



Lessons from the Salvadori Classrooms
LESSON TITLE: Bubble Your Home
PREPARED BY: Kubi Ackerman (revised by Michael Bettencourt)
TOPIC: Home
SSLAM: Home / Math / Explore
Copyright © 2006 Salvadori Center

Bubble Your Home

Content Focus: Math

- Calculation: Percents
- Geometric Shapes and Relationships
- Modeling: Spatial Reasoning
- Ratio and Proportion

Content Focus: Technology

- Construction Technologies







Content Focus: Built Environment

- Architectural Drawing / 2D
- Function
- Mapping
- Measuring/Estimating
- Observing/Surveying
- Space

Performance Outcome

- Create a Bubble diagram illustrating the square footage of each program element in your ideal home.

Standards/Interdisciplinary Connections

					
S	S	L	A	M	T
Science	Social Studies	Language Arts	Art - Visual	Math	Technology

How To Read The Symbols: The symbols in **bold** indicate the subject standards that this lesson satisfies.



Lessons from the Salvadori Classrooms
LESSON TITLE: Bubble Your Home
PREPARED BY: Kubi Ackerman (revised by Michael Bettencourt)
TOPIC: Home
SSLAM: Home / Math / Explore
Copyright © 2006 Salvadori Center

Lesson Outline (1 - 3 lessons)

1. Motivation
2. The Challenge
3. Develop The Program Of You Dream House
4. Create A Bubble Diagram Of Your Dream House
5. Present
6. Reflect
7. Extensions And Variations
8. Middle School Standards

Salvadori Prerequisites

- FOUNDATION - BASIC SKILLS: Measuring/Estimating (Activity #2); Architectural Drawing / 2D (Activity #2); Observing/Surveying (Activity #2); Mapping (Activity #2)
- FOUNDATION - ARCHITECTURE 101:Function (Activity #2); Space (Activity #1, Activity #3)
- LESSON(S): "American Dream House" (Home / Art / Pull Apart)
- Familiarity with calculating area

CONCEPTS

- The visual representation of abstract information through diagramming can help to create relationships between otherwise separate concepts.
- Measuring and analyzing the square footage of interior spaces bolsters measuring skills and a helps to develop a sense of spatial dimension.
- Analyzing the areas and relationships between different programs areas early in the design process helps determine the size and relative location of separate spaces within the building.

RESOURCES

On-Line

- <http://www.shodor.org/interactivate/activities/vdiagram/> - This is an interactive Venn diagram site that incorporates concepts from math and biology.
- <http://www.sustland.umn.edu/design/bubble.htm> - This site has a good description of using bubble diagrams in the design process.
- http://www.okstate.edu/osu_orgs/asla/LA2223/Concept/LA2223-p3.html - A wonderful illustration of the process of developing a bubble diagram into floor plan.



MATERIALS

Facilitator

- : Q&A/Teacher Tips

Students

- Yardsticks or tape measures, rulers, triangles, pencils, graph paper

MOTIVATION

- *Who or what is your favorite singer, rapper, band or musician?*

Organize students into groups of three. Separately, each student chooses one artist.

List information about the artist you have chosen.

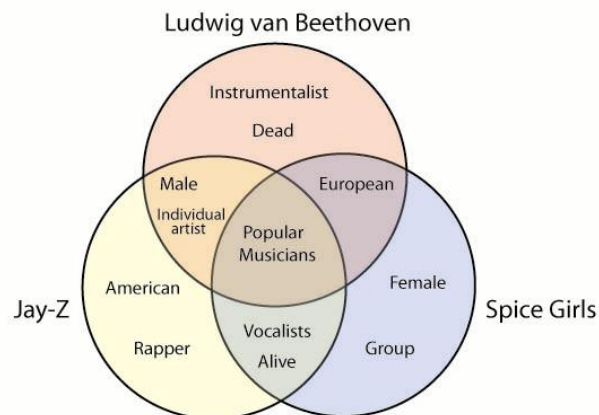
- *Is the artist male or female? How would you characterize his/her musical styles?*
- *Is s/he active in other fields than music, such as acting, writing, or politics?*

In your groups, create Venn diagrams with three bubbles, one for each artist.

Fill in the diagram with the information from your lists, placing each item in the proper part of the bubble.

Try to think of at least one piece of information for each overlapping section of the diagram.

If the class is unfamiliar with Venn diagrams, you may want to demonstrate the concept with one group's lists on the blackboard.



Groups present their diagrams to the class.



