



Moving with Algebra: Using Motion Sensors and Graphing Calculators

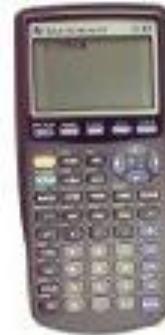
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and

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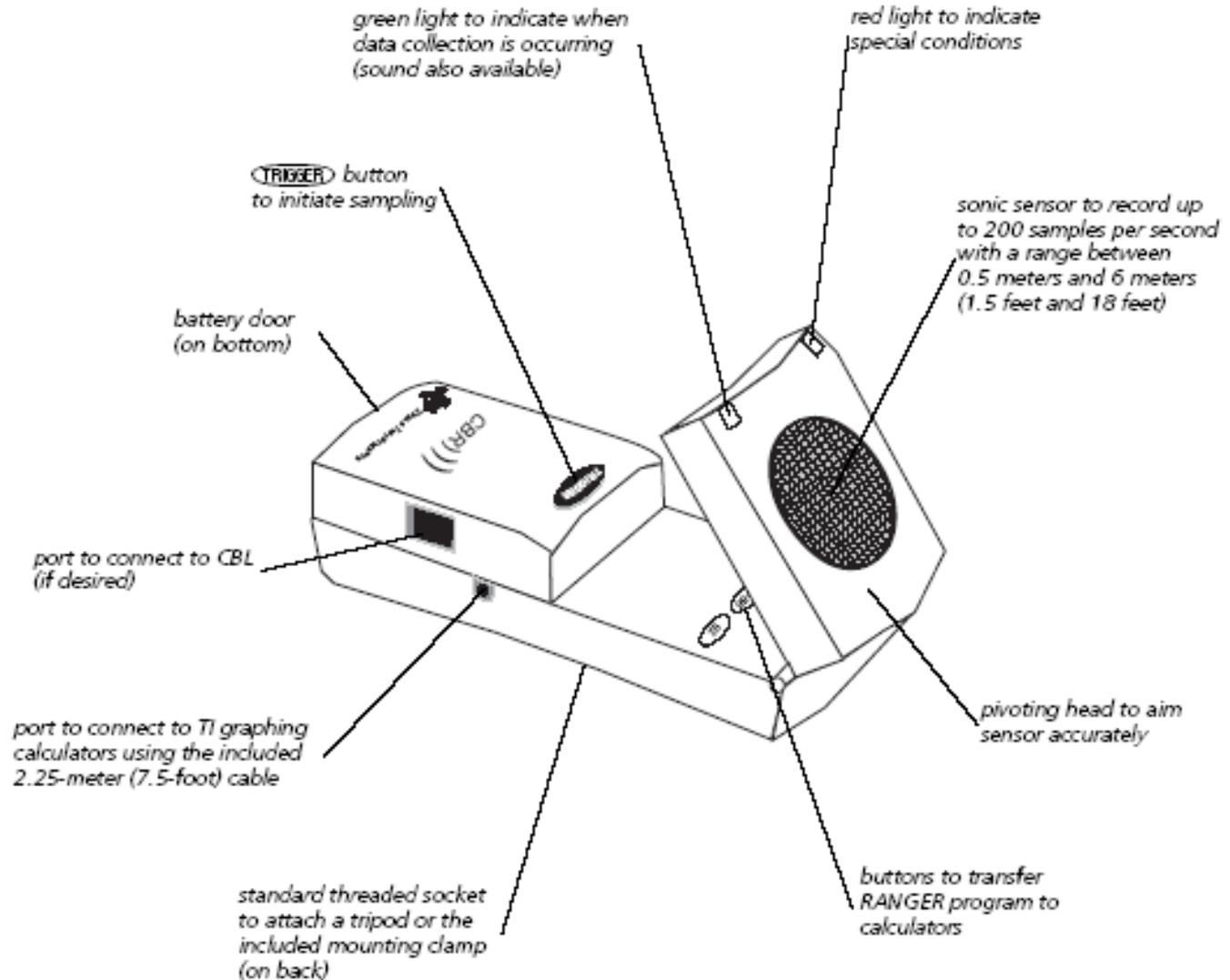
NCTM, October 25, 2012
Hartford, CT

SLOPE

- A challenging concept for many students.
- Develop a concrete understanding through 'walking a slope' using Vernier Motion Sensor and a graphing calculator.



