

GROW YOUR PALS PROGRAM GUIDE



THE NATIONAL FFA MENTORING PROGRAM

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LESSON 21

Develop an Understanding of Structural Design and Budgeting

Unit:
**AGRICULTURAL MECHANICS
AND TECHNOLOGY**

PRECEPTS

- A. Action
 - A2. Focus on results
 - A3. Plan effectivelycommunity



Lesson Type:
Large Group

NATIONAL STANDARDS

NM-NUM.3-5.3. Compute Fluently and Make Reasonable Estimates
NSS-EC.K-4.2. Effective Decision-making

STUDENT LEARNING OBJECTIVES

As a result of this lesson, the student will ...

1. Experiment with structural design and budgeting.





TIME

Instruction time for this lesson: **60 minutes.**



RESOURCES

None



TOOLS, EQUIPMENT AND SUPPLIES

- ✓ 20 plastic drinking straws – per group
- ✓ 20 straight pins – per group
- ✓ 10 small paper clips – per group
- ✓ 1 roll of masking tape – per group
- ✓ 1 measuring tape – per group
- ✓ writing utensil – 1 per student
- ✓ paper – 1 sheet per student
- ✓ calculator – per group



KEY TERMS

The following terms are presented in this lesson and appear in ***bold italics***:

None

INTEREST APPROACH

In this interest approach, connect what students already know about large structures with what goes into building them.

Hello! We are very excited to be here with you all today. Think for a moment about the largest human-made structures on the Earth. Hint: the Eiffel Tower, the Great Wall of China, etc. List as many of these structures as you can on a sheet of paper when you hear me say LIST. Your PALS may help you. What questions are there?

LIST!

Students have about one minute, or more as needed, to create a list of large/tall human-made structures. Allow for sharing of a few after time is called.



Finish up writing that last example and be ready to share a few with the rest of us. Who will share one first?

Allow several students to share.

Thanks for the awesome examples. It is pretty amazing that we have been able to create so many amazing structures throughout history, but how often do we stop and think about what it took to build these amazing structures? Today, we are going to do just that, because we will all have the opportunity to build our own amazing structure. If you're ready to find out how, turn to your PALS and say, "Let's Build!"

SUMMARY OF CONTENT AND TEACHING STRATEGIES

OBJECTIVE 1. | Experiment with structural design and budgeting.



Students will experiment with structural design and budgeting.



We are going to begin our projects by working together with our PALS. The big PALS will set up the activities, and the younger PALS will actually get to build the structure. Big PALS, remember to keep track of the materials used as well as the total costs.

Explain the following directions and make sure to check for understanding before starting the building. List on the writing surface the costs of all materials.

straws \$1
paper clips 20 cents
straight pins 10 cents
masking tape 20 cents per inch



Here are the instructions for the construction project, so listen carefully. When I say BUILD, your group's challenge is to build the tallest possible structure at the lowest possible cost. Your structure must be freestanding (stand on its own without additional supports). Before you build, work with your group to come up with a plan to get your structure as tall as you can, but by spending as little money as possible for your materials. All material costs are listed. We will have 30 minutes to plan and build our tower. What questions are there?

BUILD!

Older PALS keep track of each group's items and costs while assisting with ideas and group planning. Construction should be limited to the younger PALS. Give several time updates along the way.



One minute warning ... and stop! All hands off your structures!

Some structures may fall down. Have older PALS measure the height of the towers for their group and calculate how much was spent on supplies. The big PALS will then report findings to the entire class.



Great work! Your big PALS will measure your structure and report how much was spent on supplies. Let's rotate around the room and record our results on the writing surface.

After all of the groups have reported, have big PALS in each group discuss the following questions with the little PALS:

1. What was the most difficult part about building the structure?
2. What problems did we have to solve?
3. What changes did we make after beginning the construction?
4. If we could do it again, what changes would we make?
5. How might we have cut costs?
6. What could we have done if we spent more money?

After time for group discussions, allow each group to share some of their thoughts with the rest of the class.



Let's take a minute to share what we learned so far. What group will share their thoughts first?

Allow for reasonable discussion.



Now in your groups, discuss how you could apply what you have learned so far today to agricultural structures such as barns, fences and equipment sheds. How can we use this knowledge of planning structures for the lowest costs in agriculture? Spend a few minutes in your groups discussing how this applies to agriculture.



PALS will lead discussions in their own groups.



REVIEW / SUMMARY

When we started today, we began with images of pyramids, large skyscrapers, dams and monuments. On a smaller scale, our groups got to create their own human-made structure. We learned about effective planning, working together and keeping costs low. We learned that these principles also apply to agricultural structures, and, hopefully, we each have a better idea of what goes into building these structures.



APPLICATION

Small Group Suggestion: *Have groups rebuild their structure in less time and using less money/fewer supplies. Facilitate a discussion on how this was or was not accomplished.*



One-on-One Session: *Have students repeat the experiment, but they must complete the construction on their own. What was different about working alone?*

EVALUATION- ANSWER KEY

Use the Eyewitness News Moment to review content. Students will assume the roles of cameraperson, interviewer and expert in their groups. The interviewer will be reporting “Live from the Structural Design Conference,” and will ask the expert questions about what happened at the conference and what he or she learned about design and budgeting. After a few questions, the roles will be switched so that each student in the group will get to assume each role.

So now that we are all experts at designing and budgeting, we are going to practice a little of what we have learned. Imagine you have all just learned this information at a conference, and a news reporter wants to interview you about what went on there. Think about what you would say you learned. In your groups, your PALS will help you rotate through the roles of news reporter, expert and cameraperson to see just what you have learned today. Each of you will get to try out the various roles. PALS, please set up your groups.

Take as much time as available to rotate students through the roles. When finished, wrap up activity.

Thank you all so much for your efforts today. Remember, take what you have learned today and apply it. When you see those large structures in the world, or even drive by a barn, remember what it took to plan, build and contain costs on the structure. We will see you all next time!

ANSWERS TO EVALUATION:

Older PALS will monitor the Eyewitness News Moment and provide necessary feedback to the students as needed.