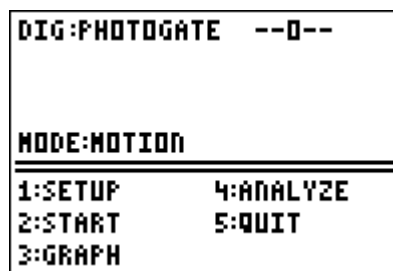# *NUMB3RS* Activity: Clearing All Obstacles
Episode: "Hot Shot"
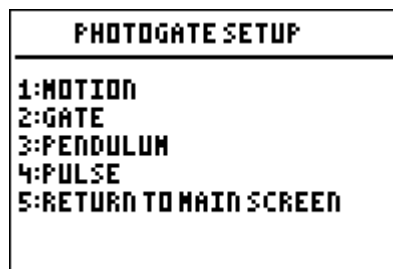
Photogate Setup Guide

First, load the DATAGATE program on to your graphing calculator using a
TI-GRAPH LINK™ cable.

Next, attach the Vernier Photogate to the DIG/SONIC port of the CBL 2™, and then
attach the graphing calculator to the CBL 2. Press the PRGM key and start the
DATAGATE program on the graphing calculator. Then follow the steps below.
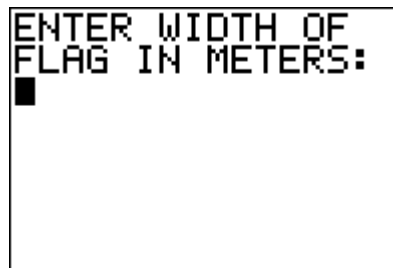
1. Select 1:SETUP.

```
DIG:PHOTOGATE   --0--   |


MODE:MOTION
━━━━━━━━━━━━━━━━━━━━━━━━
1:SETUP      4:ANALYZE
2:START      5:QUIT
3:GRAPH
```

2. Select 2:GATE.

```
    PHOTOGATE SETUP      |
━━━━━━━━━━━━━━━━━━━━━━━━
1:MOTION
2:GATE
3:PENDULUM
4:PULSE
5:RETURN TO MAIN SCREEN
```

3. Measure and enter the height of the paper ball
projectile launched in **meters.**

```
ENTER WIDTH OF
FLAG IN METERS:
■
```

4. Select 1:OK or 2:CHANGE SETTINGS if you
need to re-enter the height.

```
        SETTINGS          ▎
MODE:GATE
FLAG WIDTH(M):.04




1:OK
2:CHANGE SETTINGS
```

5. Select 2:START. You are now ready to
collect data.

```
DIG:PHOTOGATE   --O--



MODE:GATE
━━━━━━━━━━━━━━━━━━━━━━
1:SETUP      4:QUIT
2:START
3:GRAPH
```

You are now ready to launch your paper ball projectile. Have one student hold the
Photogate sensor up. Launch the paper ball projectile so that it passes directly
through the Photogate sensor when released (make sure the spoon does not pass
through the sensor).

6. When the paper ball projectile is launched, it should
pass through the Photogate sensor. You should
have data similar to that at the right. Press the
[STO▸] key on the graphing calculator.

```
       GATE MODE          ▎

TRIAL NUMBER :   1
TIME GATE 1(S):   .0015


━━━━━━━━━━━━━━━━━━━━━
PRESS [STO] TO STOP
```

7. Select 4:QUIT.

```
DIG:PHOTOGATE   --0--


MODE:GATE
─────────────────────────
1:SETUP        4:QUIT
2:START
3:GRAPH
```

8. The data from the Photogate is now stored in the list of the graphing calculator. Press the STAT key and choose **1:EDIT.**

```
GATE 1 TIME IN …
VEL. IN L4




            -DONE-
```

9. The velocity of the paper ball projectile is in list L_4 and the time is in list L_2.

```
L2        L3      L4       4
.00149    0       █████
──────  ──────  ──────




L4(1)=26.78093197…
```

10. If you need to redo the experiment with the same paper ball projectile, start the DATAGATE program again, and choose 2:START. You will not need to setup the program again. Then repeat steps 5 though 9. If you are launching a different paper ball projectile, repeat ALL steps.