Motion Sensor

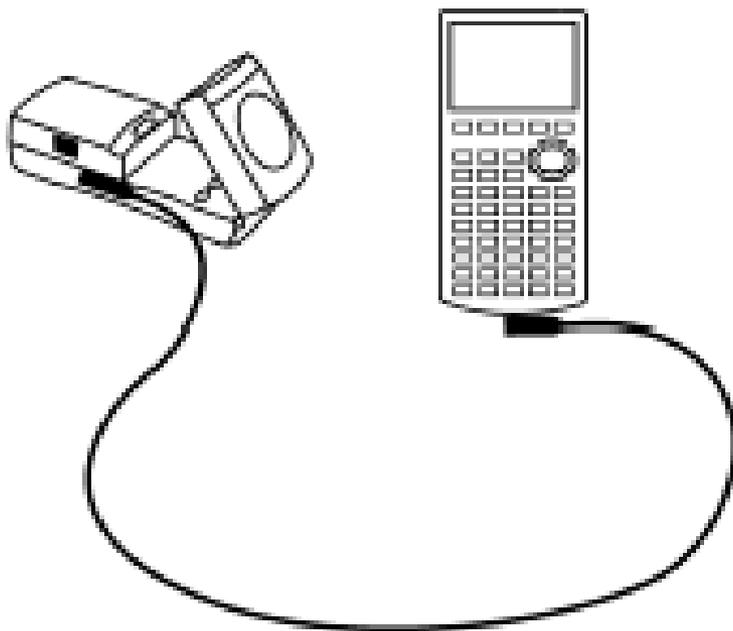


Connect

Connect CBR to a TI graphing calculator using the calculator-to-CBR cable.

Push in **firmly** at both ends to make the connection.

Note: The short calculator-to-calculator cable that comes with the calculator also works.



Activities

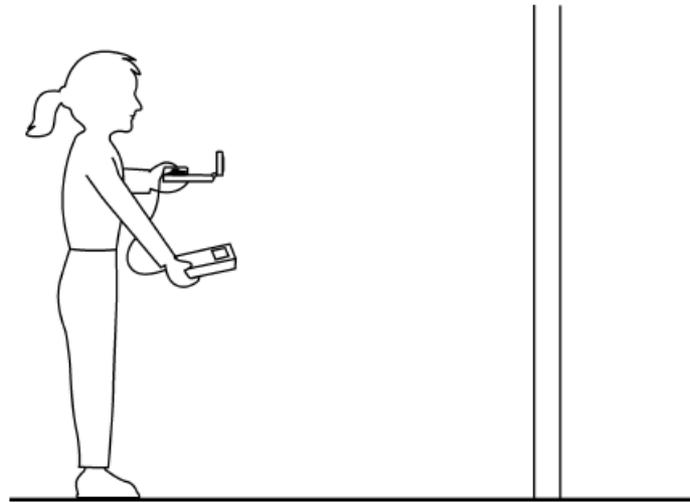
- Match the Graph
- Falling Down
- Toy Car
- Graph Your Motion

Match the Graph

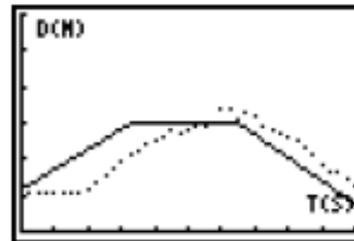
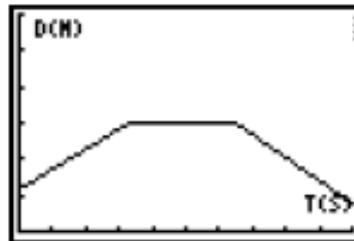
Objectives

- use the motion detector to mimic the graph generated by a graphing calculator
- analyze the graph results and repeat to increase accuracy

Match the Graph cont'd



Typical plots



Falling Down

Objectives

- drop an object and determine the average speed the object reaches
- observe whether or not changing the *mass and keeping the same shape* have an effect on the *average speed of the object*

