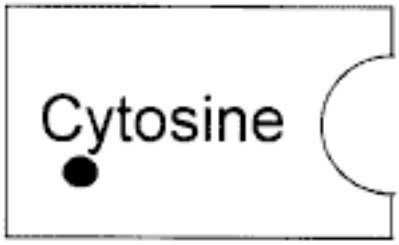
CC@WCCUSD 1/8/14

DO NOT CUT OUT.
THESE ARE FOR EXAMPLE ONLY

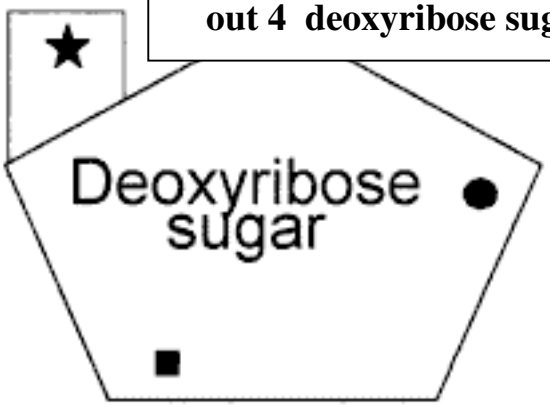
Each student will need to cut two complimentary pairs of nitrogenous bases.



