

*Justin Time Challenge*

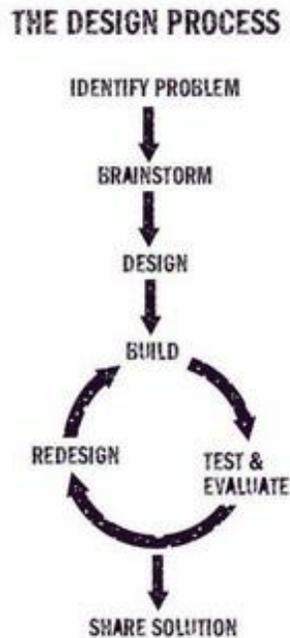
*Student Packet*

Name \_\_\_\_\_

Teacher \_\_\_\_\_

Period \_\_\_\_\_

## *“Justin Time”: An Engineering Design Process Activity*



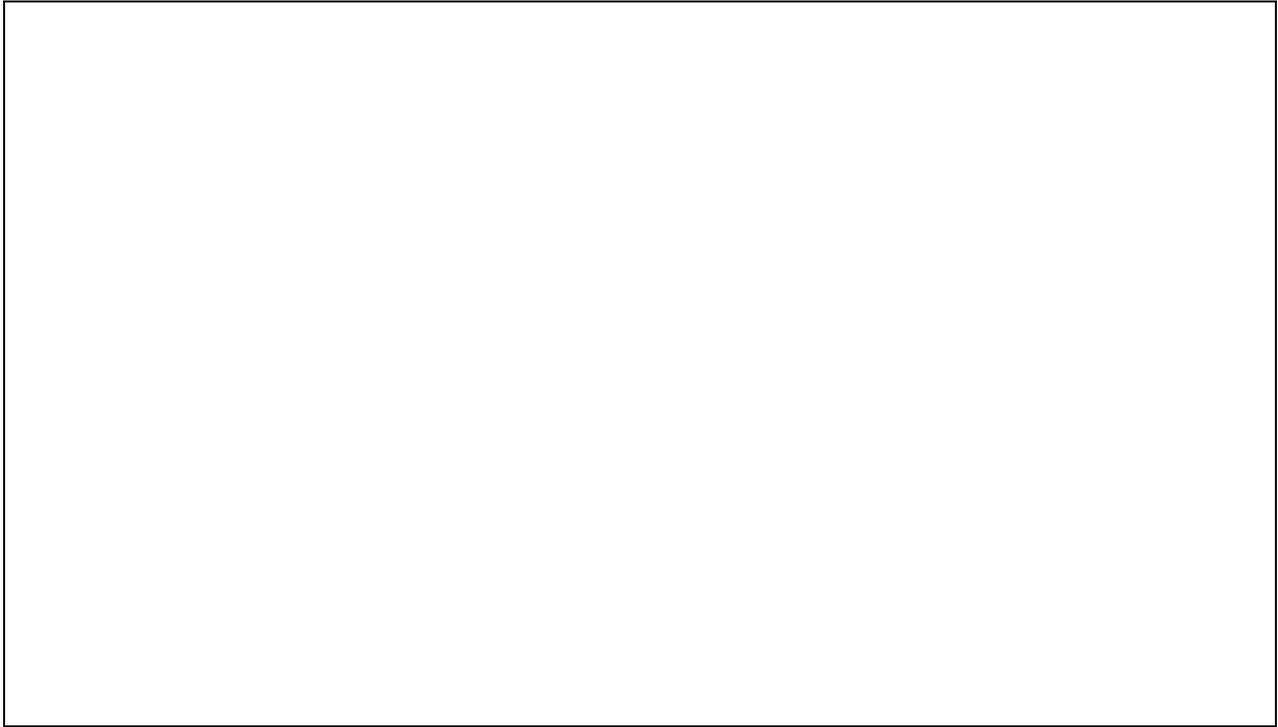
(Source: [www.pbskids.org/designsquad](http://www.pbskids.org/designsquad))

**Design task:** Use the engineering design process to design and build a device to keep time to a Justin Timberlake song.

**Suggested materials:** pennies, paper cups, paper clips, metal washers, string, scissors, tape, craft sticks, protractors, meter sticks

1. Individually brainstorm at least two solutions:

2. Initial group design: What will your device look like? (Draw and explain.)



3. Use the design above to build your device.

4. Test and evaluate your device. ***Please make sure no one is standing in the way of the device during testing and that all testing occurs perpendicular to the floor.***

What are you testing?	Why do you want to test this?	Outcome/results	How will this inform your design?

***“Justin Time”: A Scientific Investigation***

What variables did your group identify as being important for the device?

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Next you will investigate how these variables change the number of swings. We will look at each variable separately.

