12. Experiment with the masses on the ends of the strings until you find a combination that allows the car or trolley to take 4 or 5 seconds to move the full possible length of travel along the table. Record the masses you chose here.

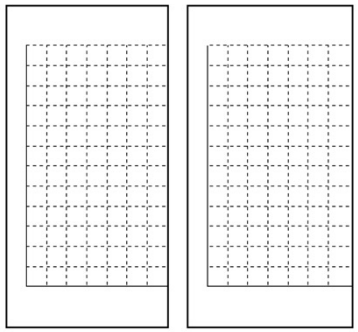
    Smaller mass ☐ g Larger mass ☐ g

    Use the space below to draw the forces on the car.

13. Predict what the streamer graph will look like when the car or trolley is released again & sketch your prediction in the space provided.

14. Release the car or trolley in time with the metronome & make a streamer graph like those in Lessons 1, 2, and 4.

15. Put your streamer graph on the board ready for a class discussion & sketch your Actual Graph in the space above.



16. Is the Actual Graph similar to any others you have made?

    Yes ☐ No ☐

    If you answered yes, use the box below to say which graph was similar to this one and explain how they are similar.

17. Write down what you have learned about the effect of forces on the motion of a car or trolley.

Lesson 6: Force and Motion

Name: _____

What happens when you pull a car or trolley in opposite directions?

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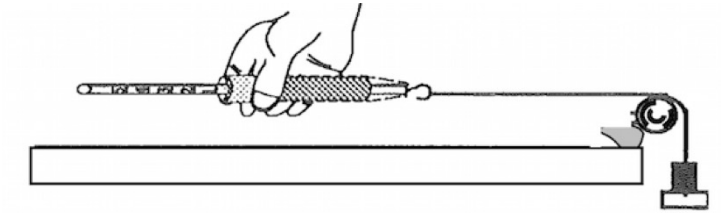
Getting started

1. Your group will need the forcemeters you made in Lesson 5. You will also need 2 tables, 2 pulleys and a way of attaching them to a table, a small toy car or trolley, some string, some masses, paper streamer, 6—10 markers, some marker pens, scissors, a metre ruler, and some butcher's paper.

Measuring force over a pulley

2. Attach your pulleys to each end of one of your tables as shown by your teacher. Make sure the pulleys clear the ends of the table and the table legs so the weight can drop cleanly to the floor.
3. Use a forcemeter on the end of a string over the pulley to find the forces needed to balance each of the different masses listed in the table below.



4. Enter your results in the following table.

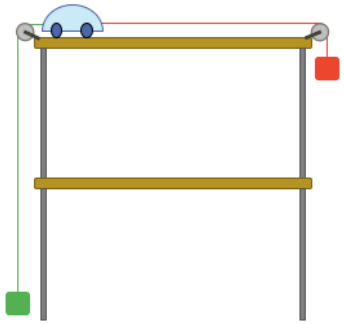
Mass (g)	Forcemeter reading (N)
400	
300	
200	

5. Is this what you expected to happen?

   Yes ☐ No ☐

   Discuss it with the rest of the class.

How does it move?



6. Carefully place the table with the pulleys attached on top of the other table.
7. Cut two pieces of string about 10 cm longer than length of the top table.
8. Attach a mass of 100 grams to one end of a string & attach the other end to the back of your car or trolley.

   Attach a mass of 200 grams to one end of a string & attach the other end to the front of your toy car or trolley.
9. Choose someone in your group to be the Starter. The Starter will place the car at one end of the top table and hold it steady to stop it moving, while other members of your group place the string with the masses attached over the pulleys.

   Use the space below to draw the forces on the car.
10. Predict what will happen to the car or trolley when the Starter releases it. Use the space below to write your prediction.
11. Watch carefully to see how the car or trolley moves when the Starter releases it.

    Did the car or trolley move as you expected?

    Yes ☐ No ☐

    Discuss it with the rest of your group.