Unit 4 Sample Homework 1

1. A uniform 20 kg wooden board is 6.0 m long. The board is balanced on two bricks, the first brick located 1.0 meter from the left end, and the other brick 2.0 meters from the right end.

6 m

Brick

20 kg wooden Board

1.0 m

2.0 m

3.0 m

1. Draw a FBD of the board.
2. If the board is in equilibrium, what is true about the Σ Forces and the Σ Moments acting on the board?
3. Sum the moments using the left hand brick as the “origin”. What is the force that the right hand brick must exert on the board?
4. What is the magnitude of the force that the left hand brick provides on the board?

2. A massless “L” shaped object is free to rotate around the axis (shown with an “X”). If a 60 N force is applied directly downward as shown at Point A, what is the magnitude and direction of a horizontal force that needs to be applied at Point B to keep the object in equilibrium?

0.80 m

1.2 m

Pt. A

Pt. B

60 N

 b. What is the Fnet  that must be applied at the “X” to keep the object in equilibrium? If you poked a hole in the object at the “X” and put your finger in it, which way would your finger need to push to keep the object from rotating?

3. A 800 kg beam spans a room 20 meters wide. The beam is supported on two posts, located as shown.

20 m

Support Post

Beam

3.0 m

7.0 m

10 m

a. Draw a FBD of the beam.

b. What is the force that each post supplies to the beam?

4. How would your answers to question #3 change if a 100 kg person stood at the very left end of the beam?

0.80 m

1.20 m

Pt. A

Pt. B

60 N

0.80 m

1.20 m

Pt. A

Pt. B

60 N

20 m

Support Post

Beam

3.0 m

7.0 m

10 m

20 m

Support Post

Beam

3.0 m

7.0 m

10 m