**Data tables**

**Table 1**

**Weight used in all trials:** \_\_\_\_\_

**Number of swings in 30 seconds**

<b>Length of string</b>	<b>Trial 1</b>	<b>Trial 2</b>	<b>Trial 3</b>

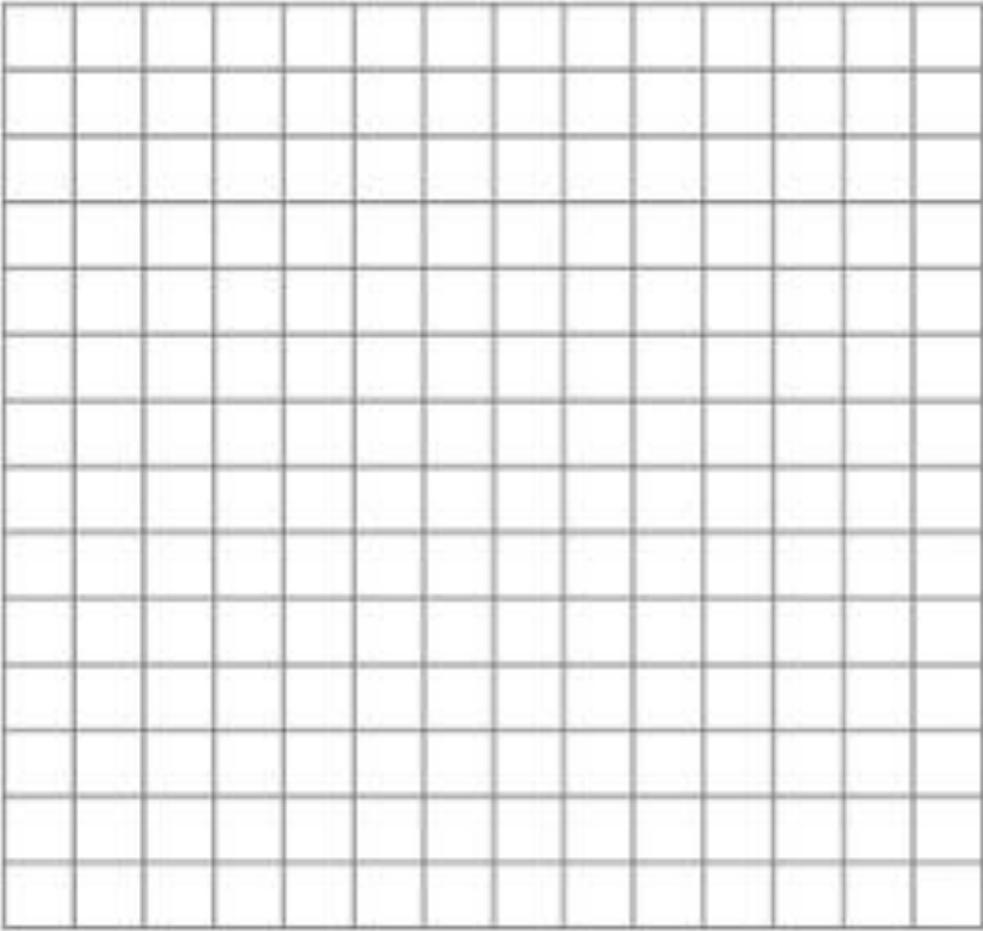
**Table 2**

**Length of string used in all trials: \_\_\_\_\_**

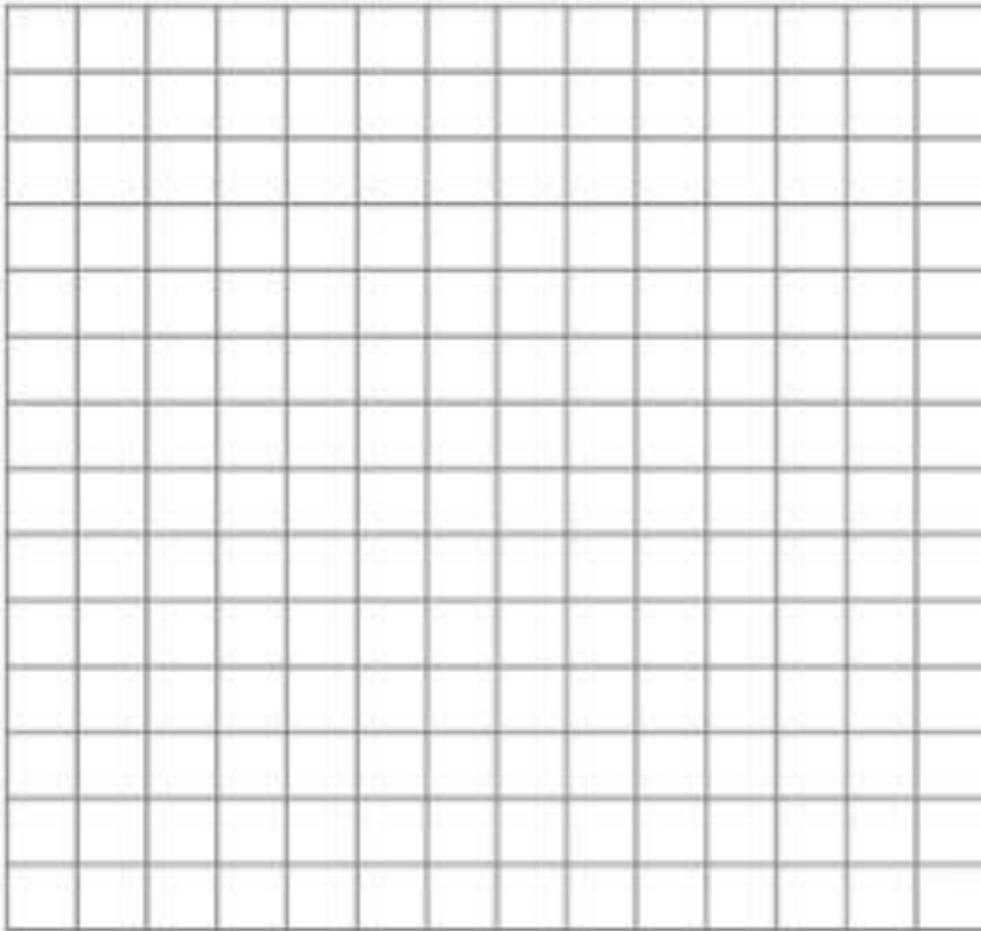
**Number of swings in 30 seconds**

<b>Amount of weight</b>	<b>Trial 1</b>	<b>Trial 2</b>	<b>Trial 3</b>

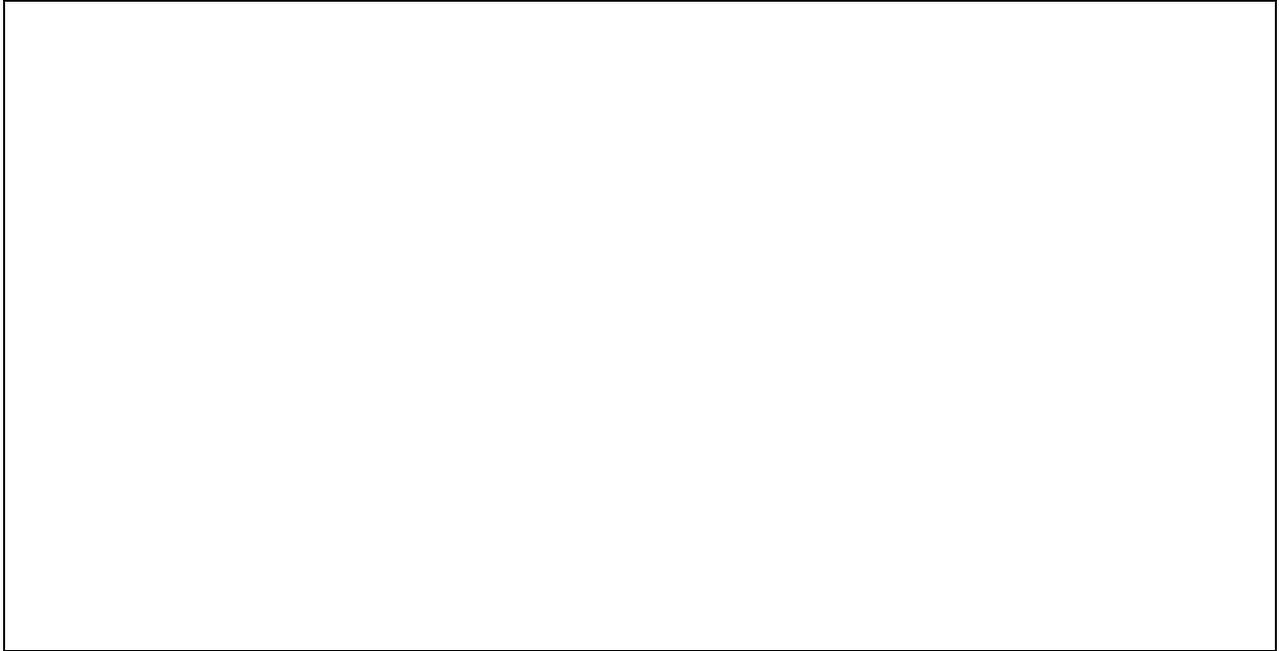
**Graph the data from Table 1:**



**Graph the data from Table 2:**



Redesign based on what you learned from your single variable testing. How can you improve your device? Draw and explain.

A large, empty rectangular box with a thin black border, intended for students to draw and explain their redesign of a device.

Share solution: Be prepared to share with the class not only what your final device looks like, but also how your team worked through the engineering design process.

***Reflection prompt questions (to be answered on a separate sheet of paper)***

Science

What happens to the number of swings when the length of the string is changed?

What happens to the number of swings when the number of washers is changed?

How did the single variable testing inform your group's design decisions?  
How did you use the data from the chart?

### Design product

Did your device work?

What were the variables you "optimized"?

Why is it important to test one variable at a time?

### Design process

How many iterations of the device did your group have?

How did your testing help inform your design decisions?

### Teamwork

How well did your team work together?

How well did your team listen to one another?

### Communication

Did you communicate your ideas clearly to your group?

Did your device reflect your designs?