

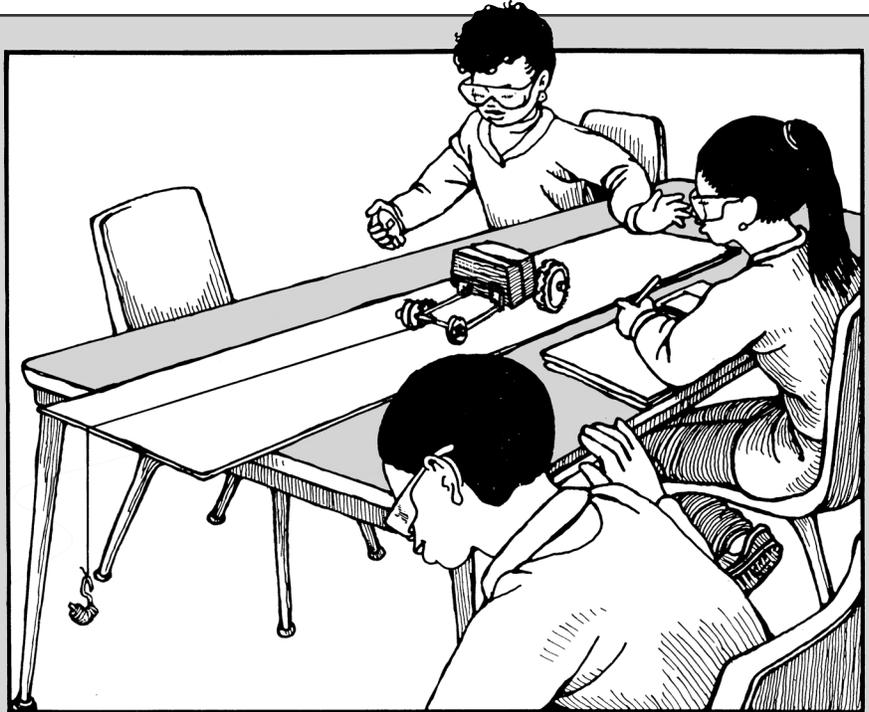
Student Instructions for Testing the Motion of Vehicles Carrying a Load

1. Set up the falling-weight system as you did in Lesson 3.
2. Add two blocks to your vehicle. Squeeze the crossbars to make certain the blocks are held in place.



