Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period \_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Lesson 2: How Does Cement Content Affect Concrete Strength?**

Cement is one ingredient in the building materials mixture known as concrete. Cement is the primary bonding agent that holds the sand and gravel together in the hardened form of concrete. What is the best mixture ratio of cement that will create the strongest concrete possible?

**Doing the Science**

1. Start the Concrete Structures Simulation by clicking on the “Sim” tab.

2. Click on the “Rebar Center” button. Do not select any rebar for this test.

3. Click on the “Mixing Center” button at the bottom center of the screen.

4. Select five bags each of gravel, water, air, and sand. Do not add any cement. You must choose a total of 20 items to complete your mix.

1. Click on the “Testing Center” button. Set the curing time to 10 days then click on the

“Mix & Cure” button.

6. Test the strength of your concrete beam by adding weights. Record your results in Table 1 below.

7. Select the “Mixing Center” button to create a different mix of concrete.

8. Click on one bag of air, sand, water, and gravel to remove them from the mixing table.

9. Add four bags of cement to the mixing table.

10. Repeat steps 5 – 7.

11. Repeat steps 7 – 9, then steps 5 - 6 to test your new batch of concrete.

**Table 1.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Trial** | **Cement****(bags)** | Air(bags) | **Sand****(bags)** | **Water****(bags)** | **Gravel****(bags)** | **Weight Supported (kg)** |
| **1** | **0** | **5** | **5** | **5** | **5** |  |
| **2** | **4** | **4** | **4** | **4** | **4** |  |
| **3** | **8** | **3** | **3** | **3** | **3** |  |

**Do You Understand?**

1. Which mix of cement resulted in the strongest concrete?

2. Discuss your results from the experiment, that is, why did one mix of cement provide the strongest mix of concrete as compared to the other mixes of cement?