Quiz Average 5.75 **Quiz High Score** 10

PH 220 **Quiz # 01 (10 pts)** **Name** Solution

An American football has a length of 28.50 cm. The playing zone of an American football field is 91.44 m long. How many whole footballs could be lined up touching the end of one football to the next football, starting from one goal line to the opposing goal line?

A. **320** **B.** 321 **C.** 32 **D.** 3201

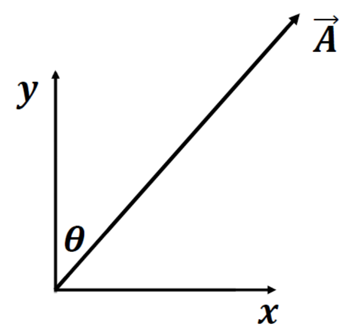
$$\boldsymbol{L = Nd}$$

$$\boldsymbol{N = \frac{L}{d} = \frac{91.44\ m}{28.50\ cm}\ x\ \frac{100\ cm}{m} = 320.8}$$

"Whole footballs" means we truncate not round! So $\boldsymbol{N = 320}$

So, the correct answer is A !

Vector $\vec{A}$ is shown on the right. It has a magnitude of $137.\ ^{m}/_{s}$. It makes angle $\theta = 39.4°$ with the y-axis as shown. What is the x-component of vector $\vec{A}$?



A. $106.\ ^{m}/_{s}$ **B.** $\boldsymbol{87.0\ ^{m}/_{s}}$ **C.** $113.\ ^{m}/_{s}$ **D.** $137.\ ^{m}/_{s}$

With picture as shown, the x-component of $\vec{A}$ would be opposite to the angle θ, so we should use the Sine function

$$\boldsymbol{A_x = A\sin(\theta) = (137.\ ^{m}/_{s})\sin(39.4°) = 86.96\ ^{m}/_{s}}$$

So, the correct answer is B !

Two vectors are given as $\vec{A} = 4(\hat{\imath}) - 3(\hat{\jmath}) + 7(\hat{k})$ and $\vec{B} = -9(\hat{\imath}) - 5(\hat{\jmath}) + 11(\hat{k})$. What is vector $\vec{C}$ if $\vec{C} = \vec{B} - 2\vec{A}$?

A. $\vec{C} = -13\,(\hat{\imath}) - 2(\hat{\jmath}) + 4(\hat{k})$

B. $\vec{C} = -1\,(\hat{\imath}) - 11(\hat{\jmath}) + 25(\hat{k})$

C. $\boldsymbol{\vec{C} = -17\,(\hat{\imath}) + (\hat{\jmath}) - 3(\hat{k})}$

D. $\vec{C} = 22\,(\hat{\imath}) + 7(\hat{\jmath}) - 15(\hat{k})$

$$\boldsymbol{\vec{C} = \vec{B} - 2\vec{A}}$$

$$\boldsymbol{\vec{C} = \vec{B} - 2\vec{A} = \left(-9(\hat{\imath}) - 5(\hat{\jmath}) + 11(\hat{k})\right) - 2\left(4(\hat{\imath}) - 3(\hat{\jmath}) + 7(\hat{k})\right)}$$

$$\boldsymbol{\vec{C} = (-9 - 8)(\hat{\imath}) + (-5 + 6)(\hat{\jmath}) + (11 - 14)(\hat{k})}$$

$$\boldsymbol{\vec{C} = -17\,(\hat{\imath}) + (\hat{\jmath}) - 3(\hat{k})}$$

So, the correct answer is C !

An object is found to have a position as a function of time given by:

$$\vec{S} = \left(16.0\text{ m} - 5.75\ {}^{\text{m}}/_{\text{s}}\,\text{t} + 2.40\ {}^{\text{m}}/_{\text{s}^2}\ \text{t}^2\right)(\widehat{\text{East}})$$

What is the instantaneous velocity at the time $\text{t} = 0.500\text{ s}$?

A. $4.45\ {}^{\text{m}}/_{\text{s}}\ (\widehat{\text{East}})$

B. $4.45\ {}^{\text{m}}/_{\text{s}}\ (\widehat{\text{West}})$

C. $3.35\ {}^{\text{m}}/_{\text{s}}\ (\widehat{\text{East}})$

D. $\boldsymbol{3.35\ {}^{\text{m}}/_{\text{s}}\ (\widehat{\text{West}})}$

$$\boldsymbol{\vec{v} = \frac{d\vec{S}}{dt} = \frac{d}{dt}\left(\left(16.0\,m - 5.75\ {}^{m}/_{s}\,t + 2.40\ {}^{m}/_{s^2}\ t^2\right)(\widehat{East})\right)}$$

$$\boldsymbol{\vec{v} = \left(-5.75\ {}^{m}/_{s} + 4.80\ {}^{m}/_{s^2}\,t\right)(\widehat{East}) = \left(-5.75\ {}^{m}/_{s} + 4.80\ {}^{m}/_{s^2}\,(0.500\,s)\right)(\widehat{East})}$$

$$\boldsymbol{\vec{v} = (-5.75\ {}^{m}/_{s} + 2.40\ {}^{m}/_{s})(\widehat{East}) = -3.35\ {}^{m}/_{s}\,(\widehat{East}) = 3.35\ {}^{m}/_{s}\ (\widehat{West})}$$

So, the correct answer is D !

A truck is moving with a speed of 7.32 m/s when it begins to uniformly slow down. After a time of 14.3 s, the truck reaches a speed of 2.65 m/s. What is the magnitude of the average acceleration of the truck during this period of time?

A. 3.06 m/s^2 **B.** 6.68 m/s^2 **C.** 0.697 m/s^2 **D.** $\mathbf{0.327\ m/s^2}$

$$\bar{a} = \frac{v_f - v_0}{t} = \frac{2.65\ m/s - 7.32\ m/s}{14.3\ s} = \frac{-4.67\ m/s}{14.3\ s} = -0.327\ m/s^2$$

The minus sign means the truck is slowing down. Acceleration is in opposite direction of initial velocity!

So, the correct answer is D !

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