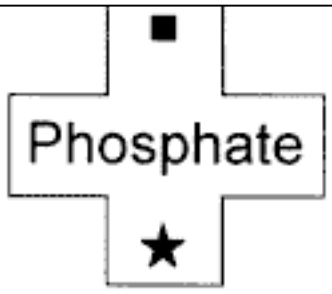


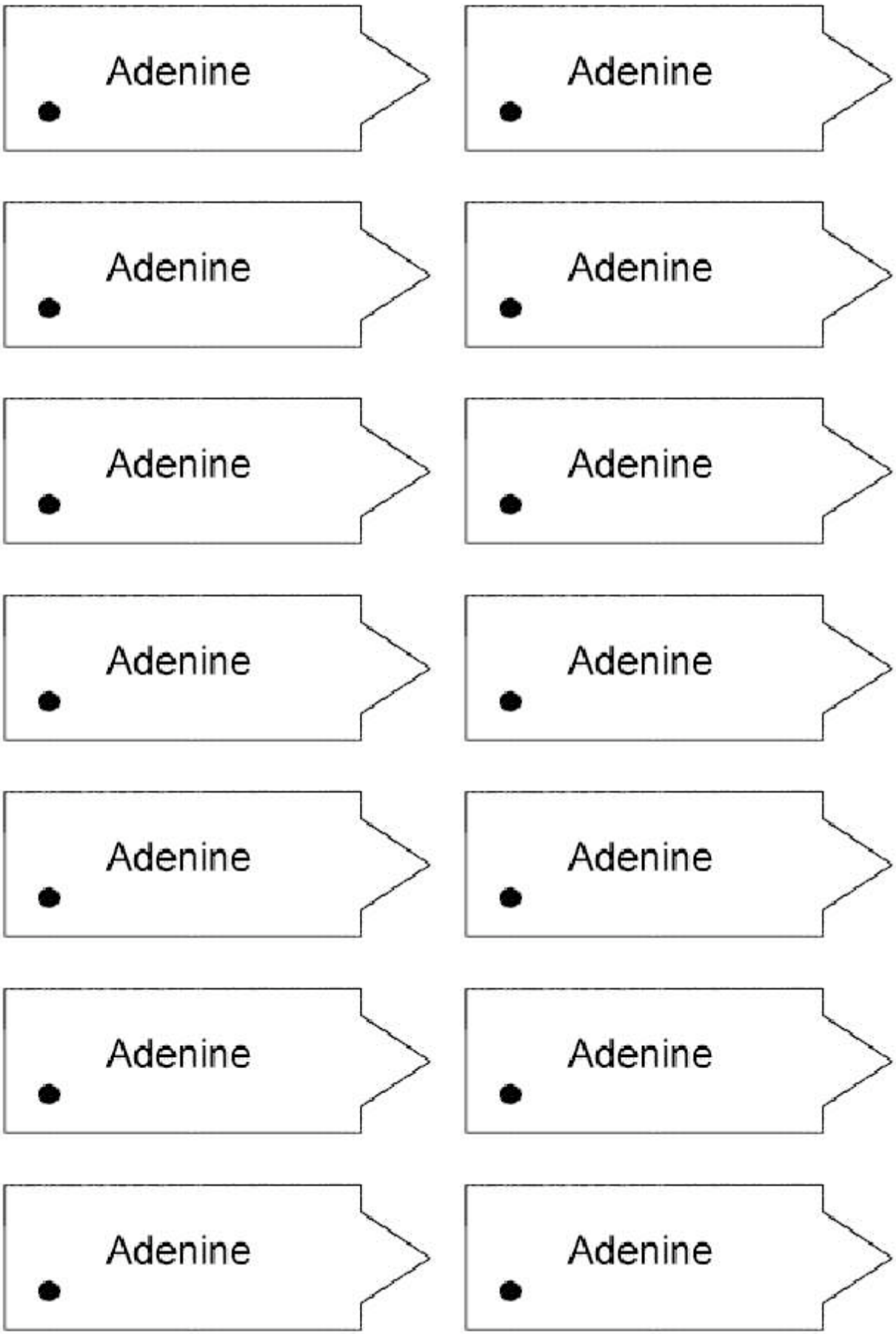


Each student will need to cut out 4 deoxyribose sugars.



Each student will need to cut out 4 phosphate connectors.

