

# THE WEIGHT AT THE BOTTOM OF THE BUILDING

M1-14 ENGINEERING

- ▶ Does the weight at the bottom of a building affect the amount of time it can stay standing in a simulated earthquake?

QUESTION

- ▶ My question is does the weight at the bottom of a building affect the stability of a shape in a simulated earthquake? The reason I chose this is partially because I did other things with earthquakes in the past and partially because I think it will affect it but have never seen a test for it. It will help others by helping people keep buildings stable. It will also help with simple Lego, K-Nex, etc. buildings for me and other kids if we want to make it sturdy. My hypothesis is that it will affect it and the higher the weight the longer it will last because the center of gravity will be lower. The procedure is timing the amount of time it takes for the water bottle to fall among other things. The empty bottle was the only one that fell in the minute time limit. That shows that my hypothesis is correct because the empty one fell the fastest.

## ABSTRACT

- ▶ If the weight increases then the time it will take to fall will increase because the center of gravity will be lower.

HYPOTHESIS

- ▶ • Wooden Little Table 21.25 cm x 21.25 cm x 4.5 cm
- ▶ • Back Massager Homemedics Brand
- ▶ • Lumber: 2.5 cm x 25 cm ( 60 cm) 5 cm x 10 cm (37.5 cm) 2.5 x 2.5 ( 75 cm)
- ▶ • Water Bottle (Member's Mark Purified Water)
- ▶ • Access to Tap Water

## MATERIALS

- ▶ 1. To make the shaker table cut the 2 by 4 lumber into two pieces 15.5 cm and one piece into 21 cm.
- ▶ 2. Cut the one by one into two pieces of 15 cm and two pieces of 24.5 cm.
- ▶ 3. Mount the 2x4s on the end of the 1x10 using the hammer and 6d nails.
- ▶ 4. Now mount the three 1x1s next to the 2x4s using the hammer and 3d nails.
- ▶ 5. Put the last 1x1 the across the 2x4s so the box doesn't rise and use the hammer and 3d nails to attach it.
- ▶ 6. Finally, insert the box and it is ready to use.
- ▶ 7. Now put your shaker on a flat surface.

## MAKING THE MATERIALS

- ▶ 1. Start by placing an empty bottle on the table.
- ▶ 2. Turn on the stop watch and the shaker to the max AT THE SAME TIME.
- ▶ 3. When the shape falls over or the stopwatch hits 1 minute turn it off.
- ▶ 4. Write the amount of time down.
- ▶ 5. Repeat with a water bottle full to 100 mL, 250 mL, 500 mL

## PROCEDURE

- ▶ Independent Variable: The weight of the bottle
- ▶ Dependent Variable: Time it takes the bottle to fall
- ▶ Control: Earthquake Power and bottle shape among other things

## PROCEDURE





# EXPERIMENT PICTURES

	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6	Trial 7	Trial 8	Trial 9	Trial 10
0 mG (0 mL)	4.4	8	11.1	16.8	8.2	3.8	5.2	9	2.4	14.1
100 mG (100 mL)	60+	60+	60+	60+	60+	60+	60+	60+	60+	60+
250 mG (250 mL)	60+	60+	60+	60+	60+	60+	60+	60+	60+	60+
500 mG (500 mL)	60+	60+	60+	60+	60+	60+	60+	60+	60+	60+
	Trial 11	Trial 12	Trial 13	Trial 14	Trial 15	Trial 16	Trial 17	Trial 18	Trial 19	Trial 20
0 mG (0 mL)	60+	13.3	60+	7.9	24.6	14.1	12.9	2.8	18.5	23.7
100 mG (100 mL)	60+	60+	60+	60+	60+	60+	60+	60+	60+	60+
250 mG (250 mL)	60+	60+	60+	60+	60+	60+	60+	60+	60+	60+
500 mG (500 mL)	60+	60+	60+	60+	60+	60+	60+	60+	60+	60+

# RESULTS

- ▶ The empty bottle was the only one that fell in the minute time limit. That shows that my hypothesis is correct because the empty one fell the fastest.

CONCLUSION

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