# Physics 203 Ecampus
## Individual Quizbit | Charges and Forces

**Timed Quizbit** | Work individually to produce a handwritten solution on paper or a tablet to **questions 1** of this Quizbit during the timed 30-minute Gradescope assignment *Timed Quizbit*. The quality of your solution and communication is far more important than the final answer!

1. Point **P** is some distance from a **10 kg** sphere of unknown charge. The electric potential at point **P** is **-4.5 V**. The sphere and point **P** are very far from anything else (ignore gravity/friction/drag).

    (a) What is the sign of the charge on the 10 kg sphere? Explain.

A **5 kg** sphere with a charge of **-3 C** is now placed at rest at point P.

    (b) What is the initial potential energy of the two charge system?

    (c) The 10 kg sphere is fixed in place and the 5 kg sphere is allowed to move. After a long time has passed, what is the speed of the 5 kg sphere?

> **Hints:**
>
> $W_{ext} = \Delta E_{sys}$
>
> $U^E = qV$
>
> $KE = \dfrac{1}{2}mv^2$
>
> $V_{pc} = k\,\dfrac{q}{|\Delta \vec{r}|}$
>
> $k = 8.99 \times 10^9 \; N\dfrac{m^2}{C^2}$

**Final Solution and Sensemaking** | After you've completed and submitted question 1 to the timed Gradescope assignment, take more time to create a final solution set to all the questions. Use any of the course support systems (LAHHH, Teams, WormHole, … etc.) to produce the best solutions. Submit your work to the *Final Solution* Gradescope assignment by Sunday. Your final work will be graded on both completeness and correctness.

2. Point **S** is halfway between the 10 kg sphere and point **P**. Before the 5 kg sphere has been added to the system, what is the electric potential at point **S**?

3. When you add the 5 kg sphere to the system (before either sphere is allowed to move), do you expect the electric potential at point **S** to increase, decrease, or stay the same? Explain.