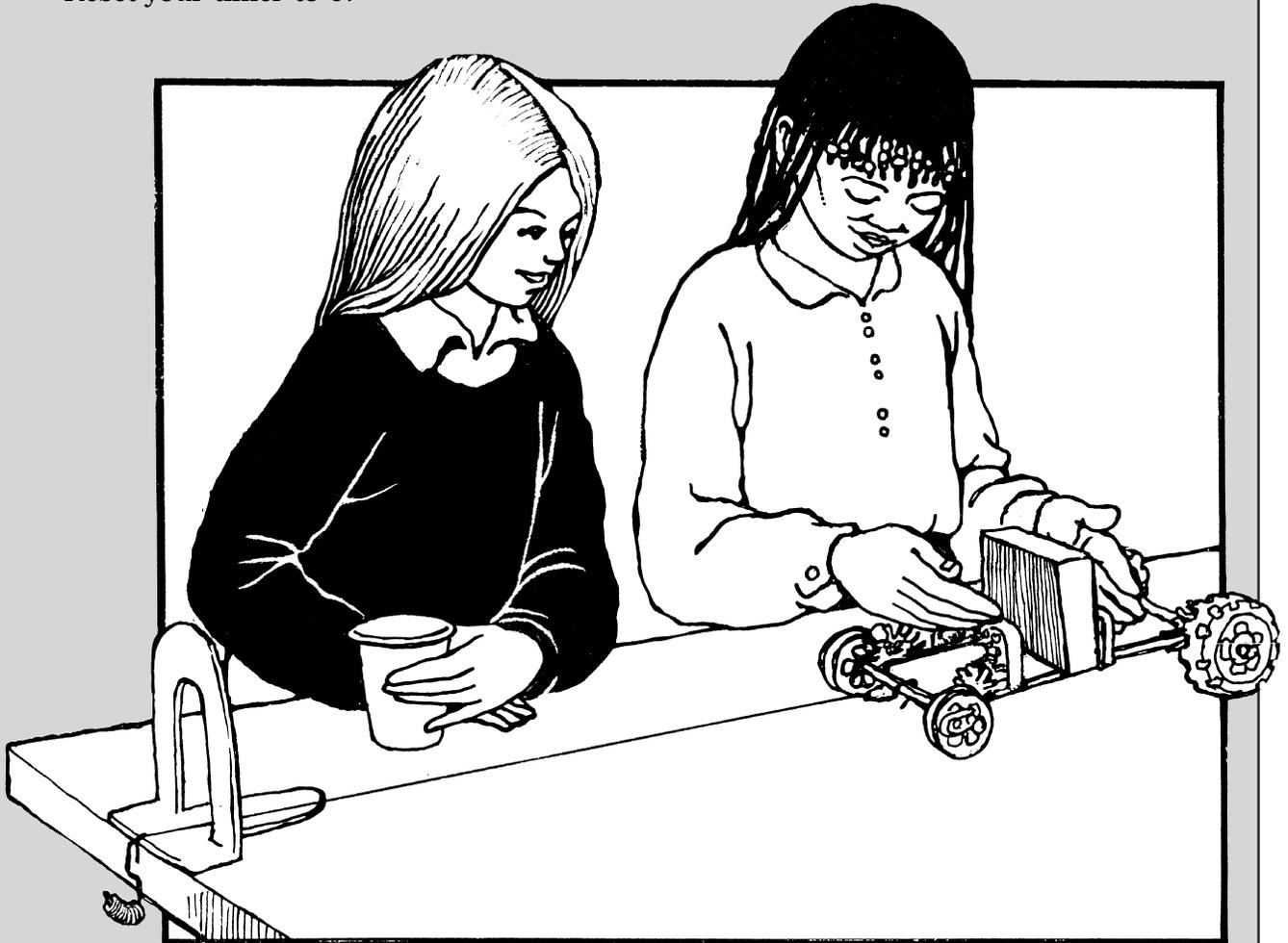
3. Make certain that one end of the string is attached to the vehicle and the other end is threaded through the opening in the bookend. Pull the vehicle back until the hook is at the top edge of your work space. Then have one group member hold the vehicle in place.
4. Place 10 small washers on the hook. Hang the weights over the edge of your work space (through the bookend). Make certain the hook is not stuck on the table edge.
5. Let go of the vehicle. If the vehicle does not move, tap it *lightly*. Can the 10 washers pull the vehicle?
6. If the vehicle still does not move at all, add more small washers, *one at a time*. Stop adding washers when the vehicle begins to move, even slightly, across the table.
7. Count your washers. Write the number on **Record Sheet 4-A**. Use this number of washers throughout this investigation. *Do not change* the number of washers.

8. Get your timer. Pull the vehicle back again until the hook is at the top edge of the table. When you are ready to begin, set the timer to 0.
9. As you let go of the vehicle, start the timer. (If the paper clip gets stuck on the edge of the table, start over.) Stop the timer when the falling weights touch the floor.



10. Now look at the large numbers on your timer. Use your **green** colored pencil. Color a circle at the bottom of the graph that matches the number of seconds it took your vehicle to move this distance.
11. Talk with your group about your vehicle's motion. How did the blocks affect how the weighted string pulled your vehicle?
12. Reset the timer to 0. Repeat these steps four more times with the vehicle carrying two blocks of wood. Reset your timer to 0 each time. After each trial, color a green circle on the graph to show your results. If you get the same time as an earlier trial, color a circle *directly above* the green circle from the other trial.

13. Now remove one block from your vehicle. Squeeze the crossbars so the block stays in place. Pull the vehicle back until the hook is at the top edge of the table. Reset your timer to 0.



