Quiz Average **8.2** **Quiz High Score** **10**

PH 220 **Quiz # 10 (10 pts)** **Name** **Solution**

A "See-Saw" is made up of an unbreakable massless board that is 10.0 m long. A child who has a mass($m_C = 42.0$ kg) is located at the distance ($x_C = 2.50$ m) from the left end of the board. A man is located at a distance ($x_M = 8.75$ m) from the left end of the board. The board is balanced when supported at a distance ($x_F = 6.47$ m) from the left end of the board. What is the mass of the man?

A. 109. kg **B.** 147. kg **C.** 24.1 kg **D.** **73.1 kg**

$$x_{CM} = \frac{m_C x_C + m_M x_M}{m_C + m_M} = x_F$$

$$(m_C + m_M)x_F = m_C x_C + m_M x_M = m_C x_F + m_M x_F$$

$$m_M x_F - m_M x_M = m_M(x_F - x_M) = m_C x_C - m_C x_F = m_C(x_C - x_F)$$

$$m_M = m_C \frac{(x_C - x_F)}{(x_F - x_M)} = (42.0\ kg)\frac{(2.50\ m - 6.47\ m)}{(6.47\ m - 8.75\ m)} = (42.0\ kg)\frac{(-3.97\ m)}{(-2.28\ m)}$$

$$m_M = (42.0\ kg)\frac{(-3.97\ m)}{(-2.28\ m)} = (42.0\ kg)(1.741) = 73.1\ kg$$

So, the correct answer is D !

The Sun is located about 1.50×10^{11} m from Earth. The diameter of the Sun is about 1.39×10^{9} m. What is the angle the Sun subtends in our eyes?

A. 2.09×10^{20} Rad **C.** **9.27×10^{-3} Rad**

B. 4.80×10^{-21} Rad **D.** 1.08×10^{2} Rad

$$\theta = \frac{S}{R} = \frac{1.39\ x\ 10^9\ m}{1.50\ x\ 10^{11}\ m} = 9.27\ x\ 10^{-3}\ Rad$$

So, the correct answer is C !

A propeller on a ship is rotating with an angular velocity of $4.73\ {}^{\text{Rad}}/_{\text{s}}\ (\widehat{\text{CCW}})$. An angular acceleration of $2.01\ {}^{\text{Rad}}/_{\text{s}^2}\ (\widehat{\text{CW}})$ is applied to the propeller for a time of $6.50\ \text{s}$. What is the angular displacement the propeller undergoes during this time?

A. $73.2\ \text{Rad}\ (\widehat{\text{CCW}})$

B. $\mathbf{11.7\ Rad\ (\widehat{CW})}$

C. $30.7\ \text{Rad}\ (\widehat{\text{CCW}})$

D. $42.5\ \text{Rad}\ (\widehat{\text{CW}})$

$$\vec{\theta} = \vec{\omega_0} t + \frac{1}{2}\vec{\alpha} t^2 = \left(4.73\ {}^{Rad}/_{s}\ (\widehat{CCW})\right)(6.50\ s) + \frac{1}{2}\left(2.01\ {}^{Rad}/_{s^2}\ (\widehat{CW})\right)(6.50\ s)^2$$

$$\vec{\theta} = 30.75\ Rad\ (\widehat{CCW}) + 42.46\ Rad\ (\widehat{CW}) = -30.75\ Rad\ (\widehat{CW}) + 42.46\ Rad\ (\widehat{CW})$$

$$\vec{\theta} = (-30.75\ Rad + 42.46\ Rad)(\widehat{CW}) = 11.7\ Rad\ (\widehat{CW})$$

So, the correct answer is B !

An object is in an orbit about a fixed point and has an angular velocity given by:

$$\omega = (12t^2 - 7)\ {}^{\text{Rad}}/_{\text{s}}$$

It is known at time $t = 0.00\text{s}, \theta = 10.0\ \text{Rad}$. What is the magnitude of the angular acceleration at $t = 1.71\ \text{s}$?

A. $\mathbf{41.0\ {}^{Rad}/_{s^2}}$

B. $13.5\ {}^{\text{Rad}}/_{\text{s}^2}$

C. $28.1\ {}^{\text{Rad}}/_{\text{s}^2}$

D. $18.0\ {}^{\text{Rad}}/_{\text{s}^2}$

$$\alpha = \frac{d\omega}{dt} = \frac{d}{dt}(12t^2 - 7) = 24t$$

At $t = 1.71\ s$

$$\alpha = 24t = \left(24\ {}^{Rad}/_{s^3}\right)(1.71\ s) = 41.0\ {}^{Rad}/_{s^2}$$

So, the correct answer is A !

A car is traveling along a straight section of road with a linear velocity of $16.7\ {}^{\mathrm{m}}/_{\mathrm{s}}$. The four tires have each have a radius of $0.350\ \mathrm{m}$. What is the average angular speed of each tire as the car is moving down the road?

A. $23.4\ {}^{\mathrm{Rad}}/_{\mathrm{s}}$ **B.** $5.85\ {}^{\mathrm{Rad}}/_{\mathrm{s}}$ **C.** $11.9\ {}^{\mathrm{Rad}}/_{\mathrm{s}}$ **D.** $\mathbf{47.7\ {}^{Rad}/_{s}}$

$$\boldsymbol{\omega = \frac{v}{R} = \frac{16.7\ {}^{m}/_{s}}{0.350\ m} = 47.7\ {}^{Rad}/_{s}}$$

So, the correct answer is D !

Dr. Donovan's Classes Page	**Dr. Donovan's PH 220 Lecture Quiz & Exam Solutions**
NMU Physics Department Web Page	**NMU Main Page**

Please send any comments or questions about this page to ddonovan@nmu.edu

This page last updated on April 19, 2024