Home Design Lesson Plan: 7th-8th Grades

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Overview:

Each team of students will design and create a small home. They will be focused on square footage and shape in conjunction to home layout.

**This lesson has an optional Day 2.**

Purpose (Objective):

Students will apply concepts of geometry as they design a home of 1,200 square feet. They may use any dimensions and shape for this design. As part of this design, they will work with scale drawings as well as calculating square feet.

Materials:

Graph paper

Activity (Explore):

1. As groups, students will decide on the dimensions of the outside wall of their homes. The home’s square footage must be 1,200. The groups will each make a to-scale model on graph paper. Groups must decide on the scale they will use (how much one box on the graph paper will represent. For example, if two boxes equals one foot, and my home is 30 ft x 40 ft, then my scale drawing would be 60 boxes x 80 boxes).
2. After students have decided on and drawn their outside dimensions, they will then start laying out the interior of their homes. Students should refer to the informational sheet for typical dimensions of walls, rooms, etc.
3. As a group, students add walls, rooms, halls, entries, doors, etc., to their design. As they are doing this, they must calculate the square footage for each area of the home. This can become difficult as they take out the space occupied by walls.
4. Students will then present their designs to the class. They will discuss the following questions:
	* Why did you choose these specific dimensions?
	* How many bedrooms and bathrooms did you add?
	* What do you love about your design?
	* What would you change about it if you were to do it again?

If time does not allow for every group to present to the entire class, you may have three groups present to each other. The teacher(s) should move around the room to get an idea of how each group is doing. Have students do peer evaluations of the presentations based on the same questions.

Closure/Conclusion:

After the presentations, bring the entire class back together and discuss what they enjoyed about the project. The following questions may be used to guide discussion:

1. What was your favorite part about today’s activity?
2. How many of you would want to design a bigger home?
3. What did you learn from today’s activity?

Assessment:

Students will be assessed on three items:

1. Design and the correct calculations of square footage.
2. Presentation of the design.
3. Participation in their group. This can be done by teacher observation and grading, but student peer evaluations also may be included.

OPTIONAL DAY 2 (1.5 hours)

Materials:

Blueprints from Day 1, masking tape, chalk, measuring tapes

Activity (Explore):

1. In the same teams the students had to create their blueprints, they will now create a life-size layout of their homes. If space does not allow, have students select the best design or a couple of designs to produce at full scale.
2. The teacher should take a moment to explain that the Pythagorean Theorem will be needed to make the house square, and to discuss wall thickness (one piece of masking tape does not represent the thickness of a wall).
3. Give the students 45 minutes to produce full-scale/life-size layouts of their homes. This can be done by using:
* Chalk on a playground.
* Tape or yarn with small pieces of tape, in a large open space or in a gym.
* Yarn or string with tent stakes on a grassy area.
1. Students will present their designs to their classmates and each team member needs to take part in the presentation.
2. Students clean up the materials used.

Closure/Conclusion:

After the presentations, bring the entire class back together and discuss what they enjoyed about the project. The following questions may be used to guide discussion:

* What was your favorite part about today’s activity?
* What was the most difficult part of the activity?
* What did you learn from today’s activity?
* Did your design work at full scale?

Assessment:

Students are assessed on two things. First the teacher should assess their presentation and appropriate design. Second, students should do peer evaluations of the other members in their group.

Home Design Lesson Plan Script: Day 1

* Introduce yourself and tell the students that you are there to do a fun activity with them that will use some of their math skills to help them design a home.
* Take a minute to tell how important math is to building homes. Specifically tell them how they use perimeter, area and other measurements and how important they are to construction.
* Explain that homes are built there must be blueprints (plans) made. These plans need to take into account the sizes of our typical furniture and appliances such as beds, bathtubs and washing machines. It is also important to think about where things are located in a home. You wouldn’t want your front door to lead into a bedroom or have a bathroom in the middle of your kitchen. These are important questions to think about with homes.
* Explain to the students that you are going to break them up into groups of 2-5 (depending upon teacher recommendation) and they are going to design a home that is 1,200 sf. Explain that as groups the students will decide what the dimensions are that make 1,200 sf.
* Explain that you are going to give them a piece of graph paper. They are going to have to decide what the scale will be for each square. For example if each square is 2ft by 2 ft then a 30 foot length will be 15 squares long.
* Give the handout explaining expectations. On that handout is a list of basic dimensions for hallways, bathrooms etc. Refer them to this list and tell them to remember to use these hints.
* Explain to them about walls. Walls are not just a line, but have mass. How much of a square is each wall going to take up (To simplify the exercise make walls 6in wide). So when you are drawing your walls, you need to draw and shade in the wall mass.
	+ Show an example blueprint and show how the walls are drawn.
* Tell the students that they are going to be giving a presentation on their design. To prepare for that presentations, write these questions on the board:
	1. Why did you choose these specific dimensions?
	2. How many bedrooms and bathrooms did you add?
	3. What do you love about your design?
	4. What would you change about it if you were to do it again?
	5. What was the hardest part of the project?

Explain that they will need to answer these questions in their presentation.

* Tell the students the specific amount of time they have to work. This will depend upon how long your explanation took as well as the length of time you have been allotted by the teacher. Remember to allow enough time for the presentations.

