Motion and Force in a Gravitational Field

Home Assignment Torque and Equilibrium

Name: _____ (30 marks total)

1. Cars are much more stable than motorcycles. Using your understanding of stability and torque, explain why.   (3 marks)

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2. A yard broom has a wide brush and a 1.90 m long handle. The brush has a mass of 3.85 kg and the handle a mass of 1.30 kg. The easiest way to pick the broom up is at its centre of mass. Calculate this position along the broom handle.   (3 marks)

3. David is trying to unscrew a small nut using a spanner. David can exert a force of 592 N at the end of the spanner which is 305 mm from the nut.   What maximum torque can be exerted by David to unscrew the nut.   (2 marks)
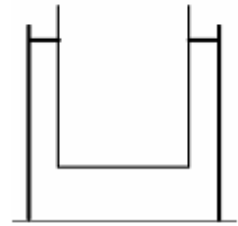
4. Using a small '**x**', indicate the approximate location of the centre of mass of the following objects. You should show any construction lines used to help you find the centre of mass.   (2 marks)
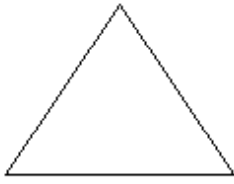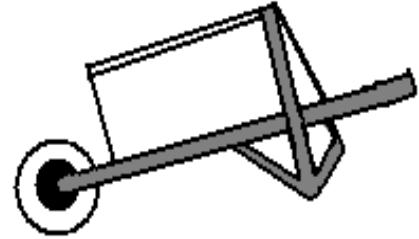
Triangle

Teacup

Swinging garbage Can

5. A fully laden wheelbarrow has a total mass of 97.0 kg. The centre of mass is located one third the distance between the axle and the end of the handle. Calculate the minimum force required to lift the wheelbarrow from a horizontal position. (2 marks)

6. A uniform plank, AB, of length 4.50 m and weight 522 N is suspended by a vertical rope at each end. Sarah of weight 549 N, stands in the position shown, 1.20 m from the end A. Calculate the tension in each of the ropes.   (3 marks)

F_A

F_B

A

B

1.2 m
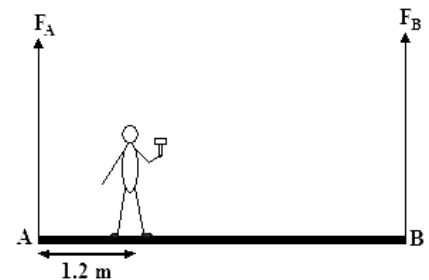
7. On holiday in New Zealand, Shawn (mass 74.5 kg) is standing 0.300 m from the end of a 5.60 m viewing platform. The 680 kg platform is supported by two supports, one at the start of the platform and one 1.40 m from the start as shown. Determine the force on each support. (3 marks)
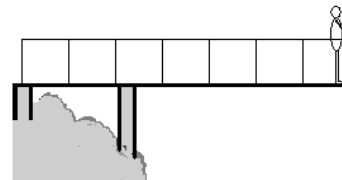
8. A large crane is being used to lift a fishing net full of fish onto a ship. At the instance shown, the jib forms an angle of 40.0^0 to the horizontal and the rope an angle of 30.0^0 to the jib as shown. The jib is 4.20 m long and has a mass of 40.0 kg. The net with the fish has a mass of 1.90×10^3 kg. Draw a diagram then calculate the tension in the rope. (4 marks)
NOTE: Mass of rope is negligible compared to jib and fish.
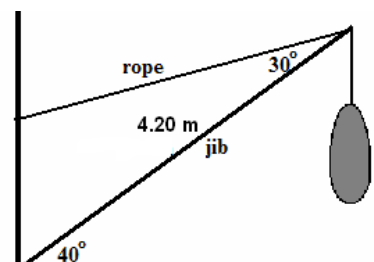
9. A traffic light of mass 9.00 kg is suspended in the centre between two poles. One wire makes an angle of 43.0^0 with the pole and the other 38.0^0 as shown in the diagram below.
Find the tension in each wire.