

Grade 4

RM 1: Experiment A

Question: Is more force needed to move an object resting on carpet than an object resting on tile?

Hypothesis/Prediction: (More/Less) force is needed to move an object on (carpet/tile) because _____.

Materials

- carpeted area
- tiled area
- large, heavy book
- string
- masking tape
- meter stick
- push-pull spring scale or pull spring scale, 5 N

Procedure

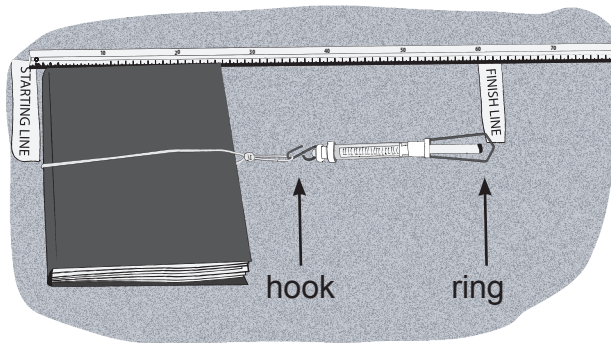
Part A

1. Place a piece of masking tape on the carpet and label it "Starting Line."
2. Use the meter stick to measure 60 cm from the starting line.
3. Place another piece of masking tape on the carpet 60 cm from the starting line and label it "Finish Line."
4. Place a large, heavy book with its spine resting on the starting line.
5. Tie a string around the book and make a loop for the spring scale hook.
6. Place the spring scale hook in the loop of the string.
7. Make sure you can see the side of the spring scale showing newtons.

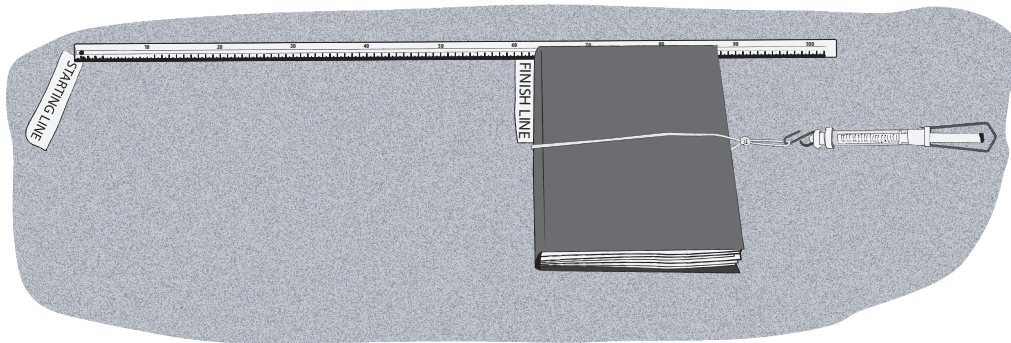
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RM 1: Experiment A continued

8. Use the ring of the spring scale to pull the book with a steady force until its spine reaches the finish line.



Before



After

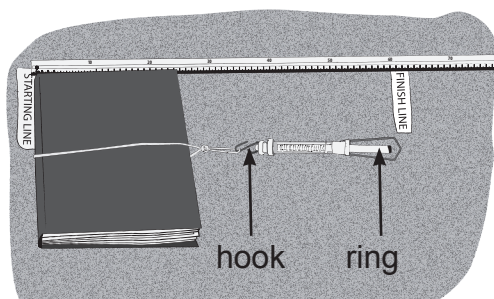
9. Observe the measurement on the spring scale from the time you begin pulling the book until the time you stop. You may notice that a greater force is needed to get the book moving.
10. Record the amount of force in newtons that you used to pull the book.
11. Place the book and spring scale back at the starting line.
12. Repeat steps 8–11 two more times.
13. Allow each person in your group to pull the book three times.

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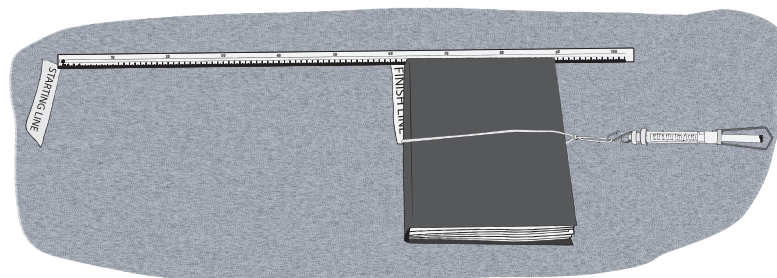
RM 1: Experiment A continued

Part B

1. Find an area of floor that is covered with tile.
2. Place a piece of masking tape on the tile and label it “Starting Line.”
3. Use the meter stick to measure 60 cm from the starting line.
4. Place another piece of masking tape on the tile 60 cm from the starting line and label it “Finish Line.”
5. Place a large, heavy book with its spine resting on the starting line.
6. Tie a string around the book and make a loop for the spring scale hook.
7. Place the spring scale hook in the loop of the string.
8. Make sure you can see the side of the spring scale showing newtons.
9. Use the spring scale to pull the book with a steady force until its spine reaches the finish line.



Before



After

10. Observe the measurement on the spring scale from the time you begin pulling the book until the time you stop. You may notice that a greater force is needed to get the book moving.

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RM 1: Experiment A continued

11. Record the amount of force in newtons that you used to pull the book.
12. Place the book and spring scale back at the starting line.
13. Repeat steps 9–12 two more times.
14. Allow each person in your group to pull the book three times.

Data

		Amount of Force Used (newtons)		
Experiment		Trial 1	Trial 2	Trial 3
A	Pull the large, heavy book 60 cm on carpet.			
B	Pull the large, heavy book 60 cm on tile.			

Conclusion

_____ of force was needed to pull the large, heavy book on _____
because _____

_____.