Tiny House Design Lesson Plan (5th-6th grades)

# Tiny House Design Lesson Plan: 5th – 6th Grades

Overview:

Each team of students will design and create a tiny house floor plan. They will make decisions about the most important elements of a home (bedroom, bathroom, kitchen, etc.) and create a tiny home that fits within a 25x20 foot perimeter.

**This lesson has an optional second day.**

Purpose (Objective):

Students will apply geometry concepts including perimeter, area and measurement. (This may also be linked to a math curriculum item of measurement depending upon the state and curriculum.)

Tiny House Design Lesson Plan:
Day 1 (1.5 hours)

Materials:

Pencils, graph paper, PowerPoint presentation, rulers or other measuring devices. (See the support materials.)

Activity (Explore):

The teams should discuss what elements of a home they feel are the most important and how they want to design their home (doors, storage space, bed, kitchen, etc.) There is not enough space in a tiny home to allow students to have everything they may want, so it is important for them to discuss what is most important and be creative with their placement and size of items. A table of items is provided to help the students.

Each block on the graph paper will represent a space of 1 foot by 1 foot. Squares may be split into half if needed. After groups have discussed what ideas they have and what they want to include, they will work together as a team to visually depict their design by creating a “blueprint” on the graph paper. It is important that they use and understand the standards outlined in the table of items. For example, if a toilet takes a space of 1 ½ squares by 2 squares, then students cannot design a toilet smaller to fit a smaller space. Walls also take up space.

Give the students 15-30 minutes (depending upon your time restraints) to design their homes.

Closure/Conclusion:

After the presentations, use the remaining time to discover as a class what works, what doesn’t and why. Discuss what worked the best, what the students discovered and what they would change if they were to do this again. Discuss what students would do with twice the square footage. What elements would they add?

Assessment:

After the students have created their blueprints, they are assessed on the appropriate use of the table of items and their sizes, as well as appropriate measurement on the blueprint. Students also are assessed on their presentation to the class. Each group will take two to three minutes to explain their designs to the class and why they chose their design. The teacher may need to use questions to lead students to these conclusions.

Tiny House Design Lesson Plan:
Optional Day 2 (1.5 hours)

Materials:

Blueprints from day 1, masking tape, yarn, chalk, yard sticks, measuring tapes

Activity (Explore):

Students should remain in the same teams they had to create their blueprints. On Day 2, they will create a life-size layout of their tiny houses. The teacher should take a moment to discuss wall thickness (one piece of masking tape does not represent the thickness of a wall).

Give the students 30 minutes to produce full-scale/life-size layouts of their homes. This can be done in a number of different ways, using:

* Chalk and yardsticks 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

Students will present their designs to their classmates, with each team member required to take an active part in the presentation.

Finally, students clean up the materials used.

Closure/Conclusion:

After the presentations, use the remaining time to discover as a class what works, what doesn’t and why. What did they discover and what would they change if they were to do this again? You may also take the discussion one step further by asking: What you would do if you were to double the size of the home? Where would you put that extra space? What important elements would you add if you had to live in this home for a year?

Explain to students that carpenters, plumbers, electricians, and other skilled tradesmen also do layouts like this for their work.

Assessment:

Students are assessed based on two things. First, after the students have created their life-size home, each group will take a few minutes to explain their designs to the class. What did they find that didn’t work in the life-size model? For example, there isn’t enough room in the bathroom to open and close the door, or there isn’t enough walk space between the bed and the wall, no storage space, no closet space to put clothes or there is nowhere to sit down and eat. The teacher may need to use questions to lead students to these conclusions.

Students also will be assessed on participation. As students work, the teacher(s) will observe to see that each student is participating.