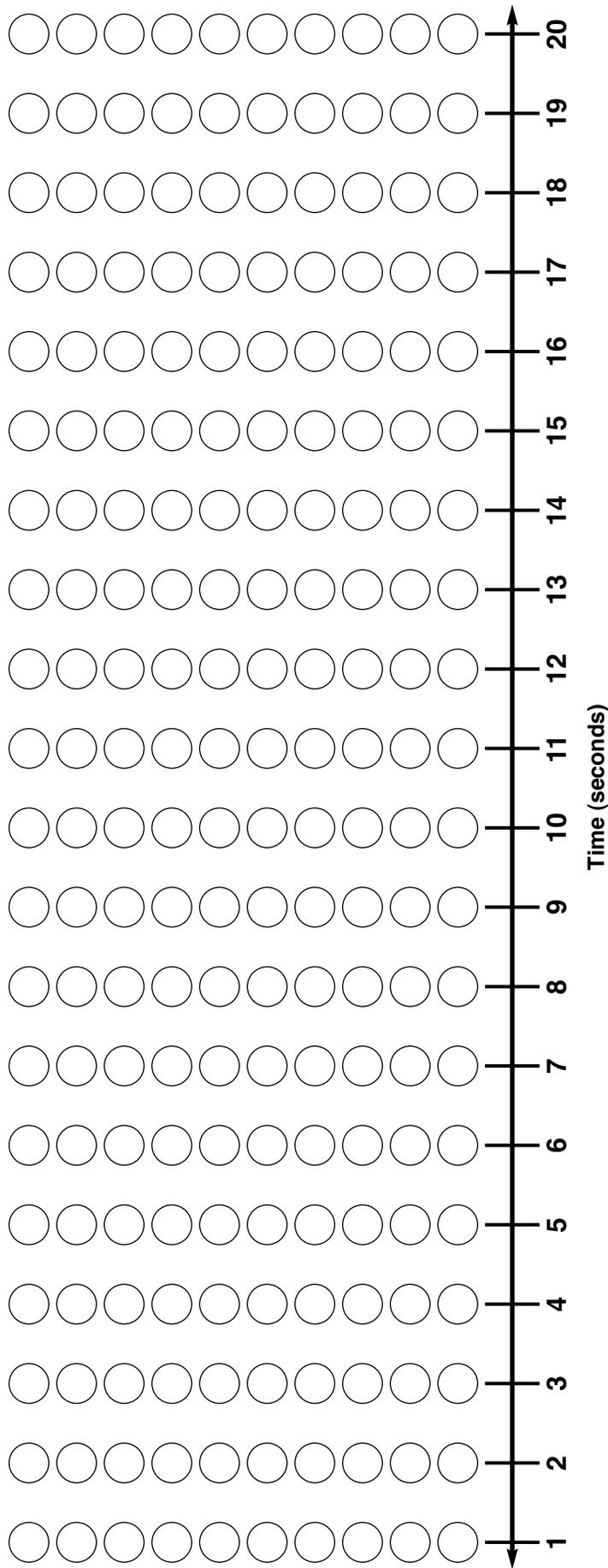
14. Let go of the vehicle. Stop the timer when the weights hit the floor. This time, show your results on the graph by coloring a circle **blue**. Do this five times altogether.
15. Remove the block from your vehicle. Now repeat the steps with an empty vehicle. Do this five times altogether. For these trials, use a **red** colored pencil to color the circles on the graph.
16. Now complete the bottom part of the record sheet.

Names: _____

Date: _____

Graphing Data: How Load Affects the Time a Vehicle Travels

Number of washers we will use: _____



Red dots, vehicle only Blue dots, vehicle + 1 block Green dots, vehicle + 2 blocks

Now look at your dots. About how long did it take your vehicle to travel while carrying each of the following loads? (Pick the number in the middle of your five trials, or the number that has the most dots of one color.) Record the numbers below.

Vehicle only (red dots) _____ seconds

Vehicle + 1 block (blue dots) _____ seconds

Vehicle + 2 blocks (green dots) _____ seconds