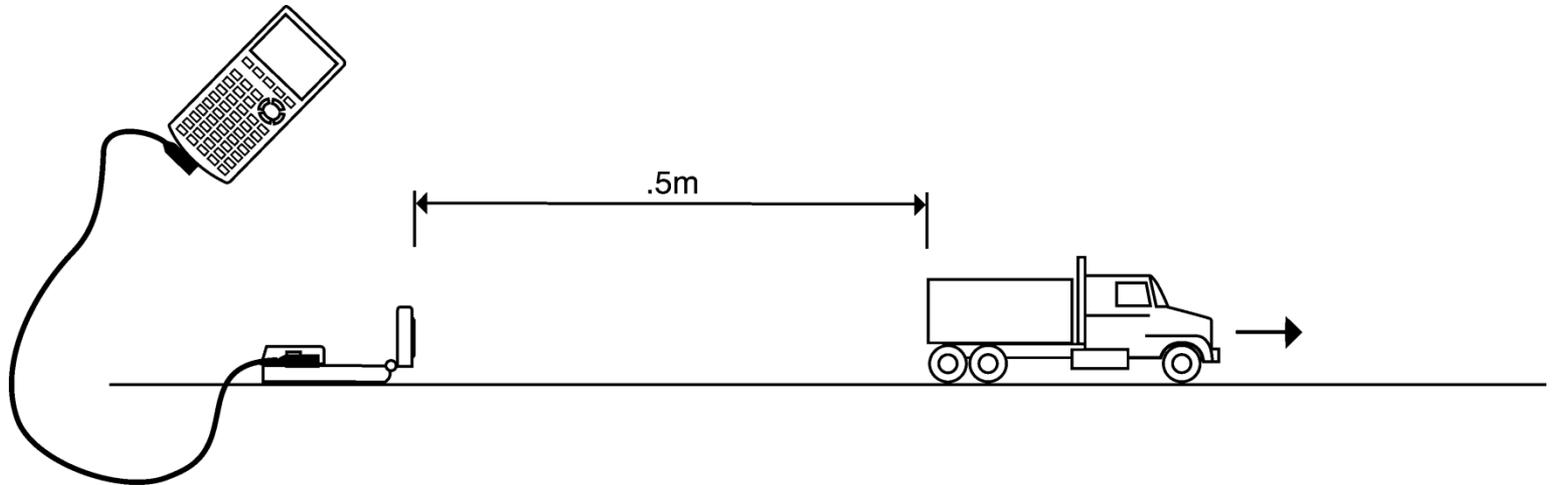
Video clip

[http://www.youtube.com/watch?v=5Zc8ESIZYNQ
&feature=results_video](http://www.youtube.com/watch?v=5Zc8ESIZYNQ&feature=results_video)

Toy Car

Objective

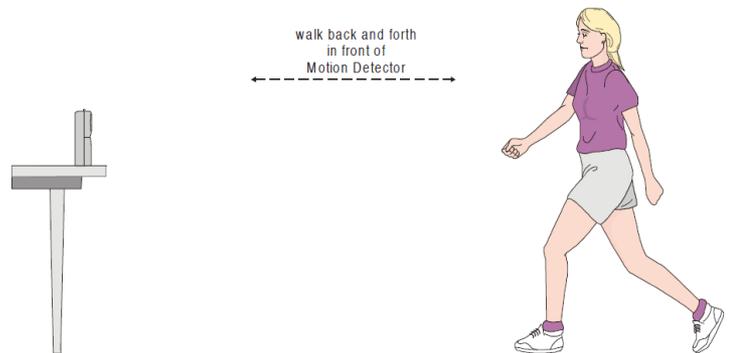
- use a motorized toy car to illustrate the real-world concept of constant velocity



Graph Your Motion

Objectives

- use a Motion Detector to measure distance and velocity
- produce graphs of your motion
- analyze the graphs you produce
- match distance *vs. time* and velocity *vs. time* graphs



Closing

- **Think-Pair-Share**

Tell your tablemates one thing you learned from these activities.



Acknowledgements

- **Texas Instruments Loan Program**

Provided calculators and motion detectors for this session

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- **Norristown Area School District**

*Eisenhower Science and Technology Leadership Academy,
partner for Dolciani grant*

References

- **Match the Graph**

<http://education.ti.com/calculators/downloads/US/Activities/Detail?id=6503>

- **Falling Down**

http://education.ti.com/xchange/US/Science/Physics/3884/MathScienceMotion_MS_Act12_Falling%20Down.pdf

- **Toy Car**

<http://education.ti.com/guidebooks/datacollection/cbr/cbr-eng.pdf>

- **Graphing Your Motion**

http://education.ti.com/xchange/US/Science/MiddleSchoolScience/3782/Vernier_Act10_graphingyourmotion.pdf

Questions?

- Thank you!
- Enjoy the rest of the conference....

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