1. (1 point)
Student Name: Arfaz Hossain
Student ID: V00984826

A particle of mass $m = 3.13$kg and charge $q = 1.77$C is moving in a region where there is a constant magnetic field $\vec{B} = 0.78$T$\hat{k}$.

At a particular instant the particle is at the origin, moving with velocity $\vec{v} = 2.58\frac{m}{s}\hat{i} - 5.33\frac{m}{s}\hat{j}$.

The particle moves in a circle under the influence of only the Lorentz force.

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

What is the magnitude of the Lorentz force on the particle?
_____ N

What is the location of the center of the circle around which the particle moves? (Hint: You will need to find the unit vector direction of the acceleration and the radius of the circle the particle travels in.)

Center at $\vec{r} =$ _____ m$\hat{i}+$ _____ m$\hat{j}$

UVic Problem ID: 38301611324924130
Student Name: Arfaz Hossain
Student ID: V00984826

Correct Answers:

- 8.175
- -12.084
- -5.849

2. (1 point)
Student Name: Arfaz Hossain
Student ID: V00984826

A moon of mass $m = 5.77 \times 10^{20}$kg orbits a planet.
The moon's orbit is circular with a radius $R = 3.83 \times 10^8$m.
The moon is moving at speed $|\vec{v}| = 0.93 \times 10^3 \frac{m}{s}$.

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

What is the mass of the planet? Note: You can assume that the planet's mass is large enough that its centre is approximately the centre-of-mass of the planet-moon system.
_____ $\times 10^{24}$kg

UVic Problem ID: 38301611324924130
Student Name: Arfaz Hossain
Student ID: V00984826

Correct Answers:

- 4.966

3. (1 point)
Student Name: Arfaz Hossain
Student ID: V00984826

Three charges are located as follows:
Charge 1 with $q_1 = 3.49 \times 10^{-4}$C is at $\vec{r}_1 = 33.5$m$\hat{i}+18.5$m$\hat{j}$.
Charge 2 with $q_2 = -4.19 \times 10^{-4}$C is at $\vec{r}_2 = 33.5$m$\hat{i}+38.4$m$\hat{j}$.
Charge 3 with $q_3 = 3.04 \times 10^{-4}$C is at $\vec{r}_3 = 48.1$m$\hat{i}+38.4$m$\hat{j}$.

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

What is the magnitude of the net force on q_3 due to q_1 and q_2
_____ N

What angle does the net force on q_3 make with the positive x-axis $\hat{i}$? with the y-axis $\hat{j}$?
Angle with $\hat{i}$: _____ degrees
Angle with $\hat{j}$: _____ degrees

UVic Problem ID: 38301611324924130
Student Name: Arfaz Hossain
Student ID: V00984826

Correct Answers:

- 4.627
- 164.148
- 74.148

4. (1 point)
Student Name: Arfaz Hossain
Student ID: V00984826

A charge $q_1 = -2.53$C is held fixed at $\vec{r}_1 = 15.7$m$\hat{j}$.
A charge $q_2 = -1.27$C is held fixed at $\vec{r}_2 = 37.1$m$\hat{j}$.
A third charge Q is placed at $\vec{r}_Q = y\hat{j}$.

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

What is the value of y for which Q is in equilibrium?
_____ m

UVic Problem ID: 38301611324924130
Student Name: Arfaz Hossain
Student ID: V00984826

Correct Answers:

- 28.226

5. (1 point)
Student Name: Arfaz Hossain
Student ID: V00984826

Three masses are located as follows:
Mass 1 with $m_1 = 6.19 \times 10^6$kg is at $\vec{r}_1 = 33.5$m$\hat{i}+18.5$m$\hat{j}$.
Mass 2 with $m_2 = 5.15 \times 10^6$kg is at $\vec{r}_2 = 53.4$m$\hat{i}+18.5$m$\hat{j}$.
Mass 3 with $m_3 = 3.72 \times 10^6$kg is at $\vec{r}_3 = 53.4$m$\hat{i}+33.1$m$\hat{j}$.

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

What is the magnitude of the net force on m_3 due to m_1 and m_2
_____ N

What angle does the net force on m_3 make with the positive x-axis $\hat{i}$? with the y-axis $\hat{j}$?
Angle with $\hat{i}$: _____ degrees
Angle with $\hat{j}$: _____ degrees

UVic Problem ID: 38301611324924130
Student Name: Arfaz Hossain
Student ID: V00984826

Correct Answers:

- 7.757
- 105.192

- `164.808`

---

6. (1 point)
Student Name: Arfaz Hossain
Student ID: V00984826

A mass $m = 29.6$kg is on a frictionless slope which makes an angle of $\theta = 19.6°$ with the horizontal.
The mass is attached to a spring with $k = 205\frac{\text{N}}{\text{m}}$.
The mass is initially held at rest in a location where the spring is unstretched.

The mass is released from rest and slides down the slope stretching the spring.

(The input below will accept answers with no more than 1
At the instant that the mass's acceleration vanishes how much has the spring been stretched from its equilibrium length?

——————— m

UVic Problem ID: 38301611324924130
Student Name: Arfaz Hossain
Student ID: V00984826
Correct Answers:

- `0.475`