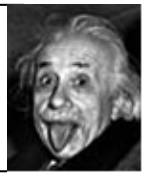
Electric field



1. Find the *force* between two charged spheres *2 cm* apart if the charge on one sphere is $4\mu C$ and the charge on the other sphere is *3 mC*. ***Resp.: $2.7\cdot10^{7}$ N.***

2. How many *electrons* would be required to have a total *charge* of *1 C* on a sphere?. $Q_e = -1.6\cdot10^{-19}$ *C*. ***Answer:*** .....

3. Two equal charges experience a repulsive force between them of $1.2\cdot10^{2}$ *N* when they are *3.0 cm apart*. Calculate the *magnitude* of the charges. ***Answer: 3.5 μC.***

4. a) Two charges, Q_1 and Q_2, are separated by a distance *d*, and exert a force F_0 on each other. What new force F_f will exist if *d is doubled*? b) Two charges, Q_1 and Q_2, are separated by a distance *d*, and exert a force F_0 on each other. What new force F_f will exist if both Q_1 and Q_2 are *doubled*? ***Answer.: $F_f = F_0/4$; $F_f = 4\cdot F_0$***

5. *Calculate the force* exerted by a point charge $Q_1 = +2\ nC$ at *(0,0)* on another point charge $Q_2 = -3\ nC$ located at *(8,-6)*. ***Answer***: $\vec{F}_{1\to2} = -4.3\cdot10^{-10}\,\vec{i} + 3.2\cdot10^{-10}\,\vec{j}$ ***N.***

6. Two charges are arranged on a standard x–y coordinate grid: a - *2 μC charge at (0, 3)* and a + *2 μC charge at (0, –3).* Find the *electric field at P (- 4, 0).* ***Answer:*** $\vec{E}_P = 864\,\vec{j}$ ***N/C***

7. a) Find the *electric field, due to the charges Q_1 and Q_2, at the point P that is located at (6, 3). Q_1(0, 0) = + 2 μC, and Q_2(0, 6) = -1 μC.* b) What is the *total force exerted* by these two charges on a charge $Q_3 = 5\ \mu C$ *located at* P. *All dimensions are in meters.* ***Answer:*** $\vec{E}_P = -13.2\,\vec{i} - 23.7\,\vec{j}$ ***N/C.***

8. A point charge of + *2 μC* is *5 m* from a charge of + *3 μC*. *Where* is the *electric field* between the charges *equal to zero*? ***Answer: .....***

9. a) Find the *electric field at the point A (8,0)* due to the charges Q_1 *(0,-6) = - 2 μC and Q_2 (0,6) = - 2 μC* and where the *coordinates* are measured in *meters*. b) What is the *total force exerted* by Q_1 and Q_2 on a charge $Q_3 = 6\ \mu C$ *located at* A. c) Find the electric potential at *A (8,0)* and *B (0,0).* d) How much *work is required* to carry a *6 μC* from *A (8,0)* to *O (0,0).* ***Answer: a)*** $\vec{E}_A = -216\,\vec{i}$ ***N/C. b) ….. c) $V_A = -3600$ V; $V_O = -6000$ V. d) $W_{A\to O} = 0.144$ J***

10. *Two identical charges* of *6 μC* are *located* along the x-axis at *(0,0)* and *(8,0)* respectively. a) Find the total electric *at point P (4, -4).* b) What is the *total force exerted* by these two charges on a charge *Q´= - 5 μC located at P*? c) Find the *electric potential* at *P (4,-4)* and *R (4,0).* d) How much work *must be done to transfer a charge* Q´= - *5 μC* from *P (4,-4)* to *R (4,0). e)* What speed is achieved by *Q´ at R* accelerated from rest from *P* if its mass is *6 grams*? *All dimensions are in meters.* ***Answer: a)*** $\vec{E}_P = -2386\,\vec{j}$ ***N/C. b) ….. c) $V_P = 19092$ V; $V_R = 27000$ V. d) 0.0395 J. e) 3.63 m/s.***