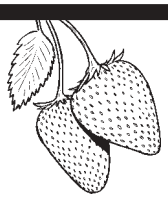
Design Yer Genes

Name _____



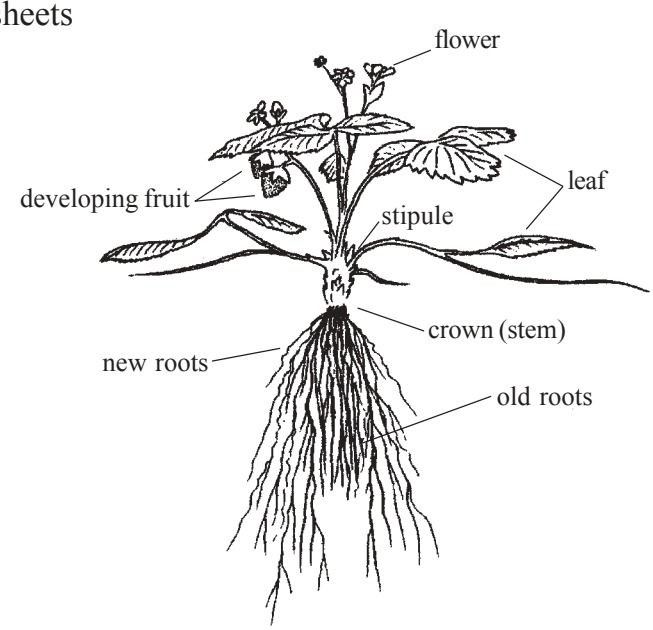
Part 1

Problem

How is a DNA molecule put together? What are genes?

Materials

- Colored markers
- *Design Yer Genes — Part 1* lab sheets
- Envelopes or bags to hold cut pieces
- Glue or tape
- Phosphate, sugar and base pair cut-out sheets
- Scissors



Procedure

1. Color the sugar units, phosphate units and base units. All of the sugar units must be the same color, all of the phosphates must be the same color, and each of the four different base units must be their own color. **You will use six different colors**.

2. Cut out the pieces you have just colored. **Be careful not to cut off the tabs; they will be needed to attach the model together.**

3. Figure out how these pieces fit together. Hints: the tabs must match; the phosphate molecules must attach to sugar molecules.

4. Using the *Gene Key for Strawberries*, choose which three traits you will put on your model.

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(Part 1 continued)

Gene Key for Strawberries

Gene Number	Base Pairs in Gene	Trait	Base Pairs in Gene	Trait
1	T-A A-T A-T A-T	Fruit has seeds in normal pattern	C-G C-G G-C C-G	Fruit has no seeds
2	A-T C-G C-G A-T	Fruit is sweet, has high sugar content	C-G A-T C-G A-T	Fruit is tart, has low sugar content
3	A-T A-T C-G C-G	Fragile skin	A-T C-G G-C G-C	Tough skin

A-T = Adenine & Thymine base pair C-G = Cytosine & Guanine base pair

Write the following information on your *own* paper.

My strawberry will have the following base pair sequences:

Gene 1 = _____

Gene 2 = _____

Gene 3 = _____

In one sentence, describe how your strawberry will appear (its phenotype):

_____

_____

5. Put together the four base pairs that match the traits you have chosen above. Each group of four bases represents one gene.

6. Dry fit your model. Make sure you have followed your teacher's directions about alternating sugars and phosphates and have matched base pairs correctly. Your model should look like a ladder and have three genes. Have your unglued model approved by your teacher. As soon as you are sure your model is correct, glue or tape it together at the tabs.

Design Yer Genes

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(Part 1 continued)

Questions

Answer the following questions on your own paper. Title your paper *Design Yer Genes — Part I Questions*.

1. The bases only fit together in certain pairings. What are these pairings?

2. The sides of the DNA ladder are made up of what two units?

3. Where is the only place for the base pairs to connect to the ladder?

4. If a "gene" were really a distinct segment of four base pairs along the DNA molecule, how many "genes" have you created in your model?

