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Physics 203

Week 07 quiz | Corvallis

5/12/2021

Collaboration is not allowed. You will have 25 minutes to download this PDF, solve, take pictures, AND upload this exam to Gradescope. You will have an additional 5 minute buffer in case technological issues arise.

Three point charges (**A** , **B** , and **C**) are fixed in place laced in a triangular pattern. These three charges create an electric potential (in volts) which is plotted in the region around these charges. **k** = 8.99 x 10^9 N·m^2/C^2

0.47	0.35	0.15	-0.18	-0.64	-1.18	-1.64	-1.83	-1.64	-1.18	-0.64	-0.18	0.15	0.35	0.47
0.64	0.54	0.31	-0.14	-0.88	-1.91	-2.95	-3.43	-2.95	-1.91	-0.88	-0.14	0.31	0.54	0.64
0.90	0.87	0.69	0.16	-0.99	-3.01	-5.67	-7.20	-5.67	-3.01	-0.99	0.16	0.69	0.87	0.90
1.25	1.41	1.45	1.07	-0.42	-4.10	-11.77	-20.31	-11.77	-4.10	-0.42	1.07	1.45	1.41	1.25
1.68	2.14	2.79	3.32	2.25	-3.01	-18.41	**Point Charge C**	-18.41	-3.01	2.25	3.32	2.79	2.14	1.68
2.08	2.95	4.63	8.29	11.85	3.38	-7.95	-17.42	-7.95	3.38	11.85	8.29	4.63	2.95	2.08
2.34	3.45	5.90	14.13	**Point Charge A**	11.42	0.62	-2.40	0.62	11.42	**Point Charge B**	14.13	5.90	3.45	2.34
2.38	3.39	5.34	9.51	14.17	8.27	3.31	1.78	3.31	8.27	14.17	9.51	5.34	3.39	2.38
2.22	2.95	4.05	5.43	6.09	4.95	3.40	2.78	3.40	4.95	6.09	5.43	4.05	2.95	2.22
1.98	2.45	3.03	3.56	3.74	3.43	2.94	2.73	2.94	3.43	3.74	3.56	3.03	2.45	1.98
1.73	2.03	2.35	2.60	2.70	2.62	2.47	2.40	2.47	2.62	2.70	2.60	2.35	2.03	1.73
1.51	1.71	1.90	2.05	2.12	2.12	2.08	2.06	2.08	2.12	2.12	2.05	1.90	1.71	1.51
1.33	1.47	1.59	1.69	1.75	1.77	1.77	1.77	1.77	1.77	1.75	1.69	1.59	1.47	1.33
1.18	1.28	1.37	1.44	1.49	1.51	1.52	1.53	1.52	1.51	1.49	1.44	1.37	1.28	1.18
1.06	1.13	1.20	1.25	1.29	1.32	1.33	1.33	1.33	1.32	1.29	1.25	1.20	1.13	1.06

THE QUSTION CONTINUES ON THE NEXT PAGE.

(a) Use the table below to fill in the signs of each point charge (positive, negative, or neutral). Explain. Note: This three charge distribution has the same convention as a point charge where the electric potential very far away is zero.

Point Charge	Sign
A	
B	
C	

(b) Rank the magnitudes of each point charge. Explain.

(c) If a 4th test charge, an electron, is placed at rest halfway between point charges **A** and **B** at the –2.40 volt location, what direction would the electron move and what would happen to the electric potential energy of the electron (increase, decrease, stay the same)? Explain. Note: At all times the original three charges (**A**, **B**, and **C**) are fixed in place and do not move.

(d) What is the speed of the electron from part (c) after is has moved 1 square in the direction you determined. Note: Each square has side lengths of 1.00 meters. The charge of an electron is -1.60×10^{-19} C and the mass is 9.11×10^{-31} kg.