Moment Worksheet #1 (2013)

1. Assume the “X” indicates the axis of rotation for a massless meterstick. Find the net moment about the “X” in the three given situations. Note that the markings on the meterstick are in centimeters.

 a.

 0 20 40 60 80 100

50 N

20 N

30 N

 b.

30 N

 0 20 40 60 80 100

50 N

20 N

 c.

30 N

 0 20 40 60 80 100

50 N

20 N

2. The object shown rests on a frictionless surface. The object can pivot about a rod (the large black dot). A single 30 N force acts as shown. Could you prevent the object from spinning by applying a

Pt A

Pt B

Pt C

30 N

2 m

3 m

Pivot

 a. Horizontal force at Pt. A

 b. Vertical force at Pt. A

 c. Horizontal force at Pt. B

 d. Vertical force at Pt. B

 e. Horizontal force at Pt. C

 f. Vertical force at Pt. C

In each case, note if the force should be larger than, equal to or less than 30 N and the direction of the applied force (up/down or left/right)

3. A meterstick has three forces acting on it as shown. Find the moment about Point P (located at the 0.20 meter mark) for each of the three forces.

1. $\left.M\right|$P  Force A

 0 20 40 60 80 100

Point P

Force A, 50 N @ 60 o

Force B, 40 N @ 0 o

Force C, 70 N @ 75 o

θ

θ

1. $\left.M\right|$P  Force B
2. $\left.M\right|$P  Force C
3. A 300 N force (not shown) acts at Point P. Why does it not matter what direction this force is acting when determining what moment the force will create with respect to Point P?

4. Today in class we spent some time tapping wooden blocks; sometimes they spun, and sometimes they slid without rotating, and sometimes they did both (slid and spun). Generalize your results, including a couple diagrams showing how to “hit” a ruler to make it behave in each of these three ways..

5. Given an irregularly shaped object resting on some frictionless ice with the four forces acting on it at the two locations shown. Find the moment about Point P created by each of the four forces.

3 m

4 m

F1 = 70 N

F2 = 80 N

F3 = 80 N

Point A

F4 = 90 N

Point P

Point C

Randomly Shaped Object

 a. $\left.M\right|$P  Force1

 b. $\left.M\right|$P  Force2

c. $\left.M\right|$P  Force3

d. $\left.M\right|$P  Force4

 e. $\left.M\right|$P  net or Σ $\left.M\right|$P

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

 0 20 40 60 80 100

 0 20 40 60 80 100

50 N

20 N

 0 20 40 60 80 100

50 N

20 N

 0 20 40 60 80 100

50 N

20 N

 0 20 40 60 80 100

3.2 N

Point P

Force A, 50 N @ 60 o

Force B, 40 N @ 0 o

Force C, 70 N @ 75 o

 0 20 40 60 80 100

Point P

Force A, 50 N @ 60 o

Force B, 40 N @ 0 o

Force C, 70 N @ 75 o

θ

θ

70 N

3 m

4 m

F1 = 70 N

F2 = 80 N

F3 = 80 N

Point A

F4 = 90 N

Point P

Point C

Randomly Shaped Object

Pt A

Pt B

Pt C

30 N

2 m

3 m

Pivot