- *Was it difficult to think of things these artists had in common?*
- *Are there things that these artists have in common that you would not have thought of had you not completed this exercise?*

You have created a type of bubble diagram called a Venn Diagram.

- *What other types of activities or tasks might Venn diagrams be used for?* ●: Teacher Tips/Q&A

THE CHALLENGE

You will be designing the program for your dream house and arranging it within its environment, or its “site”. Try to incorporate as many of your favorite activities as possible into a house with no more than 4,000 square feet.

DEVELOP THE PROGRAM OF YOUR DREAM HOUSE

Fold a sheet of paper in half. Make a list of the activities that take place in your home on the left side of the page.

Now, make a list of the different rooms or spaces in your home on the right side.

Draw connections between the lists showing the interaction of activities and spaces.

- *Are there rooms in your home in which more than one type of activity takes place?*
- *Are there rooms that you use for activities other than what they are designed for? (For example, do you ever do your homework in the kitchen, or sleep on the living room couch?) If so, make those connections as well between your two lists.*

*In the field of architecture, the way space is used within a building is called its **program**. Imagine that you had the chance to build your dream house. What would be the ideal program arrangement of the house? In other words, what types of activities would you like to be able to do and what types of spaces would these require?*

- *Are there additional program elements you would like to add to your dream house that are not yet on your list? If so, add them.*

Think about how much space each activity requires. Estimating the dimensions of this workspace to help you visualize size, come up with an ideal square footage for each program element.



- What types of things do you need to consider? ●: Teacher Tips/Q&A

Record the square footage requirement for each activity.

Add up your total square footage. If the total exceeds 4,000 square feet, decrease some program area allotments so that the total is reduced to the allowable limit.

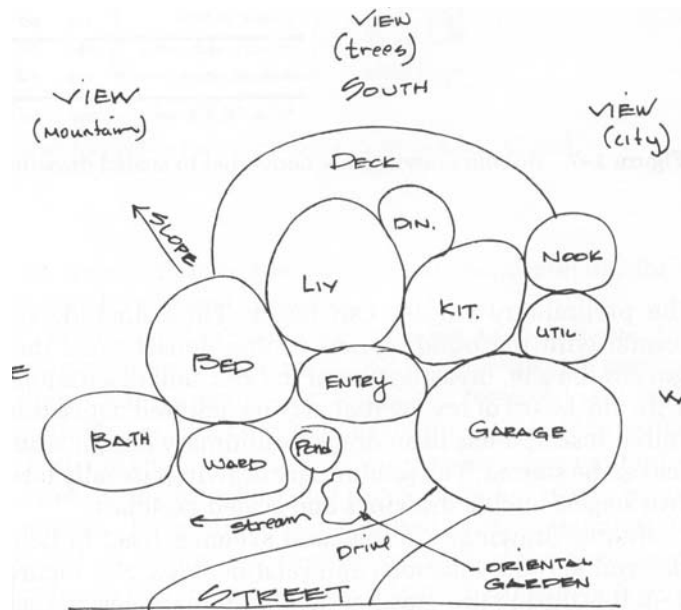
CREATE A BUBBLE DIAGRAM OF YOUR DREAM HOUSE

You will now use your list of activities and rooms to create a bubble diagram of your dream house.

Like the Venn diagram you constructed earlier, this bubble diagram will show connections or similarities—between rooms, rather than between people.

Unlike the Venn diagram, these similarities will be indicated by lines drawn between bubbles, not by overlapping the bubbles. The more lines you draw between any two bubbles (rooms), the more similar the activities that take place within them.

Such bubble diagrams are used by architects and planners to obtain the arrangement (and approximate size) of spaces within a building, park or other area they are designing. Here is an example of one:



Now, consider the type of environment you want for your dream house:

- Is it on the edge of a city block?



- *Is it in a forest, with a stream running off to one side?*

Begin by drawing the dream site for your dream house.

Distribute graph paper and have students sketch in a rough site plan. They should do so in a way that keeps elements of the setting on the edges of the paper, so that the center is free for the diagram.

Students determine the location of the entrance to their house in relation to its site and mark it on their paper.

You are now ready to create your bubble diagram. Because it needs to show both the size of each area and its relation to other areas, the diagram will be to scale. In this case, each square on your graph paper represents a 2' x 2' area, or 4 square feet. Go through the square footage allotments in your program list.

- *Approximately how many graph paper squares will each take up?* ●: Teacher Tips/Q&A

Students convert their square footage allotments to scale and begin drawing.

