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Disease Transmittance and Population Dynamics

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Final ***integrated*** **project / lesson plan** (teams-Due: Thursday, August 12th)

Submit as hard copy AND electronically through ANGEL

Names: Logan Newman; Brian Bizzigotti; Kristen Frank
Grade level(s)/Subject taught: 9 -10 Algebra A and Living Environment Biology
Objectives: 1. At the end of this lesson the student will understand disease transmittance and the population dynamics of a disease with differing virulence rates. 2. At the end of this lesson the student will display experimental data, make scatter plots, describe what is happening in each scatter plot, and determine specific probabilities of survival.

Describe the *integrated* Mathematical - Science Concepts or "key ideas" that modeling will be used to teach: (e.g. Students use mathematical modeling/ multiple representation to provide a means of presenting, interpreting, communicating, and connecting mathematical information and relationships and… Organisms maintain a dynamic equilibrium that sustains life).

Mathematical - Science Concepts to be integrated:

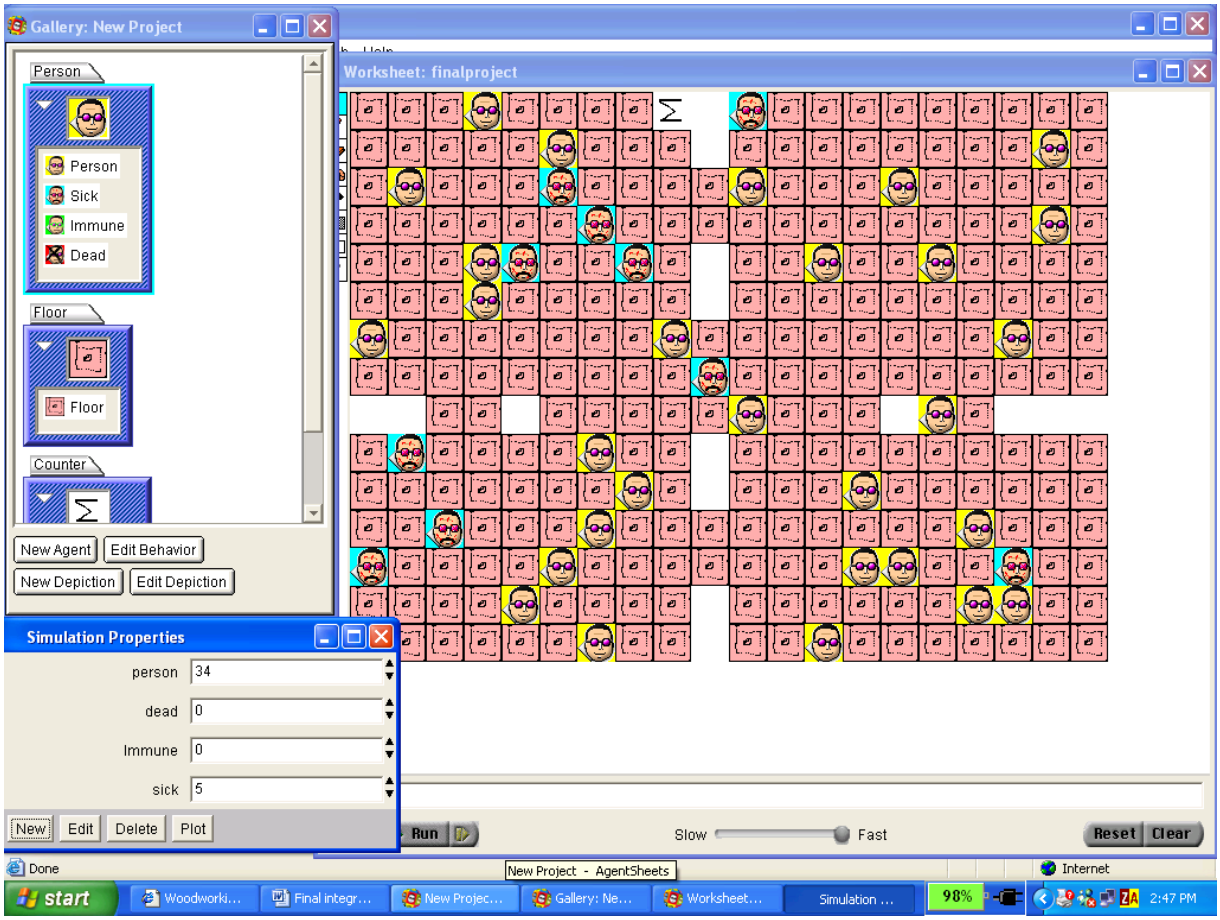
For your ***integrated*** **project / lesson plan)** lesson (team effort), describe how you plan on using a desired modeling software package(s) with your students AND how you might integrate or weave together the two (or more…) math and science concepts into one or more lessons. You might describe what a visitor might see walking into your classroom during this lesson. You might also describe the role of the student during the entire lesson and your role as the teacher. Please try to be specific as possible. Also, construct a tentative rubric that you might use with your students. ** see example page 5.

Prompts:

1. How will you assess the prior knowledge of the student?
2. How will you begin the lesson?
3. What are the teacher and students doing every 5-10 minutes? (Teacher Actions and Student Actions
4. Describe your thinking of how the concepts will be integrated.
5. How will you assess the learning for the lesson?
6. How will the chosen software/tool(s) be integrated into our teaching as per rubrics in this packet? (i.e. you may want to discuss a problem or describe how you might use the chosen modeling package in your plan. How does the model/tool help the concept(s) to be taught)?