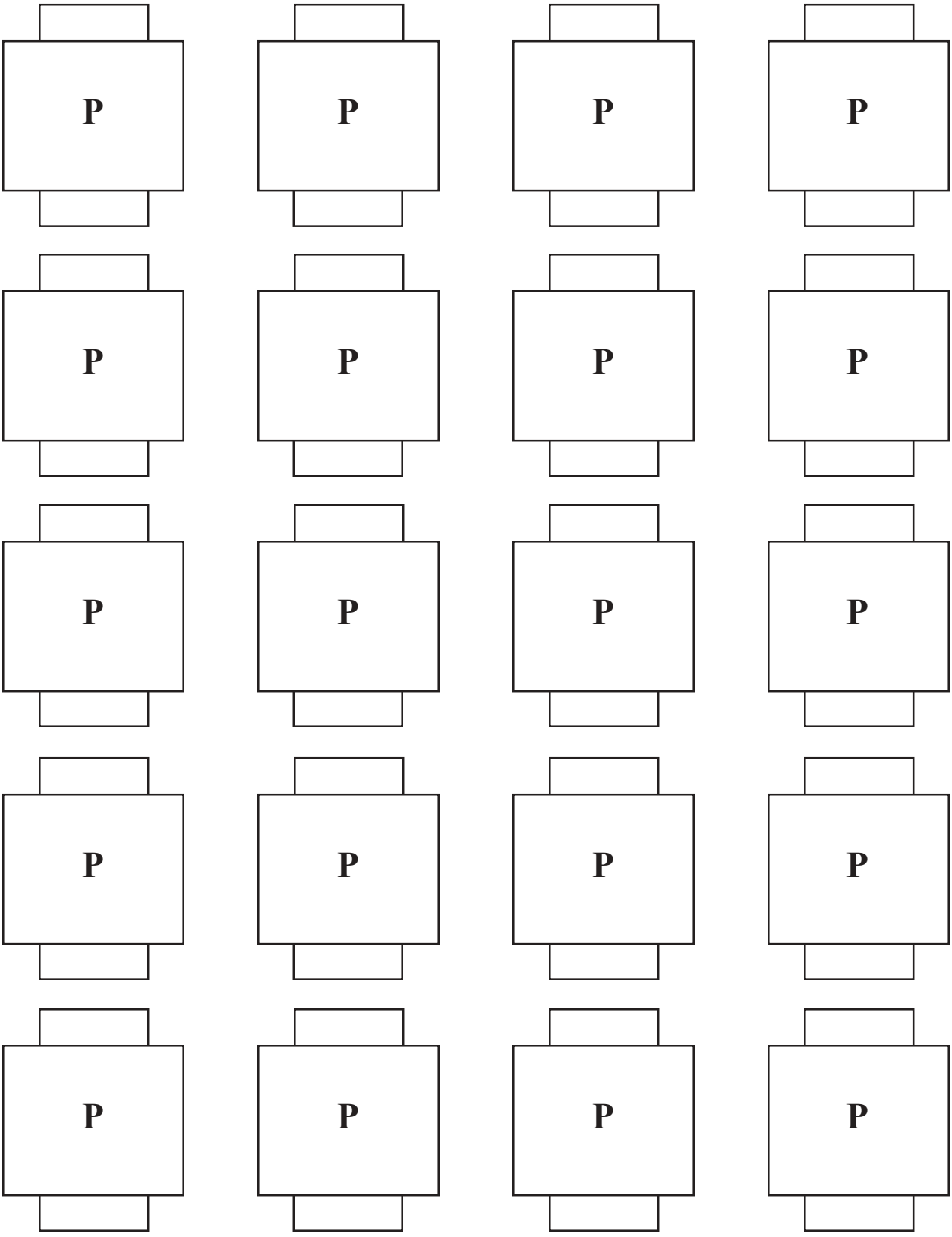
5. Look back at the *Gene Key for Strawberries*. Explain why it might be beneficial to have some strawberries with seeds and other strawberries without seeds. Why might it be beneficial to have some varieties of strawberries with fragile skins and other varieties with tougher skins?

