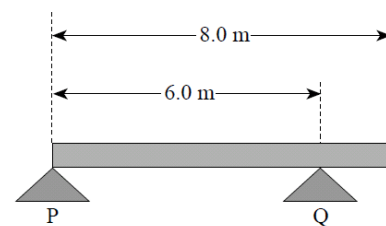# PHYSICS 12

NAME: _____

Rotational Equilibrium

1. A uniform beam of mass 25 kg rests on supports P and Q, as shown in the diagram below. What force is exerted by support P & support Q on the beam?

2. A 3.0 m uniform beam of mass 15 kg is pivoted 1.0 m from the end as shown below. A 35 kg child sits 0.60 m from the pivot. How far, *d*, from the pivot, must a 20 kg child sit in order for the beam to be in equilibrium? What force does the pivot exert on the beam?
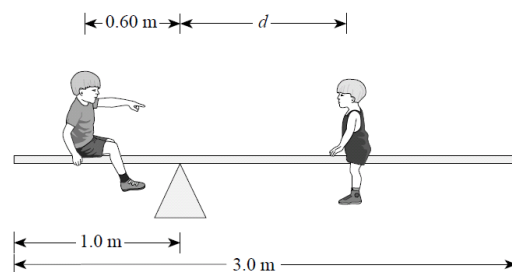
3. A platform for window-cleaning is supported as shown. If a man of mass 75 kg stands at point X, what is the tension in support A & B (if you assume that the mass of the platform is negligible in comparison to the mass of the man)?
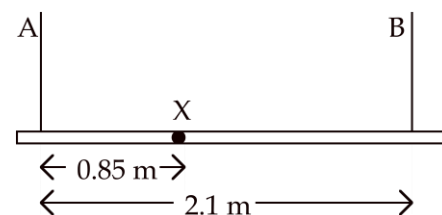
4. A uniform 18 kg beam hinged at **P** is held horizontal by a vertical string that can withstand a maximum tension of 350 N. A 5.0 kg mass is suspended from the end of the beam as shown. At what minimum distance, *x*, can the string be attached without breaking?
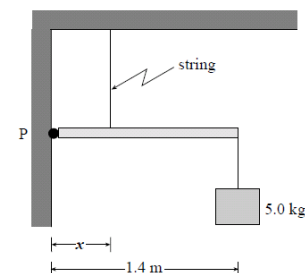
5. Forces are exerted on a bar as shown. What is the magnitude of F_1 & F_2?
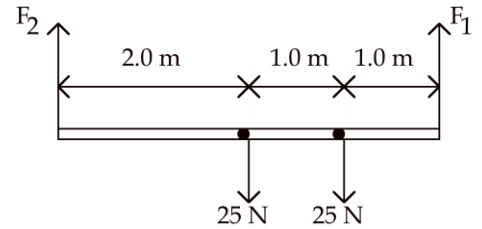
6. A uniform beam of mass 160 kg is being lifted as shown. How far from the left end should a weight of mass 500 kg be hung to keep the beam level?
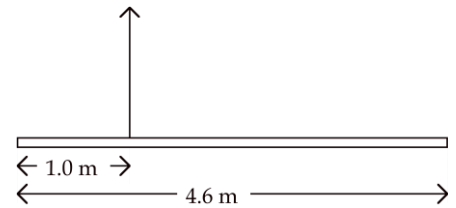
7. The motorcycle shown has a mass of 200 kg and a wheel base of 1.8 m. If the rear wheel exerts a 1 200 N force on the ground, find how far the motorcycle's centre of gravity is located from the front wheel.
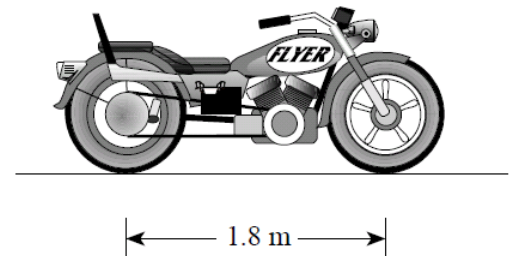
8. A load of mass 12 kg is hung from the end of a horizontal bar whose mass is 8.0 kg and whose length is 4.0 m. At what distance from the load should a single upward force of 196 N be exerted to keep the bar in equilibrium?

Answers: 1) 85 N, 160 N, 2) 0.675 m, 690 N, 3) 437 N, 298 N, 4) 0.55 m, 5) 31.25 N, 18.75 N, 6) 0.584 m, 7) 1.1 m, 8) 0.80 m