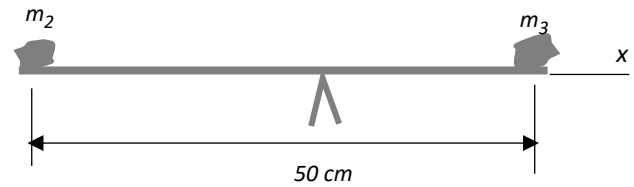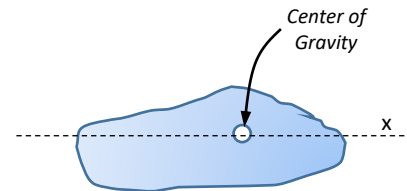**Problem 1)**

A 0.120-kg, 50-cm-long uniform bar has a small 0.055-kg mass glued to its left end and a small 0.11-kg mass glued to the other end. The two small masses can each be treated as point masses. You want to balace this system horizontally on a fulcrum placed just under its center of gravity. How far from the left end should the fulcrum be placed?

m_2 m_3

                                                              x

50 cm

Problem 2)

The center of gravity of a 5.0-kg irregular object is shown. You need

to move the center of gravity 2.2 cm to the left by gluing a 1.50 kg

mass, which will then be considered as part of the object.
Where should the center of gravity of this additional mass be located?

Center of
Gravity

x

Problem 3)

Two people carry a heavy electric motor by placing it on a light board 2.00 m long. One person lifts at one end with a force of 400 N, and the other lifts the opposite end with a force of 600 N.

a) Draw the free-body diagram for the problem.

b) What is the weight of the motor, and where along the board is the center of gravity located?

c) Suppose the board is not light but weighs 200 N, with its center of gravity at its center, and the two people each exert the same force as before. What is the weight of the motor in this case, and where its center of gravity located?

Problem 4)

You are asked to design the decorative mobile shown. The strings and rods have negligible weights, and the rods are to hang horizontally.

a) Draw Free-Body-Diagram for each rod.

b) Find the weight of the balls A, B, and C. Find the tensions in the strings S_1, S_2, and S_3.

c) What can you say about the horizontal location of of the mobile's center of gravity? Explain.

2.0 cm S_1 6.0 cm

3.0 cm S_2 5.0 cm

C

S_3

4.0 cm   8.0 cm

B

6.0 N   A
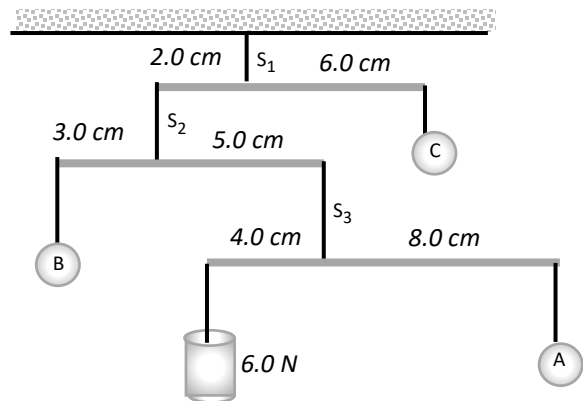
Problem 5)

Beam ABCD is loaded as shown.
Note that BE is part of the beam.
Find the components of the forces
at supports A and D.

500 N   750 N

E

0.5 m

A   D

B   C

2.0 m   2.0 m   1.0 m