

Create a Mobile

Fulcrum Placement Calculation Instructions

If two loads of equal mass are placed on the ends of a First Class lever with the fulcrum in the middle the load will be balanced.

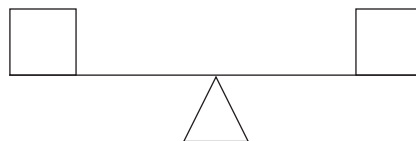
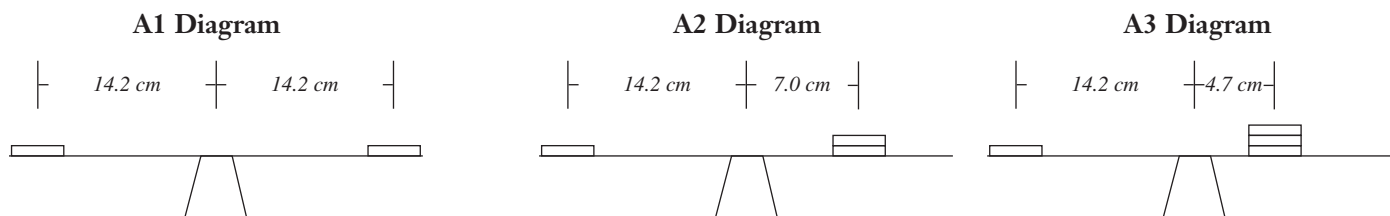
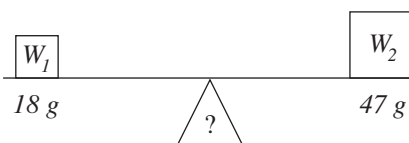


Figure 1.

If the mass of one load is twice that of the other, its distance from the fulcrum is decreased by half.



What if it is not that simple? Imagine that load W_1 has a mass of 18 g and load W_2 has a mass of 47 g. Instead of moving the load, the fulcrum is moved to balance the lever. Where would the fulcrum be placed?



To determine the fulcrum placement, the length of the lever is required. Recall from Part A that

$$W_1 \times X = W_2 \times Y \quad \text{Equation 1}$$

Since distance $X + \text{distance } Y = \text{total length of the lever, } (l)$, then

$$Y = l - X \quad \text{Equation 2}$$

Substituting for Y in Equation 1 we get

$$W_1 \times X = W_2 \times (l - X) \quad \text{Equation 3}$$

Using the information from the diagram above, the placement of the fulcrum can be determined. Assume the length of the lever is 10 cm.

$$18g \times X = 47 \text{ g} (10 \text{ cm} - X)$$

$$18X = 470 \text{ cm} - 47X \text{ (the grams cancel out)}$$

$$65X = 470 \text{ cm}$$

$$X = 7.2 \text{ cm}$$

The fulcrum should be placed 7.2 cm from load W_1 (2.8 cm from load W_2)