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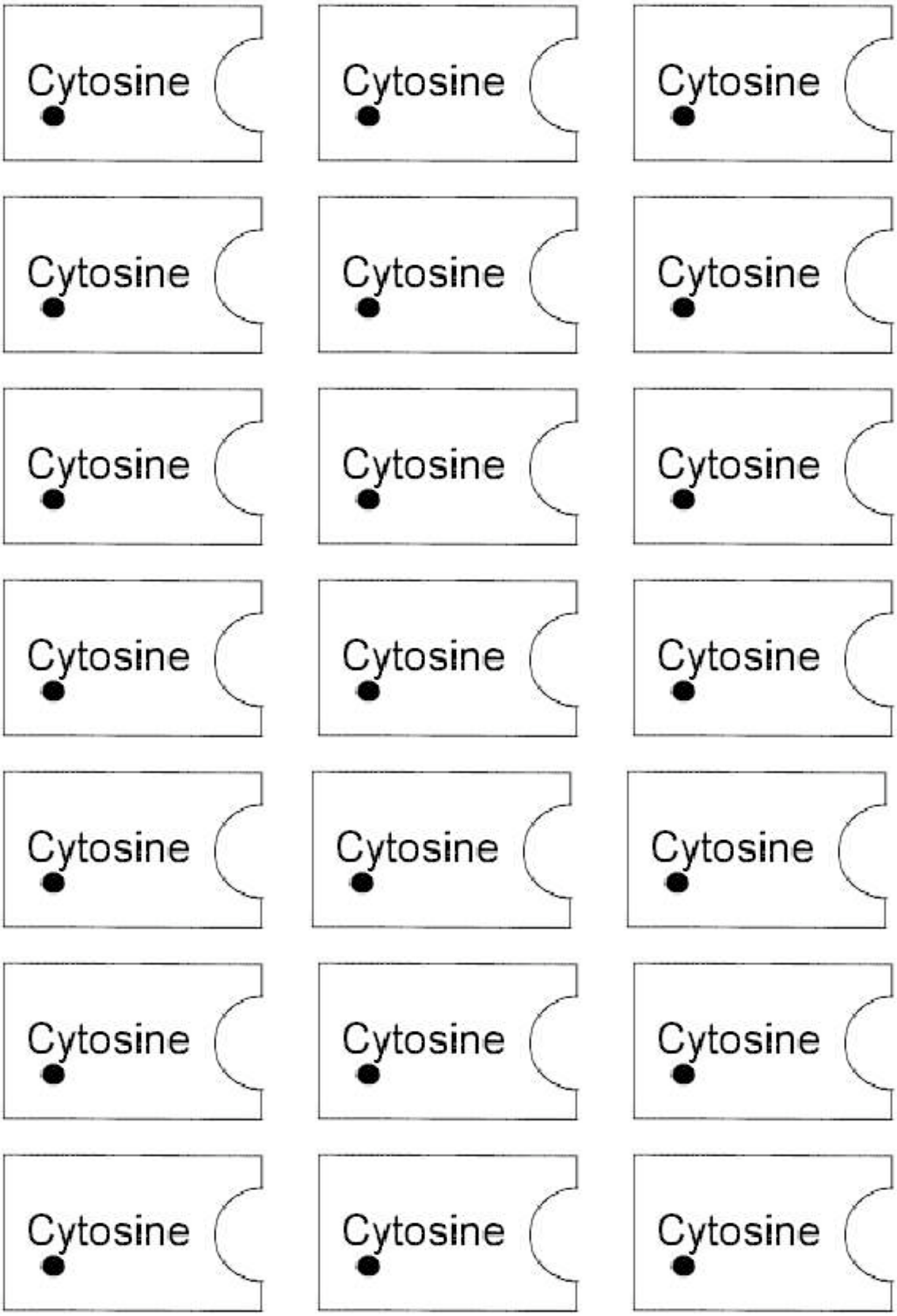
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