Name _____

Class _____

Problem 1 – Observe Motion

On page 1.2, click the forward triangle to press play and observe the motion of two trains represented by dots. The time is measured in **hours** and the distance from the station is provided in **kilometers**. The gray rectangle on the left side of the line is the train station. The trains can be stopped again using the pause button.

1. Write at least 2 complete sentences describing the motion. Compare train 1 to train 2.

2. When time = 0, what is the initial location of train 1? (include units) _____

3. What is the initial position of train 2? _____

4. Which train is traveling at a faster rate? _____

5. What is the speed of the faster train? _____

6. How far did the slower train go in 1 hour? _____

7. What is the speed of the slower train? _____

8. At what **distance** are the trains the same distance from the station? _____

9. What **time** are the trains the same distance from the station? _____

Trains In Motion

Problem 2 – Graph of $d = r \cdot t$

Read the information on page 2.1 of the TI-Nspire document and then advance to page 2.2. Press play to observe the relationship between the motion and the corresponding graph.

10. Which train has the graph with a steeper slope? _____

11. What quantity does the slope represent? _____

12. What is the y-intercept of each graph?

    a) y-intercept for train 1: _____

    b) y-intercept for train 2: _____

13. What is the physical meaning of the y-intercept for this distance-time graph?

14. Write an equation for the graph of each train.

    a) train 1: _____

    b) train 2: _____

15. To algebraically solve for the time when the two trains are the same distance from the station, set the two equations equal to each other and solve for time. Substitute this time into either equation to find the distance. Show your work.

Extension: Problem 3 – List of $d = r \cdot t$ Data

On page 3.2, look at the list of data.

16. When the rate is 5 km/hr, what is the distance when the time is 5 hours? In other words, what should the next value be in the list?

17. Use `ctrl` + `tab` to toggle to the screen that has r with up and down arrows near it. Click the up and down arrows to observe what happens to the graph and to the data.

    a) When r increases: Describe the slope. What happens to the distance?

    b) When r decreases: Describe the slope. What happens to the distance?

Extension: Problem 4 – Data & Statistics Page

On page 4.2, click on, grab, and move one of the data points.

18. Describe what happens when you move the point around. Does the ratio of distance divided by time change?

Select **MENU > Analyze > Add Movable Line.** Then select **MENU > Analyze > Lock Intercept at Zero**. Grab the movable line to adjust the slope. Use this to adjust the line until it appears to match the slope of the data. Drag the slider bar to change the value of r and readjust the movable line until the slope of the line matches the data again.

19. What is the relationship between r and the slope?