

Applying Trigonometric Functions to A Distance Time Graph

Attach the CBR2 to the calculator. From the APPS menu select CBL/CBR. Select Ranger from the list. From the Main Menu select 1 Setup/sample. Set Real Time to No and time to 4 sec. Set Begin On to ENTER. Your window should look like the one at the right. Cursor to the top of the window to Start Now and Press ENTER.

```
MAIN MENU      START NOW
-----
REALTIME: NO
TIME(S): 4
DISPLAY: DIST
BEGIN ON: [ENTER]
SMOOTHING: NONE
UNITS: METERS
```

You will be instructed to press ENTER when you are ready to collect data.

```
POINT CBR
AT TARGET

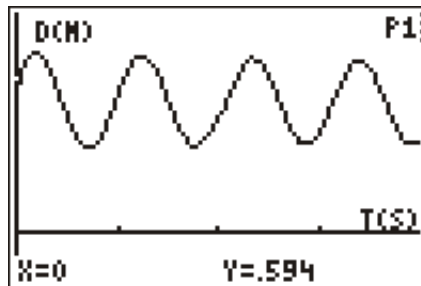
TO START PRESS
[ENTER] ON TI83P
```

You will be letting a ball move up and down while attached to a slinky. Set the CBR2 on the floor and begin to let the ball move up and down above the CBR2. When you have the motion consistent, press ENTER to begin collecting the data. You will collect data for just 4 seconds and then you will see a window that indicates that the data is TRANSFERRING. Do not move the slinky until you hear the clicking stop.

```
TRANSFERRING... '

```

What type of function do you think will fit this graph? Is it a sine or cosine function?



Let's see if we can determine the equation? Press the ON button to quit the APPS. Press $Y=$ and enter a general equation in the first slot.

$y_1 = A\sin(B(x+c))+D$. To write the graph you will need to understand what each of these constants do to the graph $y = \sin(x)$.

Write a brief description of each:

A:

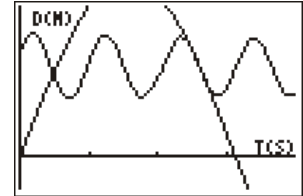
B:

C:

D:

Currently the calculator has a value of zero for each of these variables. You might want to change a few of to equal 1. Store the following values for each: $A = 1$, $B = 1$, $C = 0$ and $D=0$.

If you press GRAPH after these values are stored you should see a graph of the normal sine function with the data.



Let's try to determine the correct value of A. What do you notice about the current value of A and what the real value of A should be?

How can we determine the value for A? Trace along the graph to determine the value of A. Store this value in the calculator for A. Regraph the function to see how it fits the data.

How can we determine the value for B? Trace along the graph to determine the value of B. Remember that $B = \frac{2\pi}{\text{Period}}$. Store this value in the calculator for B. Regraph the function to see how it fits the data.

How can we determine the value for D? Trace along the graph to determine the value of D. Store this value in the calculator for D. Regraph the function to see how it fits the data.

We have one more constant to determine. How can we determine the value for C? Trace along the graph to determine the value of D. Store this value in the calculator for C. Regraph the function to see how it fits the data.

When you press GRAPH you should have a graph that closely resembles the graph for the slinky.

