

Antibody Building and Guessing Game

Activity Sheet

Please use this sheet to record your data.

Materials Needed: Pencil or pen, scissors, tape, computer or laptop with internet access. Optional: crayons/markers/colored pencils.

Immune System Background

1. What do you already know about the immune system?

2. If the adaptive immune system which fights off viruses can have memory, why do you think people get colds and other infections multiple times?

3. How do you think viruses spread throughout the body?

Antibody Guessing Game Experiment

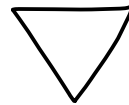
This next part is designed to allow you to pretend to be a body making antibodies!





Antibodies – Unique Immune System Tags

In the human body, the bone marrow makes B cells with unique antibodies. These B cells float around the body until they recognize an antigen and trigger the immune system. They recognize an antigen if it has certain geometry or molecular characteristics. You can think antigen and antibody binding like putting on a glove. You want the right size and style to be comfortable.

In this activity, we will pretend to be the body generating antibodies of unique shapes. Without describing the shape in detail, the Antigen player in this game will come up with a simple shape. The Antibody players have to come up with a corresponding shape. The Antigen will gradually give clues as to what shape they are, and the Antibodies will draw and predict a shape to match. After about 30 seconds of drawing, Antigens will ask our Antibodies to show their work, and then Antibodies will rework drawings as necessary to get to the correct result. There will be up to 4, 30-second attempts per antigen. The shape can be simple like a triangle or pentagon, or complex like a crescent or letter. The winner is just who has the closest shape.

Example: The shape of the antigen is a triangle.



<p>A.</p>  <p>Hint: The antibody needs to be concave</p>	<p>B.</p>  <p>Hint: The antibody needs to be sharp, not curved</p>
<p>C.</p>  <p>Hint: Antigen shape has fewer sides than a square or rectangle.</p>	<p>D.</p> 

← How the antigen fits in

What was the shape? Triangle

How many lines/pencil strokes did it take to create the antibody? 2

What hints were most helpful? That it needed fewer sides.

Use the next two pages for your drawings. If you have more than two rounds, please use a separate sheet of paper.

2.

A. Hint:	B. Hint:
C. Hint:	D.

What was the shape? _____

How many lines/pencil strokes did it take to create the antibody? _____

What hints were most helpful? _____

3.

<p>A.</p> <p>Hint:</p>	<p>B.</p> <p>Hint:</p>
<p>C.</p> <p>Hint:</p>	<p>D.</p>

What was the shape? _____

How many lines/pencil strokes did it take to create the antibody? _____

What hints were most helpful? _____

Build an Antibody Background

An antibody must have certain characteristics to an antigen to link to it and effectively tag it for the immune system. This phenomenon might be similar to how a glove fits over your hand. What are the qualities of a good glove? Think about fit, size, personal choices like style/patterns...

Build an Antibody Experiment

Instructions:

1. First, cut out the shapes on pgs. 6-7 along the black line perimeter for each of the immune cells, and antigens. For the “Y” shaped antibodies, be sure to keep the “Y” parts together. Some white space around the antibody is okay for this exercise.

2. Then spread out the shapes in front of you on the desk to see how each part goes together. Antibodies fit together based on characteristics like geometry (think puzzle pieces), charge, and other chemical characteristics.

For this exercise:

a. Connect the antigens to the antibodies based on geometry by orienting them so that the edges line up.

b. Connect them based on chemical characteristics by lining up the same patterns.

c. Connect them based on charge by lining up the complementary charges. For example, a negative (-) antigen must connect to a positive (+) part of the antigen, and two antigens next to each other must have different charges.

3. Use tape to connect each relevant part to each other. This represents the *bonds* and not the sugars physically linking; the sugars chemically link.

4. *Optional:* Customize your diagram with colors, designs, or anything else you want. You can specify what the immune cell is as well.

Pick up your linked antibody, antigens, and immune cell. What happens now that the sugar links were added?