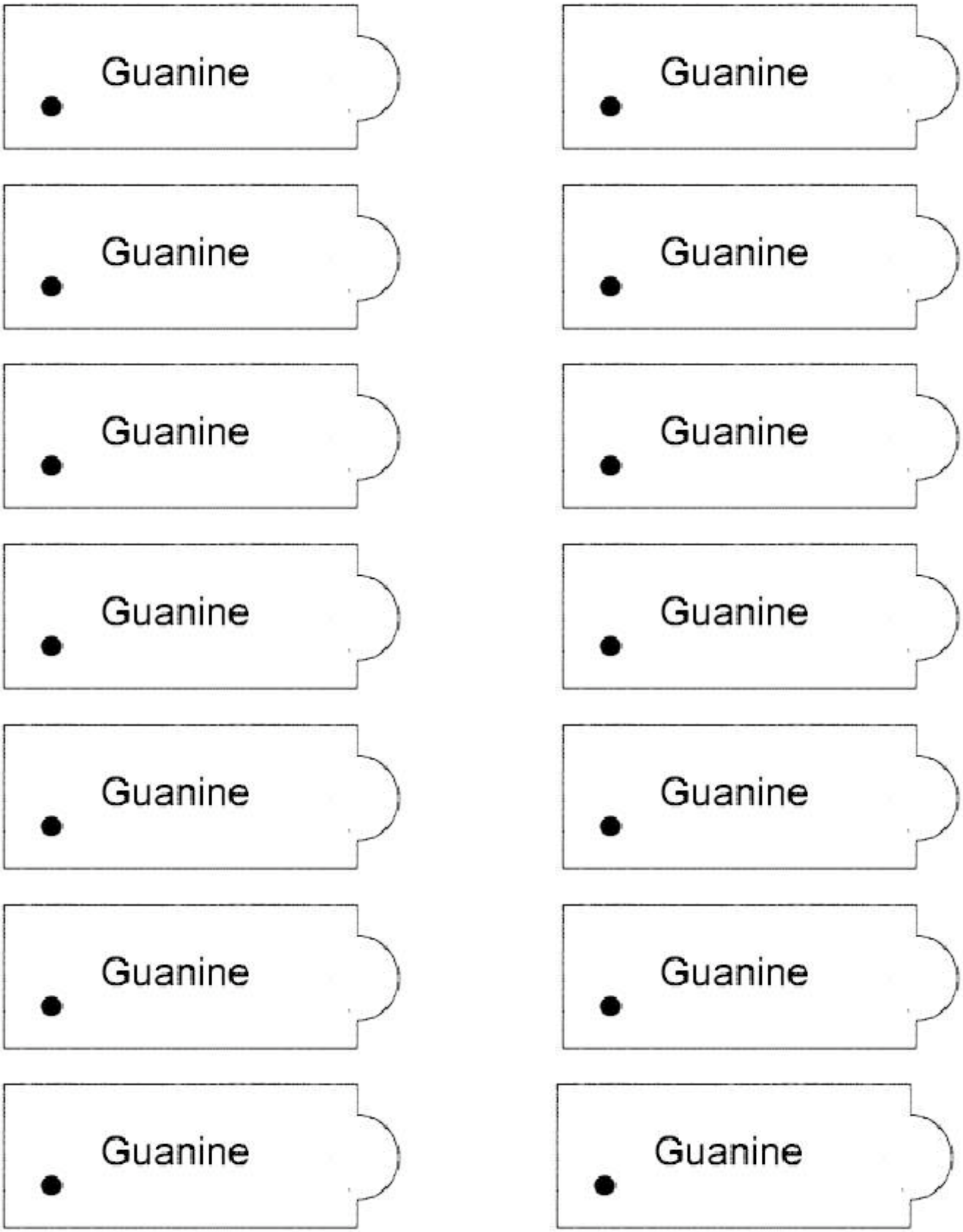
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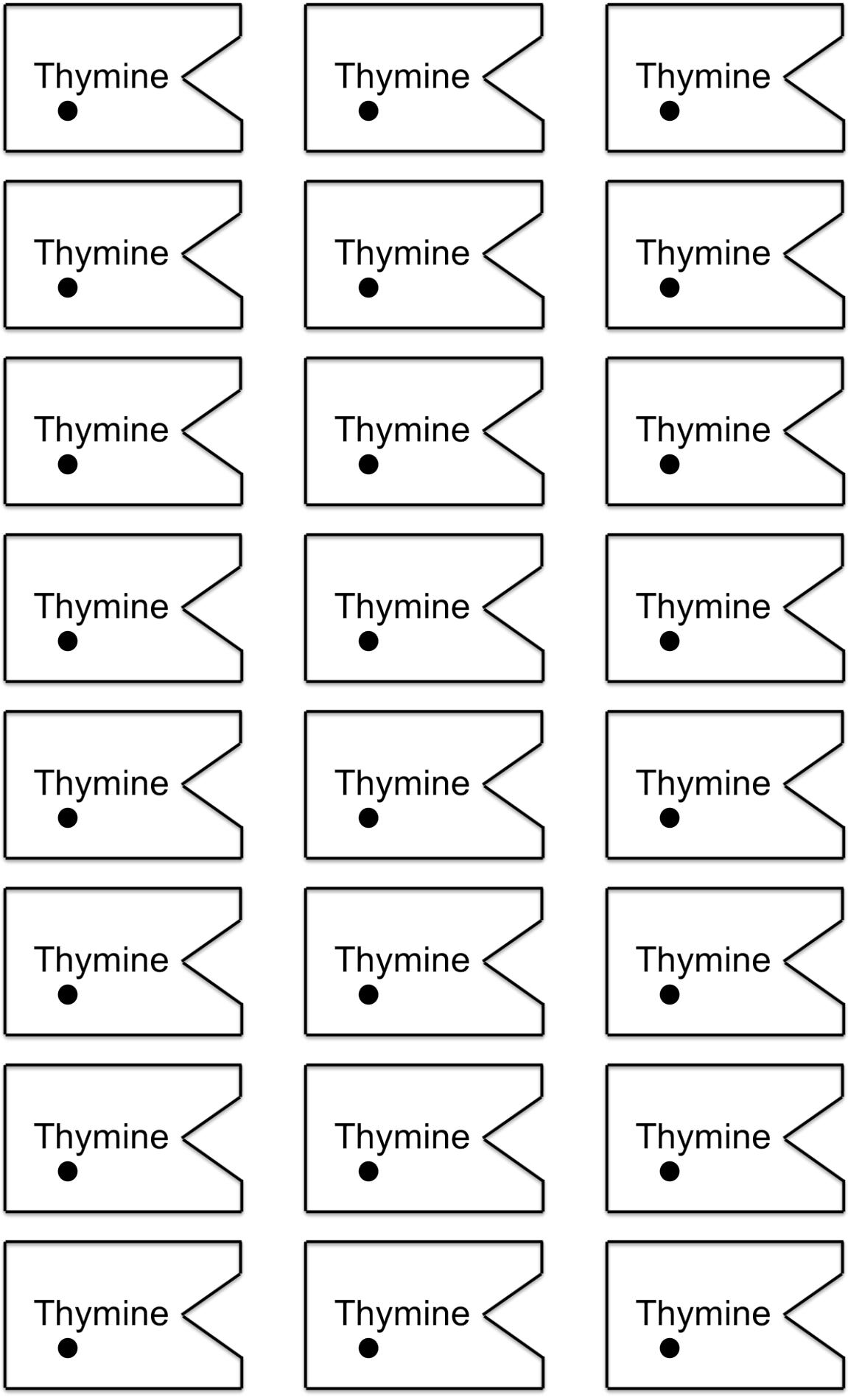
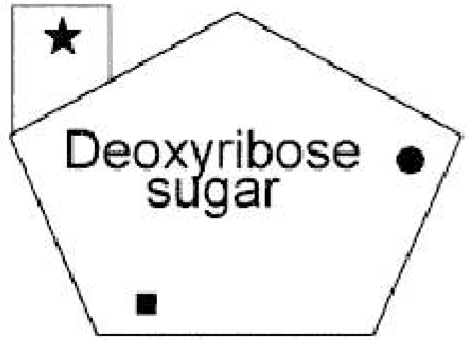