The difference between a bubble diagram and a floor plan is that a bubble diagram is a very rough sketch of spatial relationships, whereas a floor plan shows the exact shapes of each room, where the walls and doors will be, etc. Since you are making a bubble diagram, you do not need to show the shape of each room, nor does each bubble need to cover exactly the right number of squares. Rather, you are creating a visual aid to show the approximate locations and sizes of your program areas.

Students begin to create their bubble diagrams using their program lists as a guide. As they develop their diagrams, have them consider these questions:

- *Which program area do you want to enter in to?*
- *Based on the connections you made in your program list, which areas should be next to or close to one another?*
- *Which program areas do you want to be far apart from one another? (For example, you might not get much work done if you had a study right next to a game room!)*
- *Where do you want your largest or most important program areas to be?*
- *What kind of site features do you need to consider? (For example, you might not want your bedroom to be close to a busy street intersection.)*
- *Have you added areas for circulation, such as hallways or walkways?*

Students complete their bubble diagrams and indicate with lines or arrows program areas that have a strong correspondence, such as the kitchen and dining room, making sure such areas are next to or close to one another.



PRESENT

- Students color their bubble diagrams and present them to the class.

REFLECT

- *Do you think that creating the bubble diagram would help you to develop your floor plan? How might you go about developing the floor plan from the bubble diagram?*
- *What are the different ways program areas connect in real buildings?*
- *What program areas take up the most area in your diagram? Why?*
- *Compare your diagram to another student's diagram. What are some similarities? What are some differences? What does this comparison tell you about your own interests versus the other student's priorities?*
- *Did you find it difficult to get your program areas to fit together well? Why or why not?*
- *How well did you meet your challenge? What would you do differently next time?*

EXTENSIONS AND VARIATIONS

- Students create floor plans from their bubble diagrams, using the same scale.
- The class creates a bubble diagram to scale of the different program areas in the school.
- Students create circulation flowcharts of their dream homes to demonstrate the different ways one can move between different spaces.
- Students create bubble diagram sections after they have completed their plans to show multiple stories and to indicate ceiling heights and circulation between levels. They can then model a three-dimensional bubble diagram using clay and sticks, balloons and wire, or other such materials.

MIDDLE SCHOOL STANDARDS

Language Arts

- Speaking, Listening, and Viewing (E3b, c)

Art - Visual

- Structures and Functions



Lessons from the Salvadori Classrooms
LESSON TITLE: Bubble Your Home
PREPARED BY: Kubi Ackerman (revised by Michael Bettencourt)
TOPIC: Home
SSLAM: Home / Math / Explore
Copyright © 2006 Salvadori Center

Math

- Number and Operations Standard
- Algebra
- Geometry
- Measurement
- Representation

Technology

- The Designed World (20)

MOTIVATION

- You have created a type of bubble diagram called a Venn Diagram. What other types of activities or tasks might Venn diagrams be used for?

Q&A: Venn Diagrams are used in mathematics and engineering as a way of solving difficult logic problems. They are also used in marketing, business, and any other field in which it is important to be able to visualize sets of items and relationships between the sets. Example: A company interested in developing a new anti-virus program wants to determine the right market to target. The developer knows that not all computers are susceptible to all viruses, and that some computers already have anti-virus programs in place. Whom could they target? A Venn diagram is a clear way to display this information

DEVELOP THE PROGRAM OF YOUR DREAM HOUSE

- Think about how much space each activity requires. Using the dimensions of the classroom to visualize size, come up with an ideal square footage for each program element. What types of things do you need to consider?

Q&A: While the amount of square footage allotted to different program elements is going to be a subjective decision, students should consider factors such as the amount of movement required within each area, the space required for furniture and other objects in each program area, the number of people they would like to be accommodated in each space, and circulation (moving between different spaces). In certain cases, such as if a student wants to include a basketball court, there may be very specific size requirements. Students should also consider that there may be activities which take place in multiple areas. The total areas needed for these activities should be divided between individual program elements.

CREATE A BUBBLE DIAGRAM OF YOUR DREAM HOUSE

- You are now ready to create your bubble diagram. Because it needs to show both the size of each area and its relation to other areas, the diagram will be to scale. In this case, each square on your graph paper represents a 2' x 2' area, or 4 square feet. Go through the square footage allotments in your program list. Approximately how many graph paper squares will each take up?

Teacher Tip: The scale of 1 graph square = 4 square feet works well if students have under 4,000 square feet and are using 1 sheet of graph paper. You can experiment with different scales using two or more sheets of paper taped together, or better yet, have students determine their own scale based on the size of their house.