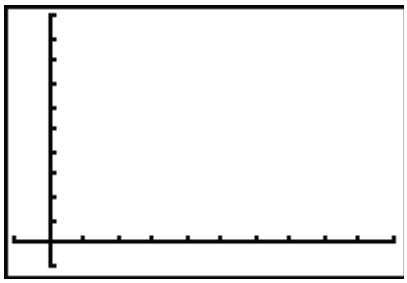
Falling Down

Name _____

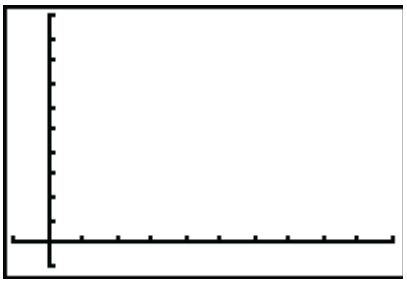
Class _____

In this adventure, you will drop an object and determine the average speed the object reaches. Then you will drop a heavier but similarly shaped object to see what effect a difference in mass makes.

Trial 1



Trial 2



1. Sketch the plots of each of the two trials on the axes provided.

2. What do the two flat sections for Trial 1 represent?

3. What does the portion of the plot that connects the two flat sections represent?

4. Use ◀ and ▶ to move along the Distance-Time plot. How far from the CBR2 was the coffee filter when it was dropped? Hint: Find the initial distance.

Trial 1_____ Trial 2_____

5. How far from the CBR2 was the coffee filter when the data collection ended? Hint: Find the final distance from the CBR2 to the filter.

Trial 1_____ Trial 2_____

6. What was the total distance traveled by the coffee filter? **Hint:** Subtract the coffee filter's initial distance from the CBR2 from its final distance from the CBR2.

Trial 1_____ Trial 2_____

7. At what time was the coffee filter released? **Hint:** This is the time value when the line begins to rise.

Trial 1_____ Trial 2_____

8. At what time did the coffee filter reach the ground? **Hint:** This is the time value when the line stops rising.

Trial 1_____ Trial 2_____

9. What was the total time that the coffee filter took to fall to the ground after being released?

Trial 1_____ Trial 2_____

10. The average speed of an object can be found by dividing the total distance it travels by the total time interval that elapses during the motion. Find the average speed of each coffee filter during its fall to the ground. **Hint:** Divide your answers for problem 6 by your answers for problem 9.

Trial 1_____ Trial 2_____

11. Which number of coffee filters resulted in the higher average speed?

12. What do you believe happened? Remember, air resistance remained the same in both trials.

13. If one object travels at a higher speed than another object, and they are dropped simultaneously from the same height, will the object with the higher average speed always reach the ground first? Justify your answer.

EXTENSION

1. Suppose the CBR2 had been placed on the floor. How would the value of the average speed be affected by the filters falling toward, rather than away from, the CBR2?

2. Look up the term “terminal velocity” or “terminal speed” and relate this to the curvature in the plot of the 5 coffee filters falling.