PHYSICS

BOOKS - DISHA PHYSICS (HINGLISH)

ELECTROSTATIC POTENTIAL AND CAPACITANCE

Physics

1. If n drops, each charged to a potential V, coalesce to form a single drop. The potential

of the big drop will be

A. $\frac{V}{n^{2/3}}$

B. $\frac{V}{n^{1/3}}$

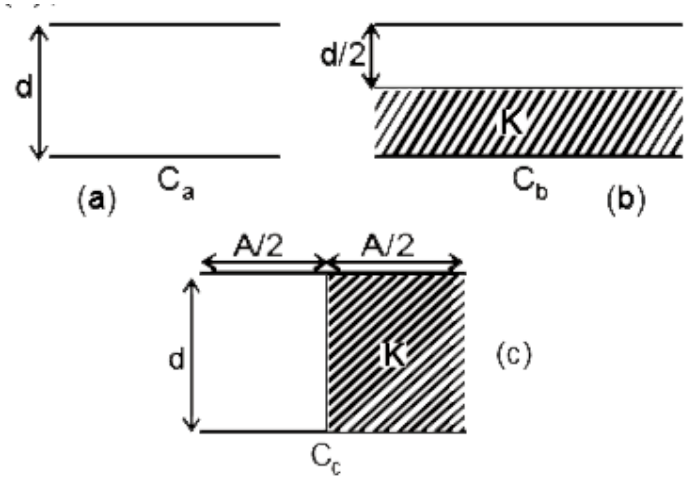
C. $Vn^{1/3}$

D. $Vn^{2/3}$

Answer:

Watch Video Solution

2. The capacitance of a parallel plate capacitor isC_a (Fig. a). A dielectric of dielectric constant K is inserted as shown in fig. (b) and (c). If C_b and C_c denote the capacitances in fig. (b) and (c), then



A. bothC_b, $C_c > C_a$

B. $C_c > C_a$while$C_b > C_a$

C. both $C_b, C_c < C_a$

D. $C_a = C_b = C_c$

Answer:

Watch Video Solution

3. The electric potential $V(\mathrm{x})$ in a region around the origin is given by $V(\mathrm{x}) = 4x^2$ volts. The electric charge enclosed in a cube of 1 m side with its centre at the origin is (in coulomb

A. $8\varepsilon_0$

B. $-4\varepsilon_0$

C. 0

D. $-8\varepsilon_0$

Answer:

Watch Video Solution

4. A parallel plate condenser is immersed in an oil of dielectric constant 2. The field between the plates is

A. increased, proportional to 2

B. decreased, proportional to $\frac{1}{2}$

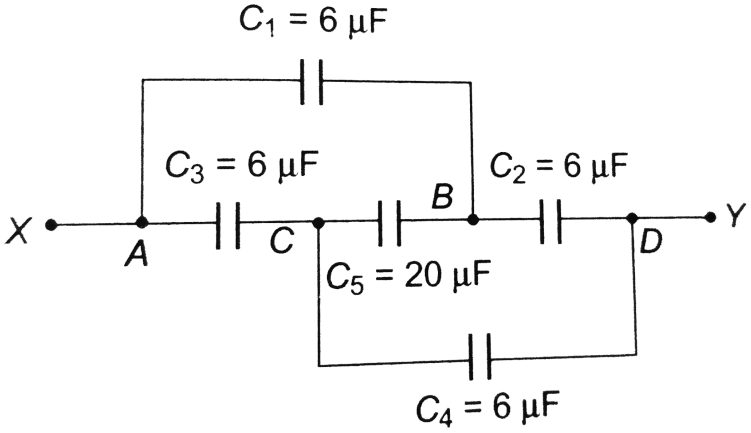
C. increased, proportional to – 2

D. decreased, proportional to - $\frac{1}{2}$

Answer:

Watch Video Solution

5. What is the effective capacitance between points X and Y ?



A. $24\mu F$

B. $18\mu F$

C. $12\mu F$

D. $6\mu F$

Answer:

Watch Video Solution

6. A parallel plate condenser with a dielectric of dielectric constant K between the plates has a capacity C and is charged to a potential V volt. The dielectric slab is slowly removed from between the plates and then reinserted. The net work done by the system in this process is

A. zero

B. $\frac{1}{2}(K-1)Cv^2$

C. $\frac{CV^2(K-1)}{K}$

D. $(K-1)Cv^2$

Answer:

Watch Video Solution

7. If a slab of insulating material 4×10^{-5}m thick is introduced between the plates of a parallel plate capacitor, the distance between the plates has to be increased by 3.5×10^{-5} m to restore the capacity to original value.