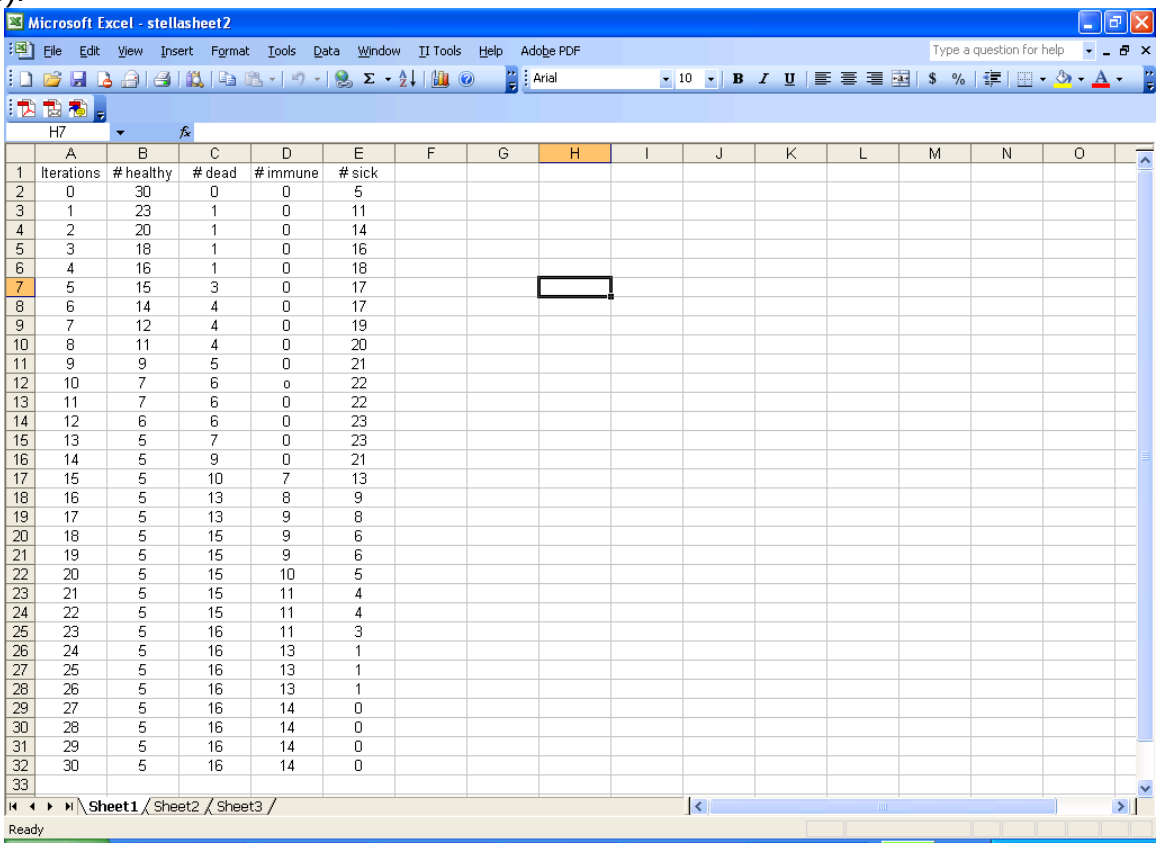
Using _____ *I plan on having my students…*
(software / modeling tool)

For a Biology class I will have had a discussion of the Dark Ages and the Bubonic Plague and we would have talked about the fact that it killed 75% of the people that it came in contact with. From there we would start to discuss the various things that cause disease to be transferred to others. I would introduce the Agent software that we are using and discuss the various aspects and agents of the model that we have built into it. I would run it once to show them the results of our specific design "Healthy people have a 85% chance of becoming sick. Sick people have a 5% chance of dying. A healthy person next to a dead person (Unburied for 5 iterations) has a 5% chance of getting sick. All sick people will become immune (unless they die) after 10 iterations."



Having done this I would then ask them to make a specific hypothesis as a class as to what would happen if we changed the percent chance of becoming sick, and we would test that together. Then I would ask them to start making their own hypotheses based on changing the various percentages that we have built into the model. As the students go through this I will be walking around the room helping the students to figure out problems that they encounter. To assess the lesson I will check their hypotheses as I walk around and measure these against the known results to see what our results will be.

For math class we will have previously taught a lesson on how to complete a scatter plot given a data chart. As a class we will then use the data chart completed in science class and type the values in excel as a spreadsheet. Once all the data is typed in we will use the chart wizard in excel to do scatter plots for each individual variable (healthy, sick, immune, and dead people).



	A	B	C	D	E
1	Iterations	# healthy	# dead	# immune	# sick
2	0	30	0	0	5
3	1	23	1	0	11
4	2	20	1	0	14
5	3	18	1	0	16
6	4	16	1	0	18
7	5	15	3	0	17
8	6	14	4	0	17
9	7	12	4	0	19
10	8	11	4	0	20
11	9	9	5	0	21
12	10	7	6	o	22
13	11	7	6	0	22
14	12	6	6	0	23
15	13	5	7	0	23
16	14	5	9	0	21
17	15	5	10	7	13
18	16	5	13	8	9
19	17	5	13	9	8
20	18	5	15	9	6
21	19	5	15	9	6
22	20	5	15	10	5
23	21	5	15	11	4
24	22	5	15	11	4
25	23	5	16	11	3
26	24	5	16	13	1
27	25	5	16	13	1
28	26	5	16	13	1
29	27	5	16	14	0
30	28	5	16	14	0
31	29	5	16	14	0
32	30	5	16	14	0
33					

Once all graphs are completed, we will ask students to describe the relationship between each variable and time. Students will also calculate specific probabilities for the trial such as what is the probability you will get sick and become immune, or what is the probability a person will

remain healthy?