Physics Design Challenge: Ready, Set, Escape!!

"Merry Christmas, Missionary!" You jump quickly out of the way as your captor hurls what must have once been a brightly wrapped package at you. And then, just as you begin to open it, he rips it from your hands. "Never mind!" he screams maniacally. "We have another gift in mind for you."

You are an engineer in a foreign country and you have been arrested for passing out Bibles. You know you and your team must escape within the hour, or you are going to die. In order to escape, you must time the movements of the guards exactly! Using only the materials below that you have discovered in your cell, you have to design a method of timing 3 minutes – the time it takes the guards to change posts – so you can make your break. You will be able to use the clock in the room to check the accuracy of you device. No other type of clock, watch, metronome, or any device that has a pre-made or pre-calibrated timer may be used in your device itself. You will be graded on how close you come to the 3 minutes. Good Luck!

Materials List

Crumpled Christmas bow	Piece of chewing gum
Torn wrapping paper	Washers
Cardboard tube	Cup
Paperclips	Plastic soda bottle - *not necessarily clean*
Bar of soap	

Room clock – may be used to test accuracy and for final testing purposes only

BONUS: You may use ONE additional item that you were able to smuggle past the guards - UPON APPROVAL only.)

Procedure

1. With your group, brainstorm ideas to complete the task (you must include at least three).
2. Choose the best solution.
3. Get approval from your teacher on additional item you wish to use.
4. Explain why that solution was chosen.
5. Sketch solution.
6. Build prototype.
7. Test prototype (record time).
8. Redesign to get a more accurate time.

Brainstorming Ideas (At least 3, be specific enough for me to understand your idea! *10 points*)

Solution (Diagram and description; *10 points*)

Result: Amount over or under the 3 minutes achieved during testing _____ seconds

Post Activity Analysis

Why was your final design chosen over your other design ideas? *(5 points)*

Describe at least one way you could improve on your final design. (5 points)

Grading Scale *(Added to the points earned above)*

+/- 5 seconds – you escape safely with time to spare   70 points
+/- 10 seconds – you probably escape safely, no leeway   60 points
+/- 15 seconds – you may or may not escape good luck!   50 points
+/- 20 seconds – it is highly unlikely that you escape   40 points
Over 20 seconds…*forget it, you're in deep trouble!*