

Architects in Schools Sample Residency Planning Form

Grade Level: 3rd

Residency Info:

Residency Topic/Focus: Bridges

Residency Goals:

Students will:

- Learn about different types of bridges.
- Understand basic structural principles and how bridges resist loads.
- Understand how design and engineering can solve problems.
- Design, build, and test their bridge models.

Possible activities in support of residency goals:

- View and discuss images of bridge types in Portland and elsewhere.
- Architects in Schools Curriculum Guide lesson 4.69: How It Feels To Be A Structure
- Architects in Schools Curriculum Guide lesson 4.97: All About Bridges!
- Demonstrate tension and compression using lines on a sponge.
- Use marshmallows and toothpicks to demonstrate the strength of a triangle vs a square.
- Talk about how the different kinds of bridges use these shapes to support the loads they carry (beams, trusses, arches). Show diagrams illustrating these concepts.

Other resources you plan to use during your residency:

- General internet research for photos and diagrams
 - The Portland Bridge Book
 - Encouraging visits to local bridges with their families
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Session #1 Info:

Session #1 Date: January 26

Session #1 Time: 10:30-11:30am

Session #1 Plan/Details:

Before the Design Professional comes:

- Teacher to introduce the students to the idea of architecture and the general kind of work an architect does.

Introduction:

- Introduce the design professional and talk about what an architect does.

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Activity or Activities:

- Introduce the project and briefly talk about key issues related to bridge design (connecting communities, teamwork, problem solving).
- Discuss team members involved in building a bridge – architect, engineer, contractor, etc.

Conclusion:

- Introduce the types of bridges (beam, truss, arch, suspension) and types of operable bridges (vertical lift, drawbridge, swing).
- Show images around the world including Portland bridges. Fill out a simple worksheet.

Materials needed for Session #1:

- Architect will prepare a slideshow of images for discussion and a worksheet for students identifying Portland bridges
- Slideshow of images worksheet

Teacher follow-up before Session #2:

- Design professional will prepare sponges with lines and a bridge design template.
 - Teacher will supply marshmallows and toothpicks.
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Session #2 Info:

Session #2 Date: February 2

Session #2 Time: 10:30-11:30am

Session #2 Plan/Details:

Introduction:

- Introduce basic structural concepts – compression, tension, arches, trusses.

Activity or Activities:

- Architects in Schools Curriculum Guide lesson 4.69: How It Feels To Be A Structure
- Demonstrate tension and compression using lines on a sponge.
- Use marshmallows and toothpicks to demonstrate the strength of a triangle vs a square.
- Talk about how the different kinds of bridges use these shapes to support the loads they carry (beams, triangles, arches). Show diagrams illustrating these concepts.
- Introduce the template they will use to design their bridge. Explain it will be made of popsicle sticks and masking tape and will be tested to see how much weight it can hold.

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Materials needed for Session #2:

- Sponges with lines
- Marshmallows
- Toothpicks
- Bridge design template

Teacher follow-up before Session #3:

- Teacher to assign partners/groups for the project.
 - Groups should draw a sketch to present to the class on Week 3.
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Session #3 Info:

Session #3 Date: February 9

Session #3 Time: 10:30-11:30am

Session #3 Plan/Details:

Activity or Activities:

- Each group presents their bridge designs with a drawing and should answer the following:
 - What type of bridge is it?
 - What crosses the bridge? (cars, trains, bikes, people...)
 - How did you come up with the design?
 - Make a prediction of how much weight it will hold.
- Architects in Schools Curriculum Guide lesson 4.97: All About Bridges!
- Design professional will demonstrate and students will practice building with popsicle sticks and tape.

Materials needed for Session #3:

- Teacher will provide popsicle sticks and masking tape

Teacher follow-up before Session #4:

- Students will begin projects
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Session #4 Info:

Session #4 Date: February 16

Session #4 Time: 10:30-11:30am

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Session #4 Plan/Details:

Activity or Activities:

- Students will work on bridge construction

Materials needed for Session #4:

- Popsicle sticks
 - Masking tape
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Session #5 Info:

Session #5 Date: February 23

Session #5 Time: 10:30-11:30am

Session #5 Plan/Details:

Activity or Activities:

- Students will work on bridge construction

Materials needed for Session #5:

- Popsicle sticks
- Masking tape

Teacher follow-up before Session #6:

- Complete bridges
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Session #6 Info:

Session #6 Date: March 2

Session #6 Time: 10:30-11:30am

Session #6 Plan/Details:

Introduction:

- Briefly discuss students' thoughts about the project - questions, successes, what they might do differently.

Activity or Activities:

- Load test each bridge until it fails and record the results.
- Take before and after photos.

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Materials needed for Session #6:

- Pennies or other weights

Teacher follow-up:

- Help student repair bridges as necessary for May exhibition.