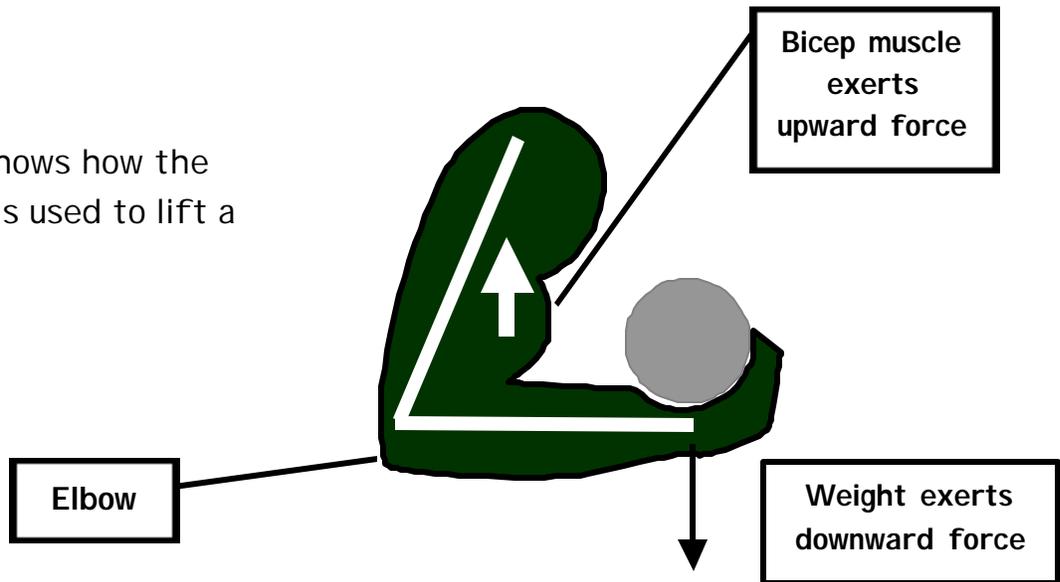
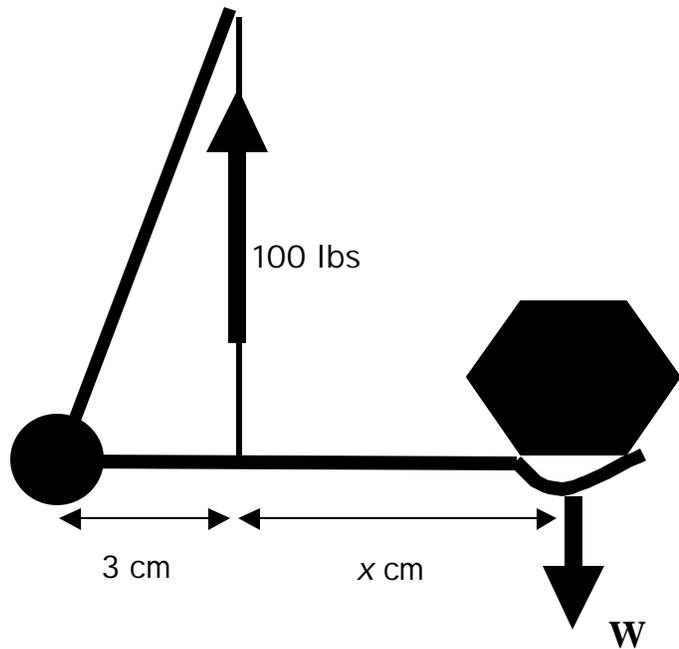


Investigation: Leverage

This diagram shows how the biceps muscle is used to lift a weight.