Home Design Lesson Plan Script: Day 1 (cont’d)

* Ask if there are any questions. If not, break them up into groups, hand out the assignment and graph paper and let them work.
* As the students work, walk around and interact with them. Help them if they are struggling to understand how to draw walls or help them to get started. If you see major problems you might bring it to their attention with a question, such as: Right now I see you have a 30x80 house. That is 2,400 square feet. We need 2100.
* Also, while the students are working you may want to keep them on track by giving them a warning every 10 minutes. For example, you have 20 min left and then you have 10 min left etc.
* When the time is up, you will want to bring all of the student’s attention back up to the front. You will remind them that they are going to give a 2-3 minute presentation on their design. Using the following questions written on the board.
* Ask which group wants to go first and proceed in that fashion. If one group goes on a long time you may have to find a kind way to stop them. If one group struggles to say anything, you may need to prompt them with one of the questions.
* After every group has had an opportunity to present, you will take 5-10 minutes to recap, discuss or bring things you feel would be pertinent. For example: if all of the groups struggled with finding the sq feet, you could address and talk about that. If all of the groups had problems with the walls, discuss that. Maybe you will want to ask them what they would add if they were to make the home bigger.
* After this you are done. Wrap up with thanking them and saying good bye.

Notes:

If you plan to come back and do the Day 2 lesson plan when they turn their blueprints into full size designs, then you may want to collect their blueprints or have the teacher collect them, so they are not lost in the interim.

The grading rubric is available if you or the teacher would like to fill those out for each student and give them a grade.

Home Design Lesson Plan Script: Day 2

For Day 2 you will need to be flexible because each school and classroom set up will be different.

* It is important to introduce yourself again when you begin. Remind them of the designs they created the first time you were there. Tell them that today they are going to make those designs life sized.
* If there is not space for the students to create all of these homes, you may want to pick three designs and group the students in larger groups. This will depend up the available space at the school.
* Depending upon the method that will be used (chalk on a playground, tape on the floor, yard and stakes in the grass, etc.), explain to the students the materials that they will use create a life-size blueprint. Then create a few discipline rules. No hitting with yard sticks. No running around. Everyone is working/participating.
* Address the idea of making the house square. The students should have already heard of the Pythagorean Theorem (a2+b2=c2). If they don’t remember, do a quick refresher. Explain that they will use this method to make sure the corners are square.



* Remind the students that they will need to give a brief presentation at the end. This purpose of the presentation is to share a few things with the class: What did they learn from making this life-sized? What was difficult about the project? How would you change your house design if you were to do it again?
* Let the students to work. Wander around while they work and help them calculate, measure, etc. Watch your clock and make sure there is enough time to do presentations. This will depend upon the time that you have been allotted by the teacher.
* When time is up, pick a group that will present first. If they are not giving any information, use questions to prompt them. If they go too long, kindly help them end.
* If you want to conclude where they are working you may, or you may want to have them clean up and then return to the classroom before you lead a quick conclusion discussion. It is during this discussion that you can help student understand the process of a builder and the fun and difficult parts of building/designing a home.
* Here are other questions to be addressed during the presentations and conclusion discussion.
	1. What was your favorite part about today’s activity?
	2. What was the most difficult part of the activity?

Home Design Lesson Plan Script: Day 2 (cont’d)

* 1. What did you learn from today’s activity?
	2. Did their design work at full scale?
* Thank the students for their time and ask if they have any questions for you about home building.

Home Design Student Handout

You will be designing a 1,200-square foot home. You will draw a scale drawing on the graph paper provided for you. First, you will need to decide on your outside wall dimensions. Remember that to calculate square footage you must take Length times the Width (LxW=A). After you have decided on you basic dimensions, you will need to decide the size that each square on your graph paper will represent. For example, is each square a 1 foot by 1 foot representation, a 2 foot by 2 foot representation, or some other measurement?

General Building Dimensions

Now that you have your outer walls, you will need to know a few general building dimensions. Refer to the list below as you begin your designs.

* Walls need to be at least 6 inches thick.
* Hallways need to be 3 feet wide.
* Interior doors are 2.5 feet wide.
* Outside doors are 3 feet wide.
* A typical small bathroom is 5 ft by 8 ft (master bathrooms are usually larger).
* A typical small bedroom is at least 10 ft x 10 ft (master bedrooms are usually larger).

Discuss as a group what you want in your house.

* How many bedrooms, bathrooms, closets, entry ways, kitchen, hallways, etc.?
* Decide where you will walk in and if there will be a back door.
* Discuss and decide where you want your rooms and how large you want them to be.

Once you have made some decisions, you can start adding walls and doorways to your home. Remember to make them to scale and label the length and width of everything.

Now calculate the square footage of each room, remember not to count the wall space in your area calculations. Label each room, hallway, bathroom or closet with the square footage.

Prepare to give a 3-5 minute presentation on your design that addresses the following questions:

* Why did you choose these specific dimensions?
* How many bedrooms and bathrooms did you add?
* What do you love about your design?
* What would you change about it if you were to do it again?
* What was the hardest part of the project?

\*Note: You will be graded on group participation, your presentation and the calculations on your model.

Peer Evaluation Form

Evaluate each of your group members on a scale of 1-5:

* 5=Helped on all aspects of the project, had a positive attitude and contributed.
* 3=Peer helped about half of the time, he/she wasn’t always engaged in what was going on and didn’t contribute as much as he/she could have.
* 1=Peer didn’t help on the project, or the presentation. Had a poor attitude.

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| --- | --- | --- | --- |
| Student’s Name | How much did this student contribute to the group’s design? | How much did this student contribute to the group’s presentation | What would you give this student as an overall grade? |
| 1. |  |  |  |
| 2. |  |  |  |
| 3. |  |  |  |
| 4. |  |  |  |
| 5. |  |  |  |