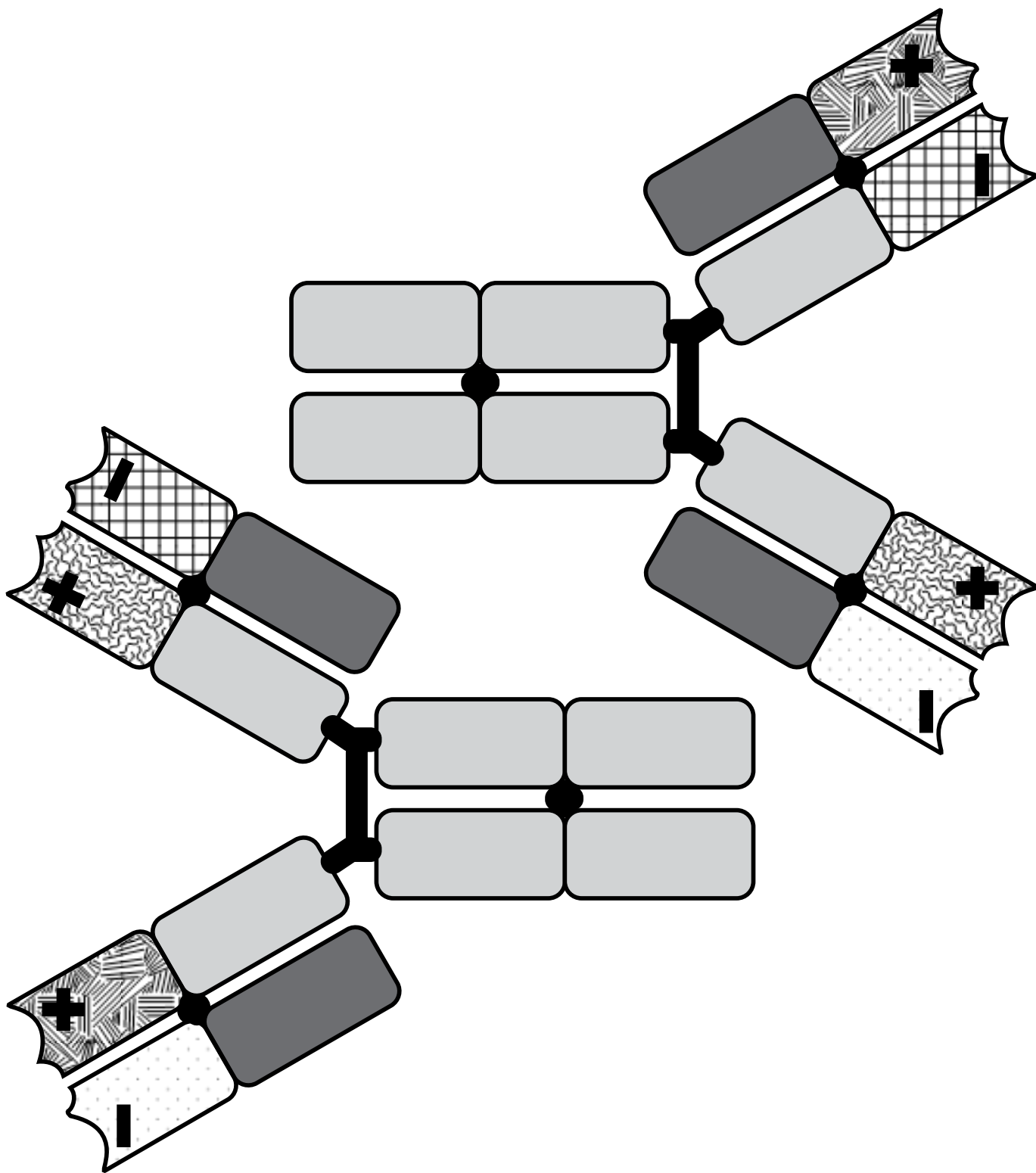
Extension Activity

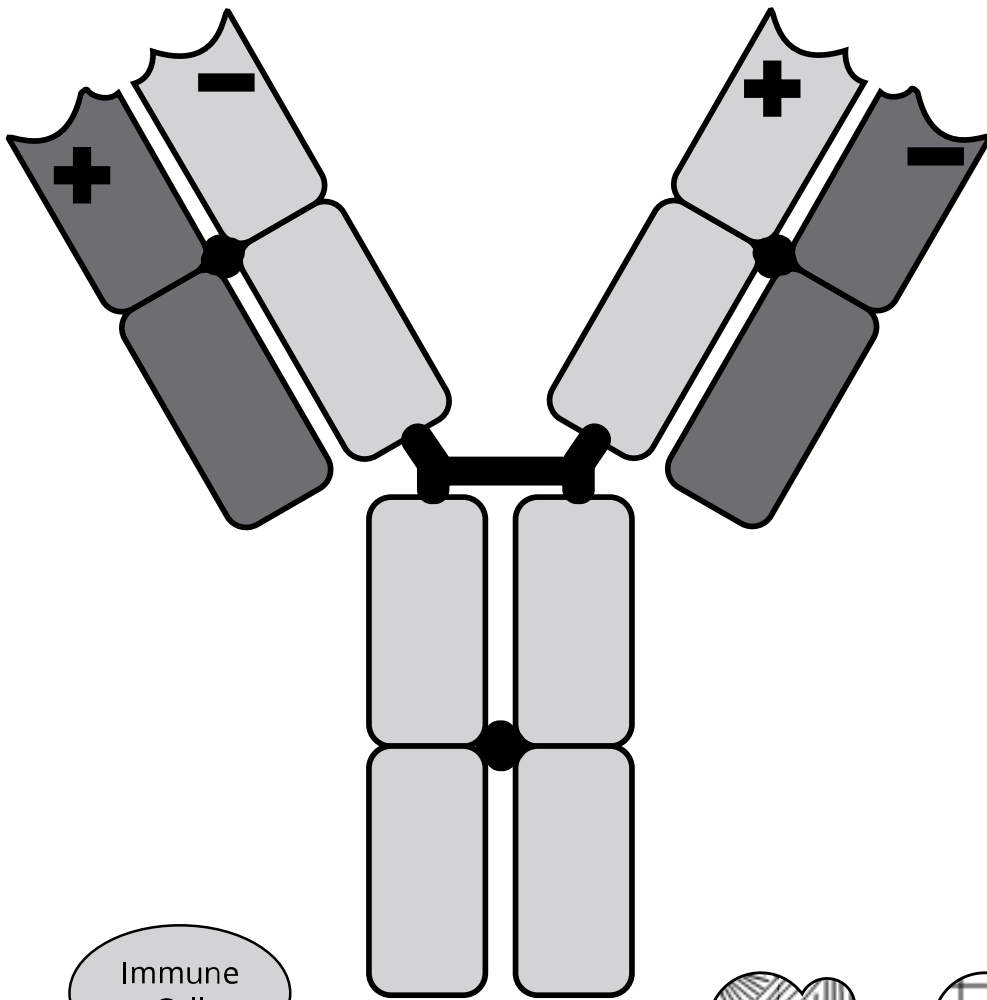
Here are some interesting videos to check out about the immune system:

<https://www.youtube.com/watch?v=GfJK3dwCWCw>, <https://www.youtube.com/watch?v=2DFN4IBZ3rl>

<https://www.youtube.com/watch?v=rd2cf5hValM>

Green, Hank, director. *Immune System, Part 1-3: Crash Course A&P #45-47*. YouTube, Crashcourse, 8 Dec. 2015, www.youtube.com/watch?v=GfJK3dwCWCw.





- Immune Cell
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