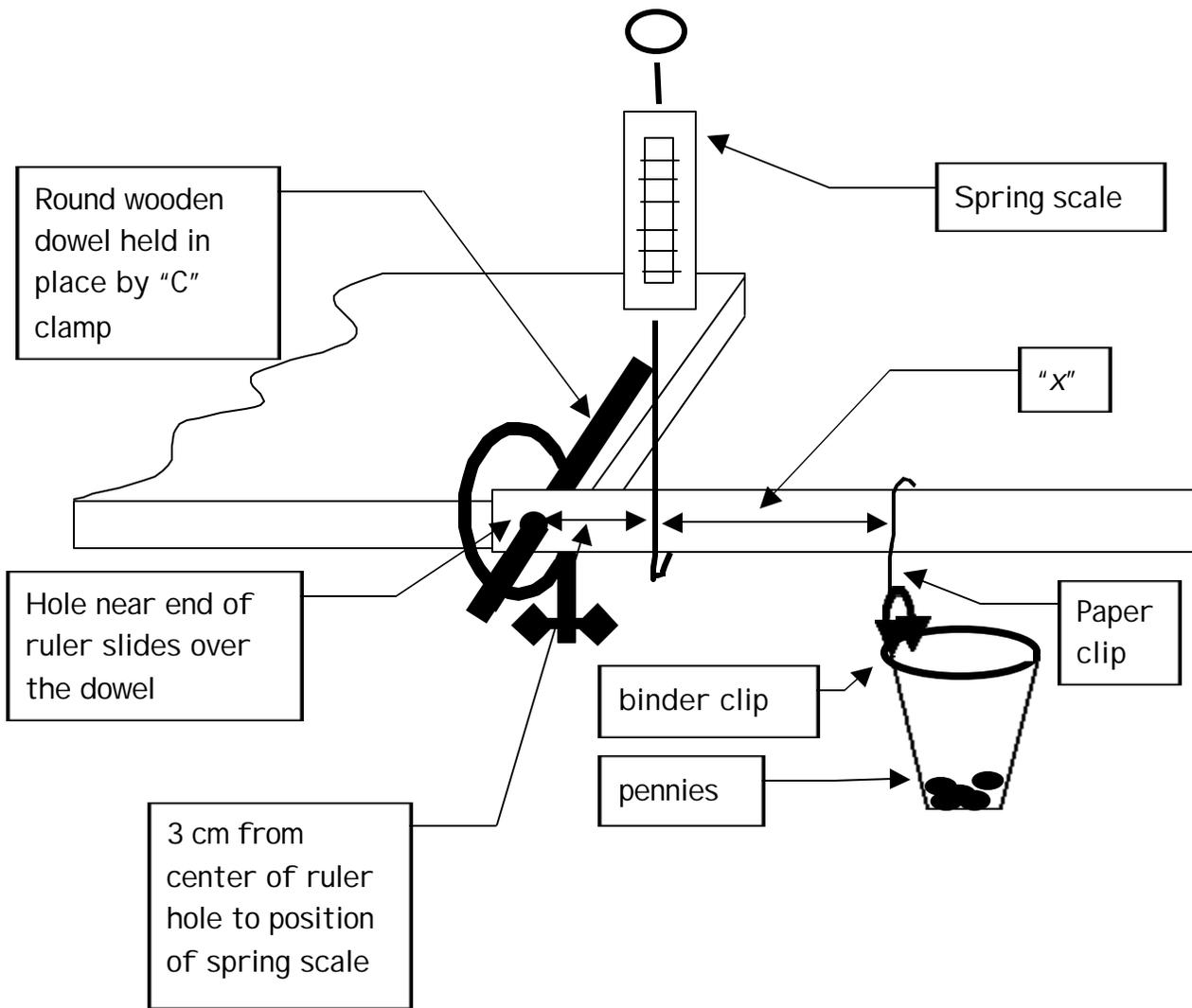


This diagram presents a model of the above situation.



In this investigation you will make a model of the arm and investigate the relationships among some of the variables in the above situation.

1. Configure your equipment as shown in the diagram on the next page.
2. Position the "weight" so that $x = 6$ centimeters.
3. Determine how many pennies you must add in order for the spring scale to read exactly halfway on its scale, with the ruler is level.
4. Reposition the weight to a different value of x .
5. Again, determine how many pennies for the spring scale to be at the same position as above (exactly halfway).
6. Repeat for several different values of x . Create a table to keep track of the data (value of " x " and "number of pennies" in each instance).
7. Graph the data, with " x " as the independent variable and "number of pennies" as the dependent variable.
8. Describe the characteristics of the graph. What happens to "number of pennies" as " x " increases?
9. (Advanced)
 - a) Which of the two functions below do you think is a better way to describe the relationship between the number of pennies, " n ", and the distance " x "?
$$\text{linear function, } n = ax + b$$
$$\text{rational function, } n = a/(b + x)$$
 - b) For the function you chose, find the values of " a " and " b " which give the closest match to the data you graphed.
 - c) What does your selected function predict for a value of " n " when $x = 0$?
 - d) Test this prediction.



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