6. Describe at least two things you have learned about DNA and genes that you did not know before.

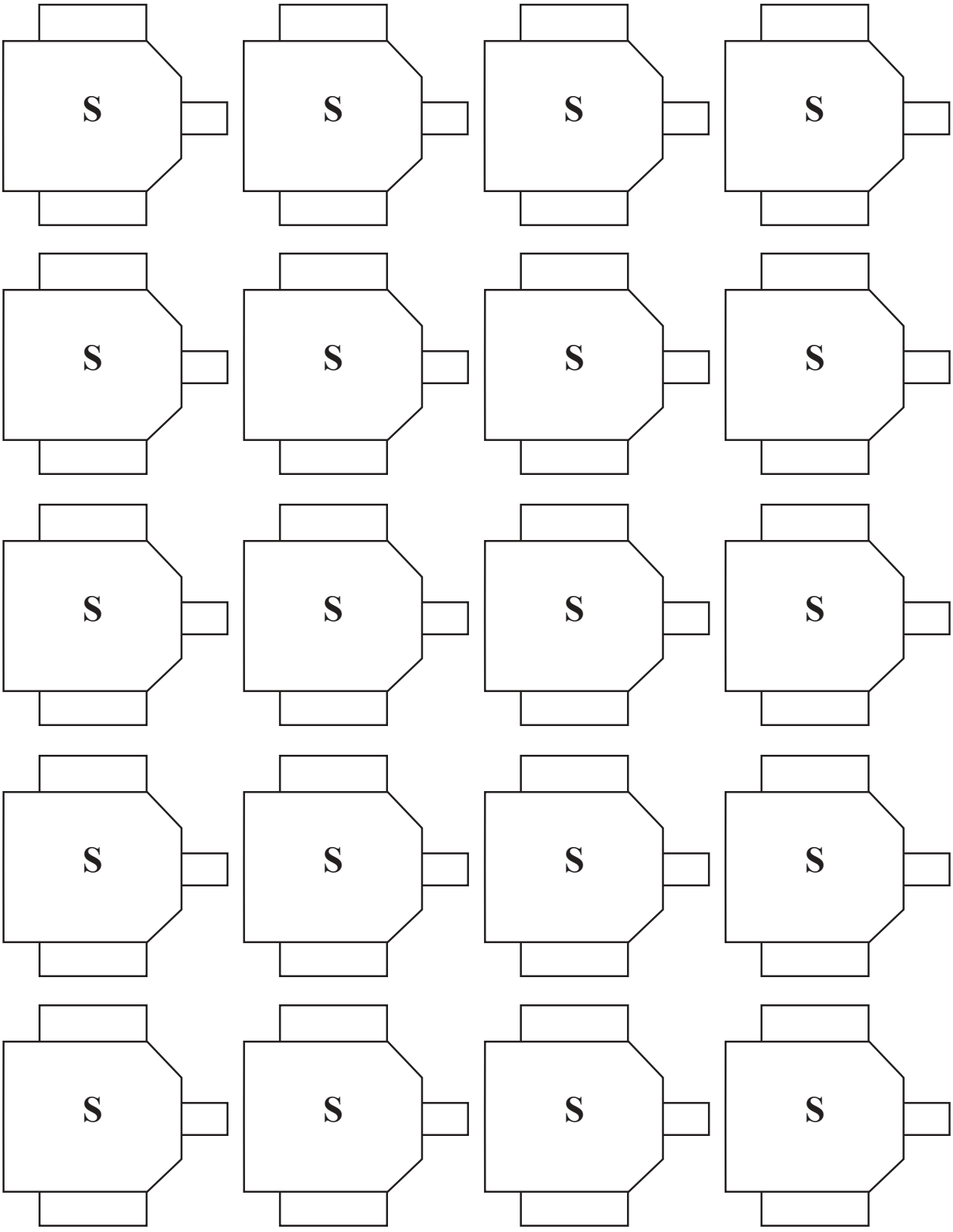
Extension

Extra! Extra! We know genes control our traits or phenotypes. How many genes are on a typical human chromosome?

Phosphate Units for the DNA Model



Sugar Units for the DNA Model



Base Pairs for the DNA Model