Activity 5.1c - Reaction Forces Using Spring Scales

Purpose

Use the formulas for reaction forces that you learned in the prior lesson to calculate the weight of objects that are suspended with string attached to spring scales.

Equipment

Items commonly found in the technology lab: hammer, wrench, saw, or other tools
String
Paper clips
Two spring scales
3/8 diameter flat washer
Nut or bolt to use as plumb bob
Protractor

Procedure

1. Cut two lengths of string and attach one end to the washer, the other end to a spring scale as shown in figure 1.

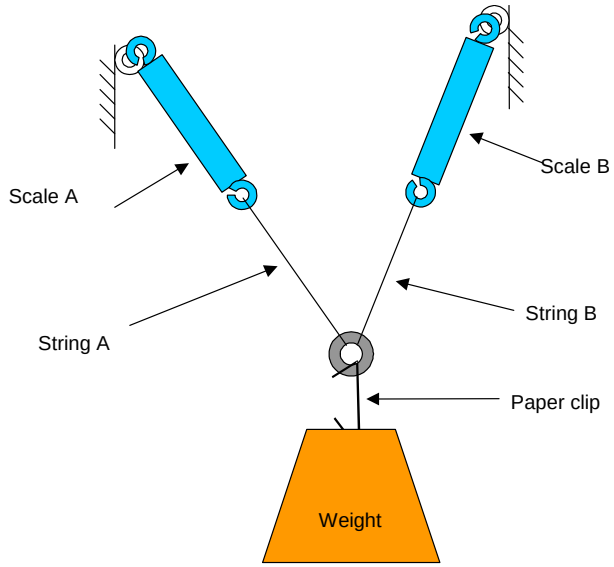

Figure 1 Reaction Force Activity Set Up

2. Suspend the object with paper clips attached to the washer.

3. Note that you shouldn't use more than two strings to suspend the object, this will ensure you have a two dimensional problem. A third string might not be in the same plane as the 1st two strings and the 2-D equations you leaned in class would not be valid.

4. Suspend a nut or bolt from another string to establish a vertical line and use a protractor to measure the angles θA and θB as shown in figure 2.

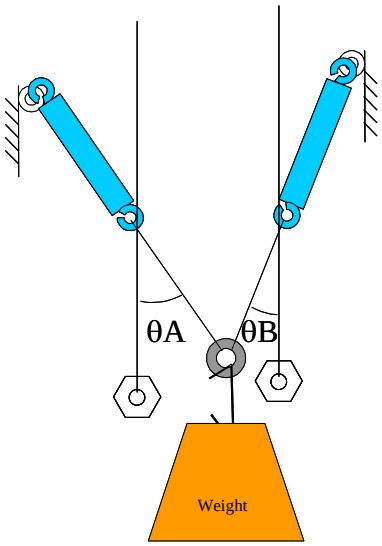

Figure 2 Angle Measurements

5. Measure the reaction force on each scale, FA and FB.

6. Draw a free body diagram of the washer.

7. Calculate the weight of the object, W, using the formulas you learned in class.

8. Weight the object on a scale and compare against calculation.

Conclusion

1. Name of object you suspended:

2. Draw the free body diagram of the washer in the space below:

3. Complete the table shown below. Calculate the weight of your object.

	Member A	Member B
Angle	θA=	θB=
Force	FA=	FB=
Vertical (Y) Force Component	FAY=	FBY=
Weight	W=	

4. Weight of object obtained by weighing on a scale:

5. Do the measurements and the calculations actually equal? If not what are your thoughts on why they weren't?