Then the dielectric constant of the material of slab is

A. 8

B. 6

C. 12

D. 10

Answer:

Watch Video Solution

8. A unit charge moves on an equipotential surface from a point A to point B, then

A. $V_A - V_B = +ve$

B. $V_A - V_B = 0$

C. $V_A - V_B = -ve$

D. it is stationary

Answer:

Watch Video Solution

9. Identify the false statement

A. Inside a charged or neutral conductor, electrostatic field is zero

B. The electrostatic field at the surface of the charged conductor must be tangential to the surface at any point

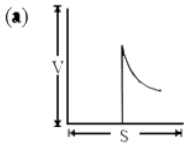
C. There is no net charge at any point inside the conductor

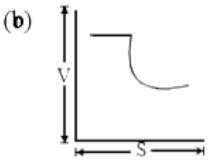
D. Electrostatic potential is constant throughout the volume of the conductor

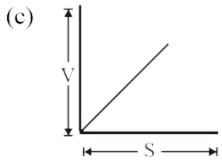
Answer:

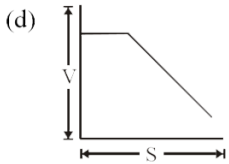
Watch Video Solution

10. In a hollow spherical shell, potential (V) changes with respect to distance (s) from centre as

A. 

B. 

C. 

D. 

Answer:

Watch Video Solution

11. The 1000 small droplets of water each of radius r and charge Q, make a big drop of spherical shape. The potential of big drop is

how many times the potential of one small droplet

A. 1

B. 10

C. 100

D. 1000

Answer:

Watch Video Solution

12. The work done in carrying a charge Q_1 once round a circle of radius R with a charge Q_2 at the centre is

A. $Qq\left(4\pi\varepsilon_0 r^2\right)$

B. $Qq\left(4\pi\varepsilon_0 r\right)$

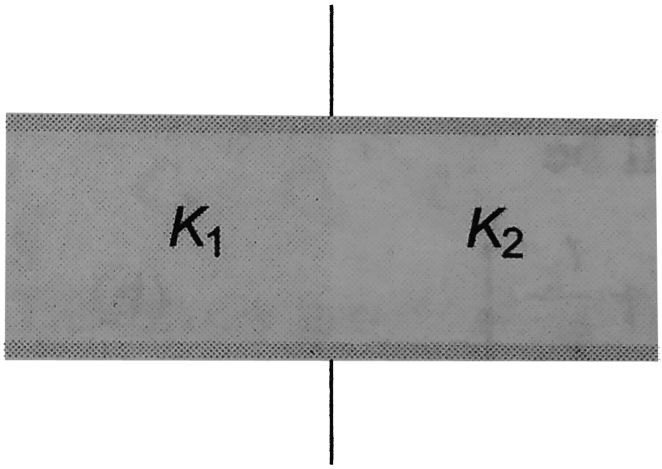
C. zero

D. $Qq^2\left(4\pi\varepsilon_0 r\right)$

Answer:

Watch Video Solution

13. A parallel plate condenser is filled with two dielectrics as shown. Area of each plate is $A\text{metre}^2$ and the separtion is t metre. The dielectric constants are K_1 and K_2, respectively. Its capacitance in farad will be



A. $\frac{\varepsilon_0 A}{t}(k_1 + k_2)$

B. $\frac{\varepsilon_0 A}{t} \cdot \frac{k_1 + k_2}{2}$

C. $\frac{2\varepsilon_0 A}{t}(k_1 + k_2)$

D. $\frac{\varepsilon_0 A}{t} \cdot \frac{k_1 + k_2}{2}$

Answer:

Watch Video Solution

14. Two metal pieces having a potential difference of $800V$ are $0.02m$ apart horizontally. A particle of mass $1.96 \times 10^{-15} kg$ is suspended in equilibrium

between the plates. If the e is the elementary charge, then charge on the particle is

A. 8

B. 6

C. 0.1

D. 3

Answer:

