

Subject: Tech Ed

Unit: Bridge Building

Part I: Clarity of Learning Targets

What are the grade level indicators that go with this unit? Place a star next to the grade level indicators that are Power Indicators. Are the indicators in student friendly language? Place the level of Bloom's Taxonomy next to each Power Indicator.

- Students will **understand** why triangles are used to support structures (Conceptual).
- Students will **understand** the concepts of scaled drawings, how they relate to bridge building and how to transfer a computer design to full size design (Conceptual).
- Students will **understand** bridge components, their function and importance (Knowledge):
 - Road bed (bridge bottom)
 - Sides
 - Top
 - Understructure
- Students will **understand** that the bottom of the bridge holds the weight and the top of the bridge prevents it from caving in on itself (Conceptual).
- Students will **apply** their knowledge of triangles to **create** a bridge design (Conceptual).
- Students will **evaluate** their bridge design using bridge testing software (Procedural).
- Students will **create** a bridge with a limited amount of materials (Procedural).
- Students will **perform** tests on their bridge and **analyze** the results (Procedural).
- Students will **evaluate** the efficiency of their bridges (Conceptual).

What are the Big Ideas that go with this unit?

1. The purpose of design is to create something that works (functionality) and looks nice (aesthetically pleasing).
2. All structures must contend with two types of forces: live loads and dead loads.
3. Forces create stress on structures.
4. Bridge efficiency is the relationship between how much the bridge weighs and how much weight it can hold.

What are the Essential Questions that go with this unit?

1. What are the components of design and why are they important to keep in mind as you are making a product?
2. What are the different types of forces and why are they important to think about when designing a bridge?
3. Why is it important to understand how stress impacts a structure?
4. Why are some bridges able to hold more weight than others?

What strategies will we use in order to make learning targets clearer for all students, before, during and after instruction? How will you communicate the learning indicators to students?

- Show overview instructional video to introduce unit
- Share Essential Questions #s2, 3 and 4 prior to Bridge Building Introduction packet
- Read packet and complete Bridge Building Introduction questions.
- Students will have unit instructions available on the common student folder for OFMS
- Teacher will provide Big Ideas and Essential Questions #1 to students
- Teacher will use rubrics and class discussions in order to help students identify what a quality bridge looks like.
- Students will self and peer assess work and reference learning targets when doing so.

Part II: Feedback and Assessments (Formative and Summative)

How will we provide students with feedback throughout the unit?

What formative assessments will we use? (Non-graded assignments that check for understanding and provide feedback to the students) Incorporate the 7 Strategies of Assessment for Learning here.

NOTE: Need some major feedback as it relates to the importance of the bridge bottom

- Teacher shares models of strong and weak examples of the project throughout the unit with students
- Teacher shares models of strong and weak bottoms of the project before students begin drawing
- A formative checklist will be used that allows the students to self and peer assess at checkpoints throughout the unit.

How will students be involved with keeping track of their own learning progress (note—this is different than tracking points for a grade)?

- Student has a self-check sheet to record self and peer feedback that will help them know if they are on track to complete the project

What summative assessments will we use? (Graded, evaluative assessments)

- Teacher will grade the project before testing using the rubric
- Teacher will grade reflection questions at the end of the project (10 pts)

Part III: Instruction and Student Activities

What instructional and student activities will we use for this unit? These activities should directly align with the indicators and assessments.

1. Complete [Bridge building introduction](#). Use **Model Bridges** packet to answer questions
2. Get together with group and each group member should **sketch** 3 top, 3 bottom, & 3 side bridge designs.
3. [See Truss Designs examples](#)

Websites for additional help

[Bridge building basics](#)
www.balsabridge.com

4. Choose 1 top, bottom, & side design, and then **see me**. (*Consider how much wood will be used you don't want to run out. You are limited to 30 feet of wood*)
5. Test side design on **West Point Bridge Designer**. (**Set deck elevation to 12 meters.**)
6. When you have a working side design print it out and transfer to ½ size sheet of graph paper. *Use a ruler to transfer printout to graph paper.* You will need to get this paper from the teacher.
7. Bring the finished ½ sheet to your teacher to check your work.
8. If your drawing is approved, you will transfer it to the full size sheet. (11' x 17")
9. Draw the side design on a sheet of 11" x 17" graph paper; use a ruler. The bottom of the side **must be 12" long**.
10. Draw the top and bottom designs on a separate sheet of 11" x 17" graph paper. Use a ruler. The bridge bottom **MUST BE 12" LONG AND 3" WIDE**. The top design **MUST BE 3" WIDE and as long as the top of your side design**.
11. After drawing the designs have them checked by your teacher.
12. Mount the drawings to cardboard, cover the 2 11" x 17" drawings with waxed paper.
13. Get building supplies from cart, see your teacher to receive the 30' of wood