STEM Sims

Concrete Structures

Lesson 1: How Does Water Content Affect Concrete Strength?

Concrete is a mixture of various materials, including water. Water is required to aid in the bonding process of the substances that make up concrete. But how much water is required to achieve the strongest concrete possible?

Doing the Science

- Start the Concrete Structures Simulation by clicking on the "Sim" tab. 1.
- 2. Click on the "Rebar Center" button. Do not select any rebar for this test.
- Click on the "Mixing Center" button at the bottom center of the screen. 3.
- 4. Select five bags each of cement, gravel, air, and sand. Do not add water. You must choose a total of 20 items to complete your mix.
- 5. Click on the "Testing Center" button. Set the curing time to 10 days then click on the "Mix & Cure" button.
- Test the strength of your concrete beam by adding weights. Record your results in Table 6. 1 below.
- 7. Select the "Mixing Center" button to create a different mix of concrete.
- Click on one bag of air, sand, cement, and gravel to remove them from the mixing table. 8.
- Add four bags of water to the mixing table. 9.
- 10. Repeat steps 5 - 7.
- Repeat steps 7 9, then steps 5 6 to test your new batch of concrete. 11.

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

Table 1.

Do You Understand?

- 1. Which mix of water resulted in the strongest concrete?
- 2. Discuss your results from the experiment, that is, why did one mix of water provide the strongest mix of concrete as compared to the other mixes of water?