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1. (1 point)

Student Name: Arfaz Hossain
Student ID: V00984826

A particle's position as a function of time is given by $\vec{r} = \left(6.08\text{m} + 1.07\frac{\text{m}}{\text{s}^4}t^4\right)\hat{i} + \left(-5.93\frac{\text{m}}{\text{s}}t + 0.72\frac{\text{m}}{\text{s}^5}t^5\right)\hat{j}$

(The input below will accept answers with no more than 1

What is the angle between the particle's velocity and acceleration vectors at $t = 1.17\text{s}$?

_____ degrees

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Correct Answers:

- 45.900

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2. (1 point)

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A ball of mass $M = 2.9\text{kg}$ is moving in a circle of radius $R = 2.63\text{m}$ at constant speed.
The ball takes $t = 3.74\text{s}$ to go around a complete circle.

(The input below will accept answers with no more than 1

What is the magnitude of the acceleration this ball experiences?

_____ $\frac{\text{m}}{\text{s}^2}$

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Correct Answers:

- 7.423

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3. (1 point)

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A ball of mass $m = 3.13\text{kg}$ has its position vector given as $\vec{r}(t) = R\cos(\omega t + \phi)\hat{i} + R\sin(\omega t + \phi)\hat{j}$
The numerical values of the parameters are $R = 1.38\text{m}$, $\omega = 2.13\text{s}^{-1}$, and $\phi = 0.77$.

(The input below will accept answers with no more than 1

What is $\vec{v}$ at $t = 1.67\text{s}$?

$\vec{v} =$ _____ $\frac{\text{m}}{\text{s}}\hat{i} +$ _____ $\frac{\text{m}}{\text{s}}\hat{j}$

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Correct Answers:

- 2.724
- -1.105

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4. (1 point)

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A projectile is launched in the x-z plane over level ground with an initial speed of $|\vec{v}| = 17.7\frac{\text{m}}{\text{s}}$ at an angle of 28.2 degrees above the horizontal.
In addition to the downward acceleration of gravity, a strong wind in the direction the projectile is traveling provides a constant acceleration $a_x = 1.36\frac{\text{m}}{\text{s}^2}$.
The projectile was launched from the origin.

(The input below will accept answers with no more than 1

What is the x-component of the particle's landing location?

_____ m

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Correct Answers:

- 28.608

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5. (1 point)

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A particle moves with constant acceleration.
At $t = 0s$ the particle is at the origin.
At $t = 0\text{s}$ the particle was moving at a speed of $|\vec{v}| = 19.4\frac{\text{m}}{\text{s}}$. The particle's velocity makes an angle of 74.9° with the positive x-axis, 117° with the positive y-axis, and 148.4° with the positive z-axis.
The acceleration is $\vec{a} = 2.32\frac{\text{m}}{\text{s}^2}\hat{i} - 2.57\frac{\text{m}}{\text{s}^2}\hat{j}$.

(The input below will accept answers with no more than 1

At what time $t > 0\text{s}$ is the speed of the particle $36.6\frac{\text{m}}{\text{s}}$?

_____ s

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Correct Answers:

- 6.545

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