Watch Video Solution

15. A one microfarad capacitor of a TV is subjected to 4000 V potential difference. The energy stored in capacitor is

A. 8 J

B. 16 J

C. $4 \times 10^{-3} J$

D. $2 \times 10^{-3} J$

Answer:

Watch Video Solution

16. An uncharge parallel plate capacitor having a dielectric of dielectric constant K is connected to a similar air coare parallel plate capacitor charged to a potential V_0. The two share the charge, and the common potential becomes V. The dielectric constant K is`

A. $\frac{V_1 - V_2}{V_1}$

B. $\frac{V_1}{V_1 - V_2}$

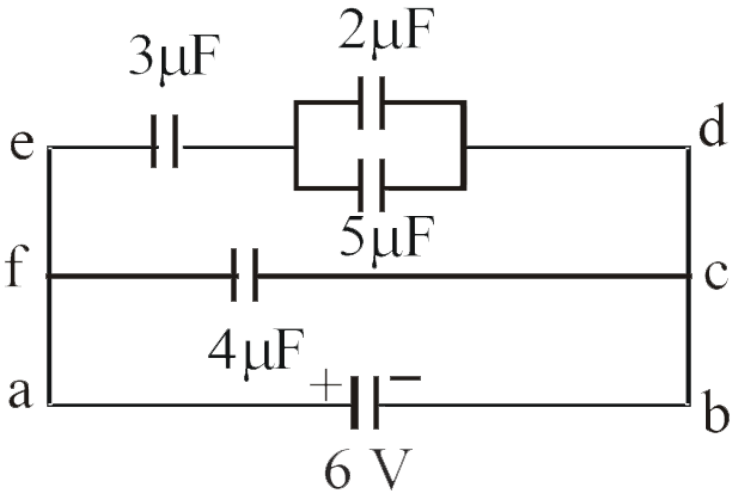
C. $\frac{V_2}{V_1 - V_2}$

D. $\frac{V_2 - V_2}{V_2}$

Answer:

Watch Video Solution

17. In the circuit given below, the charge in μC, on the capacitor having $5\mu F$ is



A. 4.5

B. 9

C. 7

D. 15

Answer:

Watch Video Solution

18. Two concentric, thin metallic spheres of radii R_1 and R_2 $(R_1 > R_2)$ bear charges Q_1 and Q_2 respectively. Then the potential at distance r between R_1 and `R_(2) will be

A. $K\left(\frac{Q_1+Q^2}{r}\right)$

B. $K\left(\frac{Q_1}{r}+\frac{Q^1}{R^2}\right)$

C. $K\left(\frac{Q_2}{r}+\frac{Q^1}{R^1}\right)$

D. $K\left(\frac{Q_1}{R^1}+\frac{Q^2}{R^2}\right)$

Answer:

Watch Video Solution

19. An α-particle is accelerated through a.p.d of 10^6 volt the $K.\ E.$ of particle will be

A. $1MeV$

B. $2MeV$

C. $4MeV$

D. $8MeV$

Answer:

Watch Video Solution

20. Four point charges $-Q, -q, 2q$ and $2Q$ are placed, one at each corner of the square.

The relation between Q and q for which the potential at the centre of the square is zero is

A. $Q = -q$

B. $Q = -\frac{1}{q}$

C. $Q = p$

D. $Q = -\frac{1}{q}$

Answer:

Watch Video Solution

21. A parallel plate capacitor having a separation between the plates d, plate area A and material with dielectric constant K has capacitance C_0. Now one-third of the material is replaced by another material with dielectric constant 2K, so that effectively there are two capacitors one with area 1/3A, dielectric constant 2K and another with area 2/3A and dielectric constant K. If the capacitance of this new capacitor is C then $\frac{C}{C_0}$ is

A. 1

B. $4/3$

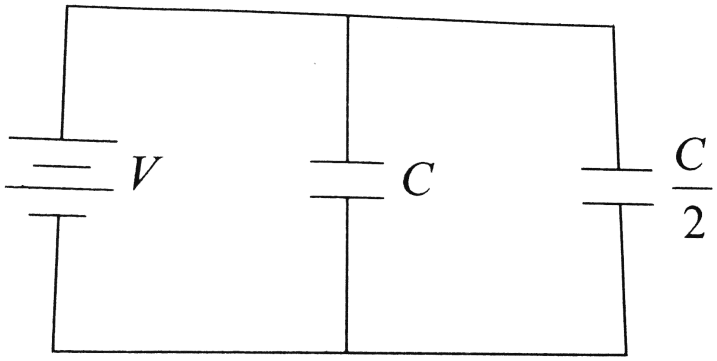
C. $2/3$

D. $1/3$

Answer:

