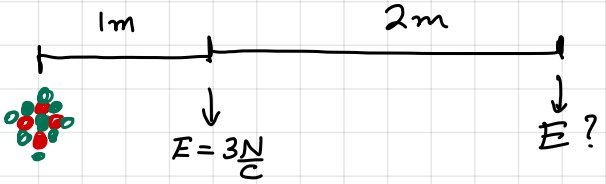
Physics Battle!

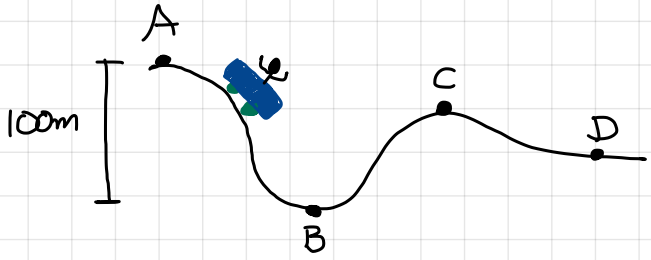
1. The Electric field 1m away from a positively charged ion is $3\frac{N}{C}$. a) What is the electric field 3m away from it?



b) What is the direction of the electric field at these points?

Bonus) How could you determine the charge of the ion? (Mathematically)

2. Consider the following rollercoaster:



a) In which point would the energy be highest? Neglect friction of any type and consider only the force due to gravity.

b) Find the speed at Point B.

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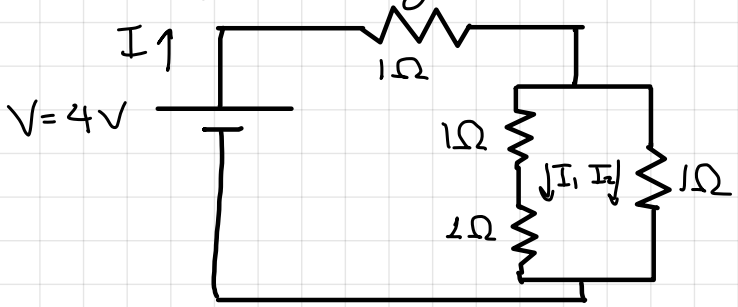
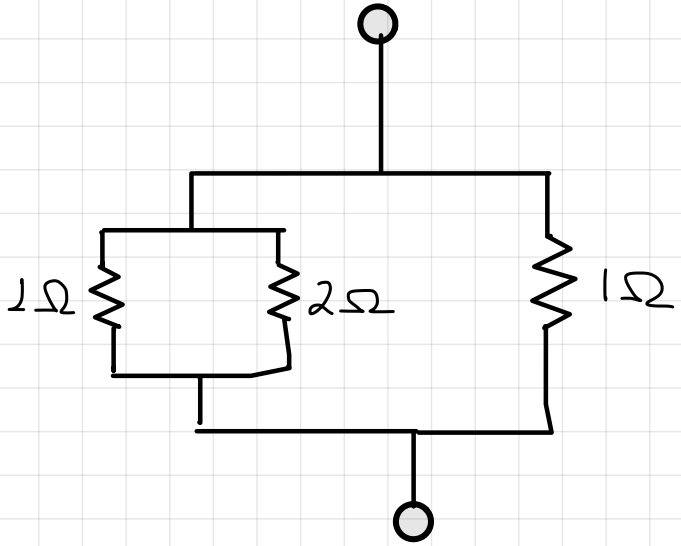
3. Find the current flowing through the voltage source in the following circuit:



b) Find I_1 and I_2.

4. Find the equivalent resistance of the following resistors:



b) What voltage should we use if we want a 10 A current flowing through the ends?

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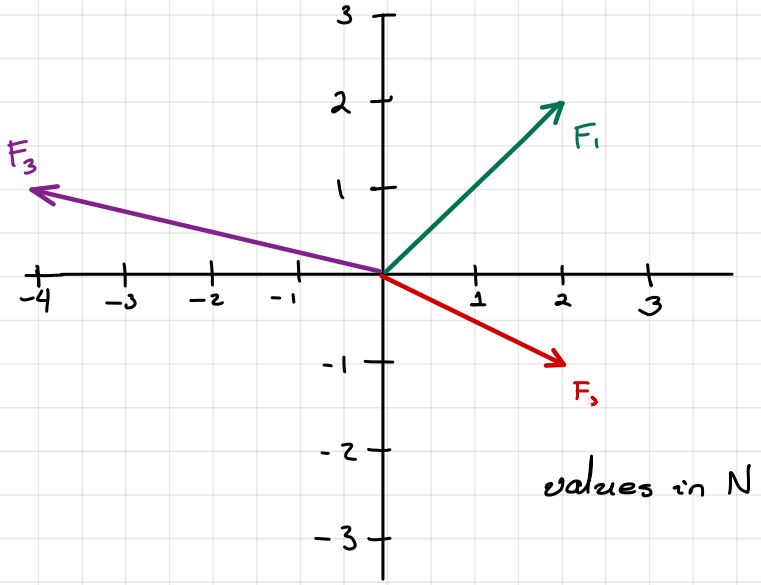
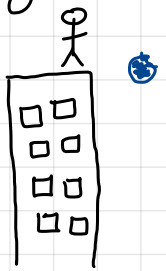
5. Consider the following free body diagram:



a) Find the resulting force.

b) The resulting force is acting on a 2kg object. Find its acceleration.

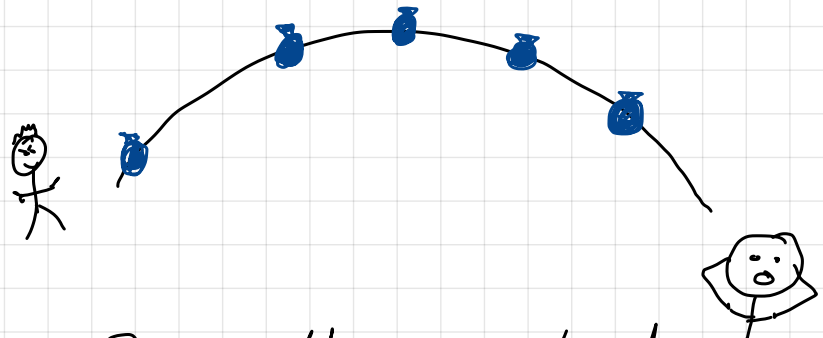
6. Imagine that you throw a water balloon from the top of the Physics building.



a) What is its speed after 5 seconds?

Recall $g = 9.81 \frac{m}{s^2}$

Now imagine you throw it at one of your friends. It follows a parabola as shown below:



Draw the acceleration vector at each point.