Thymine


Deoxyribose sugar


Deoxyribose sugar


Deoxyribose sugar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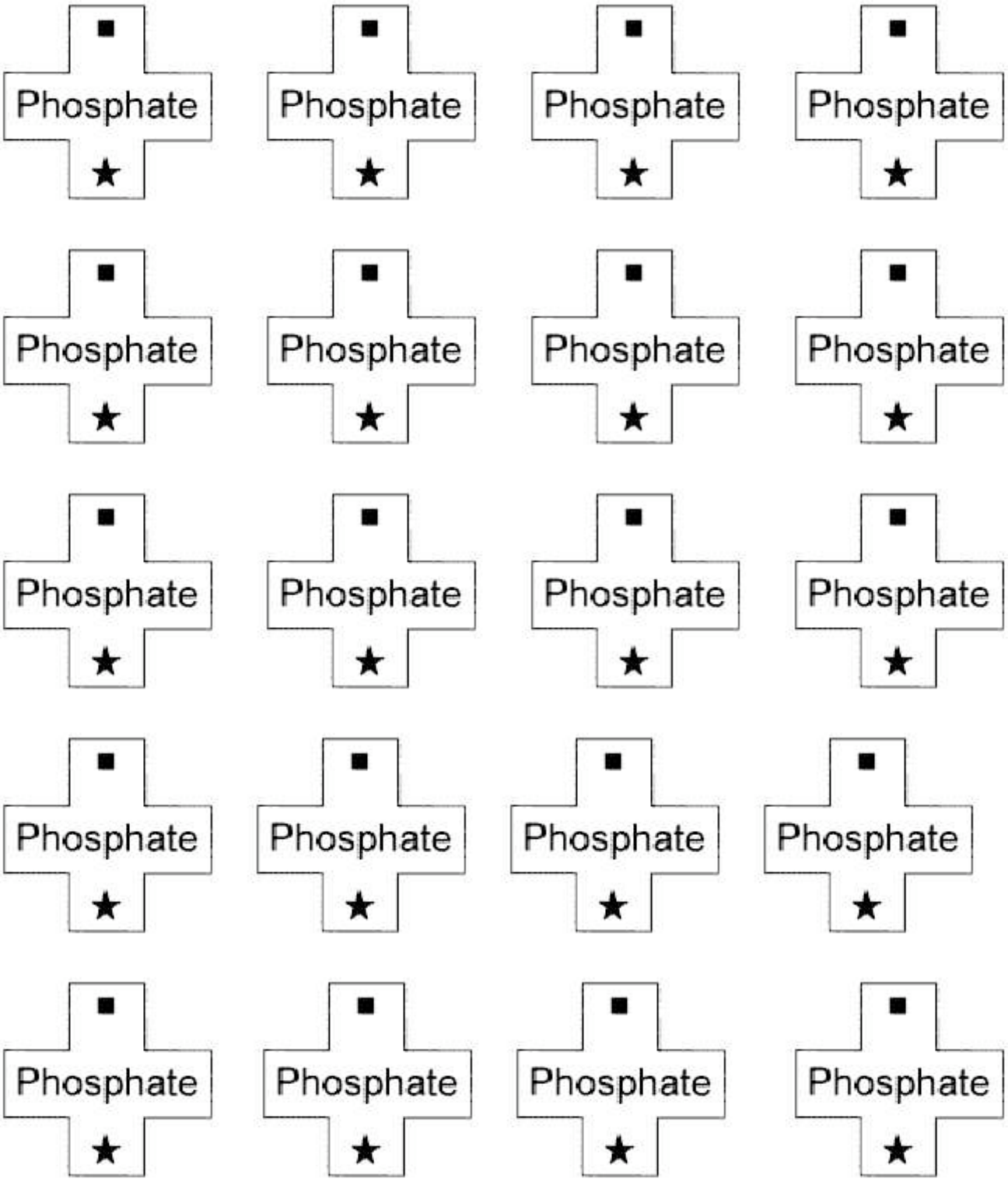
Deoxyribose sugar


Phosphate