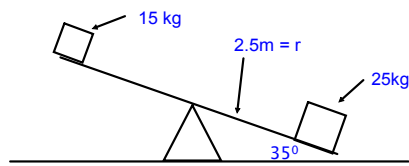


TEST REVIEW PROBLEM

What is the net torque on the seesaw in the following diagram?

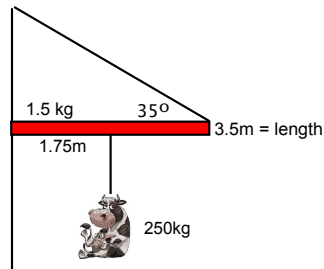


$$\tau = - 201 \text{ Nm}$$

$$15 \text{ kg} (9.81) (2.5 \text{ m}) \cos(35) - 25 \text{ kg} (2.5 \text{ m}) (9.81) \cos(35) = \tau$$

Mar 25-8:28 AM

What is the tension in the wire if a milk laden cow is suspended from the rod?



$$2150 \text{ N}$$

$$3.5 \text{ m} \sin(35) T = 1.5 \text{ kg} (9.81) (1.75 \text{ m}) + 250 \text{ kg} (9.81) (1.75 \text{ m})$$

Feb 14-10:47 AM

TEST REVIEW PROBLEM

What is the tension in the wire if a heavy plant is suspended from the rod?

760N

$2.75 \sin(25) T = 1.5\text{kg} \cdot 1.75\text{m}$
 $(9.81) + 25\text{kg}(9.81)3.5\text{m}$

Mar 25-8:28 AM

A torque of 15 Nm is applied to a 90kg disk with a radius of 50cm whose moment of inertia is $I = \frac{1}{2} mr^2$.

- What is the angular acceleration of the disk?
- If the disk is initially at rest and the torque is applied for 20 seconds, what is the rotational frequency ω of the disk at the end of the 20 seconds?

$\tau = I\alpha$
 $15\text{Nm} = \frac{1}{2}(90\text{kg})(0.5\text{m})^2 \alpha$
 $\alpha = 1.33\text{rad/s}^2$
 $\omega_f = 0 + 1.33\text{rad/s}^2 (20\text{sec})$
 26.6 rad/s

Feb 16-8:24 AM

A melon, initially at rest, rolls down a ramp reaching a final speed of 12.1 m/s.

a. How tall is the ramp?

$$mgh = 1/2 I \omega^2 + 1/2 mv^2 \quad \omega = v/r$$

$$mgh = 1/2 [(2/5)mr^2](v/r)^2 + 1/2 mv^2$$

$$gh = (2/10)v^2 + 1/2 v^2$$

$$h = 10.4 \text{ m}$$

Feb 9-7:55 AM

Now you have a new melon with a diameter of 0.5m and a mass of 10kg that reaches a velocity of 6.2m/s.

b. What is the angular velocity of the melon at the bottom of the ramp?

c. What is the translational kinetic energy?

d. What is the rotational kinetic energy?

e. If the melon loses a seed with each rotation, how many seeds would be on the ramp (2.75 m)?

$$\omega = (6.2 \text{ m/s}) \div 0.5 \text{ m} = 3.1 \text{ rad/s}$$

$$KE_{\text{trans}} = 1/2 (10 \text{ kg})(6.2 \text{ m/s})^2 = 192 \text{ J}$$

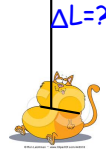
$$KE_{\text{rot}} = 1/2 (2/5)(10 \text{ kg})(0.5 \text{ m})^2 (3.1 \text{ rad/s})^2 = 4.8 \text{ J}$$

$$\omega = (6.2 \text{ m/s}) \div 0.5 \text{ m} = 3.1 \text{ rad/s}$$

Feb 14-10:50 AM

A 14.5 kg cat, fastened to the end of a steel wire of unstretched length 1m, is whirled in a vertical circle with an angular velocity 2 rev/s at the bottom of the circle. The cross-sectional area of the wire is 0.065 cm².

- What is the amount of force acting on the cat at the bottom of the sphere?
- What is the elongation of the wire when the cat is at the lowest point of its path?



$$F = m\omega^2 r + mg$$

$$F = 14.5\text{kg}(1\text{m})((2\text{rev/s})2\pi)^2 + 14.5\text{kg}(9.81\text{ m/s}^2) = 2432\text{N}$$

$$Y = \frac{F}{A} \cdot \frac{L}{E} \quad 2 \times 10^{11} = \frac{2432\text{N}}{6.5 \times 10^{-6}} = \frac{\Delta L}{1\text{m}} = 1.87 \times 10^{-3}\text{m}$$

Feb 14-10:50 AM