

# Name: \_\_\_\_\_ Membrane Diffusion Lab

In this investigation, you will explore the process of diffusion across a semi-permeable cell membrane.

Part 1: Go to the following website: <http://phet.colorado.edu/en/simulation/membrane-channels> . Click “Run Now” (bright green)

1. Add 5 blue “Gated Channels” – space them out evenly
  - a. Make sure the channels are closed
2. Let the green dots represent solute (like salt) and the blue diamonds represent water molecules
3. Add 20 green dots and 20 blue diamonds into the top section of the cell (let this be the inside of the cell)
4. Add 40 blue diamonds to the bottom section of the cell (let this be the outside of the cell)
5. Would this be Passive or Active Transport? \_\_\_\_\_
6. Is the cell “hypotonic”(gaining water), “hypertonic” (losing water) or “isotonic” (free flow of water) to the surrounding fluid? Explain.  
\_\_\_\_\_  
\_\_\_\_\_
7. You are about to open both of the channels at the same time, what do you expect to happen?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
8. Was there facilitated diffusion present? Explain. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
9. Open both types of channels at the same time and begin a timer for 15 seconds.
10. After 15 seconds, pause the simulation and count how many green dots and blue diamonds are one each side of the cell membrane.

	Inside of Cell (top of simulation)		Outside of cell (bottom of simulation)	
	Solute (green dots)	Water molecules (blue diamonds)	Solute (green dots)	Water molecules (blue diamonds)
0 seconds	20	20	0	40
15 Seconds				
30 Seconds				
45 Seconds				
60 Seconds				

11. If you could see this cell and could watch this happen, what would you see the cell do?  
\_\_\_\_\_  
\_\_\_\_\_
12. Which type of transport was this? How do you know? \_\_\_\_\_  
\_\_\_\_\_
13. Please describe which specific part of a cell membrane molecules freely flow through. \_\_\_\_\_  
\_\_\_\_\_

Part 2:

14. Click the "Clear Particles" icon
15. Add 20 green dots and 40 blue diamonds into the top section of the cell (let this be the inside of the cell)
16. Add 20 blue diamonds to the bottom section of the cell (let this be the outside of the cell)
17. Is the cell "hypotonic", "hypertonic" or "isotonic" to the surrounding fluid? Explain.

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18. You are about to open both of the channels at the same time, what do you expect to happen?

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19. Is this Active Transport? Explain. \_\_\_\_\_

20. Which part of the cell might molecules that diffuse through the membrane go to? \_\_\_\_\_

21. Open both types of channels at the same time and begin a timer for 15 seconds.

22. After 15 seconds, pause the simulation and count how many green dots and blue diamonds are on each side of the cell membrane.

	Inside of Cell (top of simulation)		Outside of cell (bottom of simulation)	
	Solute (green dots)	Water molecules (blue diamonds)	Solute (green dots)	Water molecules (blue diamonds)
0 seconds	20	40	0	20
15 Seconds				
30 Seconds				
45 Seconds				
60 Seconds				

23. If you could see this cell and could watch this happen, what would you see the cell do?

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24. What is the purpose of a protein channel in the cell membrane? \_\_\_\_\_

25. What is the purpose of a carbohydrate chain on a protein in the cell membrane? \_\_\_\_\_

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Part 3:

26. Click the "Clear Particles" icon
27. Add 20 green dots and 40 blue diamonds into the top section of the cell (let this be the inside of the cell)
28. Add 40 blue diamonds to the bottom section of the cell (let this be the outside of the cell)
29. Is the cell "hypotonic", "hypertonic" or "isotonic" to the surrounding fluid? Explain.

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30. You are about to open both of the channels at the same time, what do you expect to happen?

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31. Open both types of channels at the same time and begin a timer for 15 seconds.

32. After 15 seconds, pause the simulation and count how many green dots and blue diamonds are one each side of the cell membrane.

	Inside of Cell (top of simulation)		Outside of cell (bottom of simulation)	
	Solute (green dots)	Water molecules (blue diamonds)	Solute (green dots)	Water molecules (blue diamonds)
0 seconds	20	40	0	40
15 Seconds				
30 Seconds				
45 Seconds				
60 Seconds				

33. If you could see this cell and could watch this happen, what would you see the cell do?

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34. What are the two main parts of a phospholipid in the cell membrane? \_\_\_\_\_

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35. Construct a graph. But, before you do, answer the following questions:

- a. What do you think is the important information to graph?

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- b. Is the data you chose to graph, relevant to our lab?

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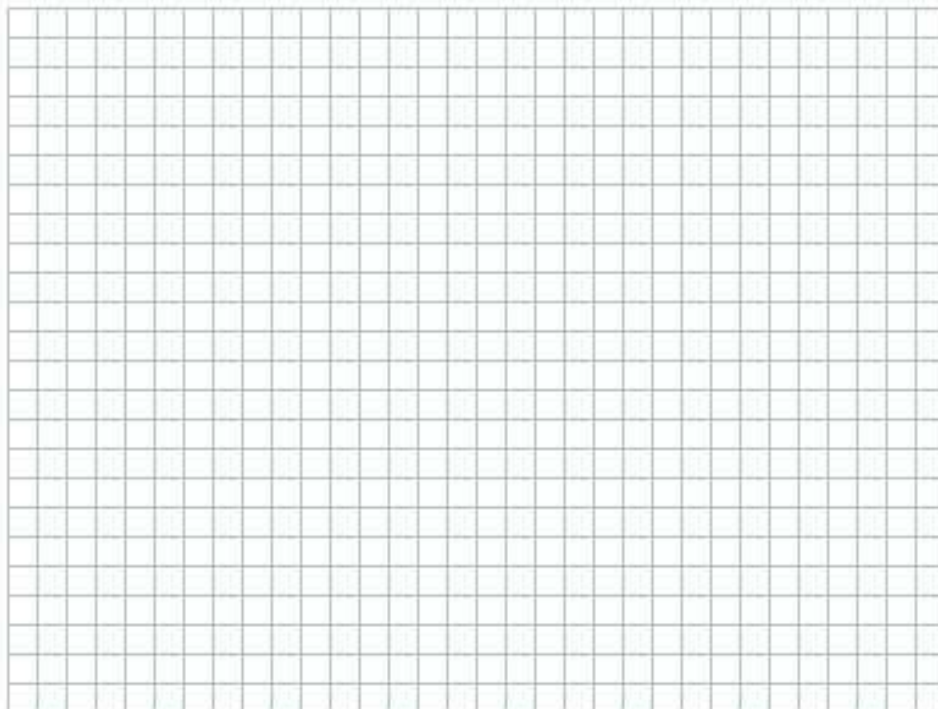
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- c. What type of graph should you create (i.e. line graph, bar graph, pie chart, etc.)? Why?

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36. What can you learn by looking at your graph?

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37. Use your graph to make a claim about this investigation.

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38. What is the main difference between passive and active transport?

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39. What is the role of a phospholipid in membrane transport?

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40. Draw three cells with Passive Transport, each using a different term from the following list (facilitated diffusion, diffusion, osmosis).