Script for Tiny House Design Lesson Plan

* Introduce yourself. Tell 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.
* Explain how important math is to building homes. You can tell them how builders use perimeter, area and measurement and how important they are to construction.
* Explain that before any home is built, blueprints and plans must be made. These plans need to take into account the size of our typical furniture and appliances such as beds, bathtubs, couches. It is also important to think about where things are located in a home. You wouldn’t want your front door to walk into your bedroom or have a bathroom in the middle of your kitchen. These are important questions for builders to think about when designing homes.
* Present the PowerPoint presentation. Tiny homes or mini homes are a big trend right now. They are homes that are not very big, but have all the important parts of home that you will need, such as bathrooms and kitchens. Discuss the characteristics of these smaller homes.
* Now with that information we are going to break you up in to groups of 2-5 (depending upon teacher recommendation) and you are going to design a home that has a 20 foot by 25 foot perimeter. I am going to give you a piece of graph paper that has these exact dimensions. Each square on the graph represents a one foot by one foot area. You will need to use the list of items I pass out to help you understand the dimensions of certain things that go into a home. For example if you want a bathtub in your home, it is going to take up more room than if you add a shower. After we have worked on designing your home for 15-30 minutes, you will each have the opportunity to present your blueprint and tell us about it. There are also some presentation questions on the sheet I will hand out to help you think about what you say.
* Now, before you get started, I need to tell you something about walls. Walls are not just a line, but are solid mass. Today we are going to make our walls six inches wide. How much of a square is each wall going to take up? Half a square. So when you are drawing your walls, you need to draw and shade in the wall mass. (The builder will want to show the example blueprint and show how the walls are drawn.)
* So here is what you’re are going to do:
	1. Draw the outside walls.
	2. Decide where you want your rooms and draw the interior walls.
	3. Write in the length and width of each room. Remember you can count this with the squares.
	4. Draw in the furniture, counters, appliances, etc., according to their size on the Table of Items.
	5. Calculate the square footage of the entire home. Remember that you will use the formula LxW=A.
	6. If you finish before time is up, you can prepare your presentation.

Script for Tiny House Design Lesson Plan (cont’d)

* On the sheet I am handing out to you, there is a list of tasks you can follow.
* Now with the help of the teacher, break up the student into groups. Give each group a copy of the Table of Items as well as two or three copies of the graph paper.
* 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 get started. If you see major problems you might bring it to their attention with a question, such as: Do you think that a shower, toilet and sink are all going to fit in that space?
* 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 minutes left and then you have 10 minutes 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 1-2 minute presentation on their design. Using the following questions:
	1. Tell us about your design.
	2. What problems did you run into?
	3. What would you change if you were to do it again?
* 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 tactful 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 up things you feel would be pertinent. For example: If all of the groups struggled with the size of the bathroom, then you can bring that up and talk about it. If all of the groups had problems with the walls, you can address 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 and can wrap up with thanking them and saying good bye.

Notes:

* If you plan to return for the second day when they turn their blueprints into full-size homes, then you may want to collect their blueprints or have the teacher collect them, so they are not lost before Day 2.
* The grading rubric is available if you or the teacher would like to fill those out for each student and give them a grade.

Tiny House Design Student Evaluation

|  |  |  |  |
| --- | --- | --- | --- |
| Student Names | Blueprint | Presentation | Participation |
| 1: |  1 2 3 |  1 2 3 |  1 2 3 |
| 2: |  1 2 3 |  1 2 3 |  1 2 3 |
| 3: |  1 2 3 |  1 2 3 |  1 2 3 |
| 4: |  1 2 3 |  1 2 3 |  1 2 3 |
| 5: |  1 2 3 |  1 2 3 |  1 2 3 |

Grading Rubric

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Points | 1 |  | 2 |  | 3 |
| Blue Print | Did not add anything to the blueprint.  |  | Blueprint includes some walls and furniture. |  | Used all provided space. Blueprint included wall dimensions, furniture and square footage. |
| Presentation | Did not say or do anything during the presentation. |  | Stood with the group and helped a little, said a little, but didn’t engage much in the explanation of what, why or how. |  | Vocally presented at least one item from the house and explained a why, what, how question. (Example: Why they did something, how they would change it or what they did.) |
| Participation | Added very little to the group throughout the entire activity. |  | Helped some, but was not always engaged with the group and helping. |  | Worked with the group and helped throughout each stage of the activity. Helped and added to the discussion. |

Tiny House Design Student Handout

Task List

1. Draw perimeter walls, interior walls, doors and windows.
2. Write in length and width of each room.
3. Draw furniture, counters, appliances etc. (Remember it must be to scale, use table below.)
4. Calculate the homes square footage (hint: LxW=A).
5. Prepare to present your design for 1-2 minutes.

Table of Items

* Walls: 6 in or 0.5 ft
* Bed, Queen: 5 ft x 7 ft
* Bed, Twin: 3 ft x 6 ft
* Toilet: Standard 1 ft x 2 ft
* Counter: 2 ft deep
* Kitchen Sink: 1 ft x 2 ft
* Bathtub: 3 ft x 5 ft
* Shower 3 ft x 3 ft or 2 ft x 4 ft
* Oven/range: 2.5 ft wide x 2 ft deep
* Refrigerator: 2 ft x 2 ft
* Couch: 3 ft x 4 ft or 3 ft x 6 ft
* Kitchen table: 3 ft round or 3 ft x 3 ft square
* Closets: Designed as you wish. Remember that you must have 6-inch walls.
* Doors: 2.5 ft or 3 ft wide (The front door must be 3 ft.)

Presentation

1. Tell us about your design.
2. What problems did you see or have?
3. What would you change if you were to design this again?