

Load-Lifting Lever

Purpose

To help students understand that a lever can be used to lift a weight with less effort

Procedure

1. Measure the board and mark the center of the board with a marker.
2. Starting at the center of the board and working your way to one end, mark the board every 30 cm.
3. Label the center of the board "C." Label the next mark "1R," the third mark "2R," and the end "3R" (right side of the board).
4. Repeat for the other side of the board, labeling the marks 1L, 2L, and 3L (left side of the board). See diagram 1.
5. Place the triangular block (fulcrum) at the center mark of the board.
6. Place six same-sized textbooks (load) on mark 3R at the end of the board. This arrangement works best if you are able to "center" the books over the ends of the board.
7. Predict how many textbooks it will take to balance the load and record the number.
8. On the opposite end of the board at 3L, begin to stack the same-sized textbooks (force or effort) until the board balances. Record in data chart below.
9. Take all the books off the board.
10. Keeping the effort at the same place, repeat experiment with the load at a different point by centering the stack of six books (load) over mark 2R and by repeating steps 7-9. Note: To get the board to balance, you might need to adjust the position of the effort by a few centimeters.
11. Repeat steps 7-9, keeping the effort constant, but positioning the stack of books (load) over mark 1R.
12. Look at the data collected and find any patterns and/or relationships.
13. In the previous experiment, you moved the load closer to the fulcrum and applied the force or effort in the same place. Now you are going to keep the load constant and move where you apply force or effort. Predict any patterns that might be created and record in your science journal.
14. Place two textbooks (load) at the end of the board at mark 3R. Predict how many textbooks it will take to lift the load from the 2L mark. Record your prediction in your science journal.
15. Begin stacking textbooks (force or effort) at mark 2L, being sure to center them over the mark.
16. Continue to stack textbooks until the board balances. Record in data chart and take the books off the board.
17. Keeping the load at 3R, repeat steps 15-16 but this time center the books over mark 1L.

Materials

2 in x 6 in x 6 ft board
(5 cm x 15 cm x 180 cm)
small triangular block for fulcrum
marker
meter stick

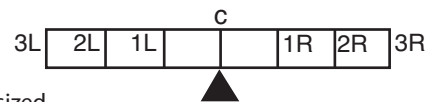


Diagram 1

Conclusion

1. What did the board represent? The triangular block? The six books lifted? The books used to do the lifting?
2. As you moved the load toward the center of the board, did it take more or fewer books to lift the six books (load)?
3. As you moved the force or effort toward the center of the board, did it take more or fewer books to lift the six books (load)?
4. In your science journal, create a graph of your data.

Data Chart

Effort at 3L—Load Varies	Prediction	Actual
3R		
2R		
1R		

Load at 3R—Effort Varies	Prediction	Actual
3L		
2L		
1L		

Extension

1. Predict where to place the fulcrum on the lever to lift your teacher. If your teacher will agree, test your prediction.
2. Research and explain Archimedes' Law of the Lever.
3. Research and explain the three classes of levers.