Watch Video Solution

22. Two condensers, one of capacity C and the other of capacity $C/2$ are connected to a V volt battery, as shown.



The work done in charging fully both the condensers is

A. $\frac{1}{4}CV^2$

B. $\frac{3}{4}CV^2$ $\frac{1}{4}CV^2$

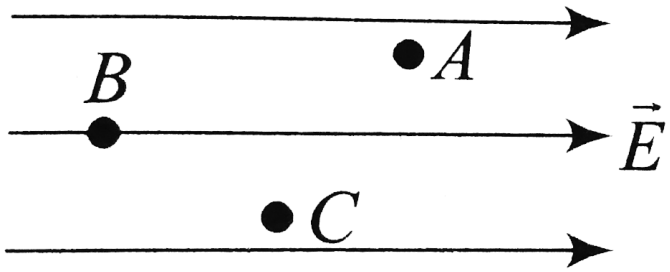
C. $\frac{1}{4}CV^2$

D. $2CV^2$

Answer:

Watch Video Solution

23. A, B and C are three points in a unifrom electric field. The electric potential is



A. maximum at B

B. maximum at C

C. same at all the three points A, B and C

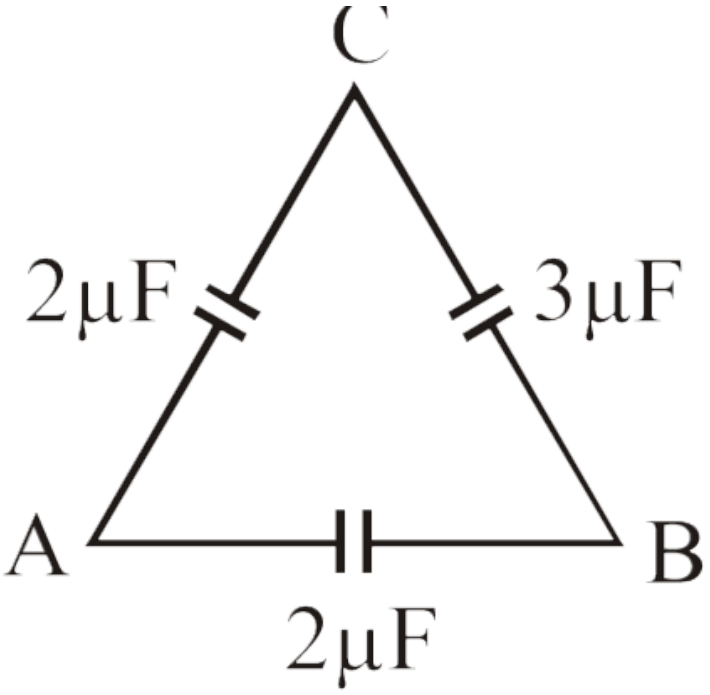
D. maximum at A

Answer:

Watch Video Solution

24. Three capacitors are connected in the arms of a triangle ABC as shown in figure 5 V is applied between A and B. The voltage between

B and C is



A. 2V

B. 1V

C. 3V

D. 1.5V

Answer:

Watch Video Solution

25. Two parallel metal plates having charges $+Q$ and $-Q$ face each other at a certain distance between them.If the plates are now dipped in kerosene oil tank ,the electric field between the plates will

A. remain same

B. become zero

C. increases

D. become zero

Answer: A::C::D

 Watch Video Solution

26. An air capacitor C connected to a battery of e.m.f. V acquires a charge q and energy E. The capacitor is disconnected from the battery and a dielectric slab is placed between the

plates. Which of the following statements is correct ?

A. V and q decrease but C and E increase

B. V remains unchange, but q, E and C increase

C. q remains unchanged, C increases, V and E decrease

D. q and C increase but V and E decrease.

Answer:

Watch Video Solution

27. Choose the wrong statement about equipotential surfaces.

A. It is a surface over which the potential is constant

B. The electric field is parallel to the equipotential surface

C. The electric field is perpendicular to the equipotential surface

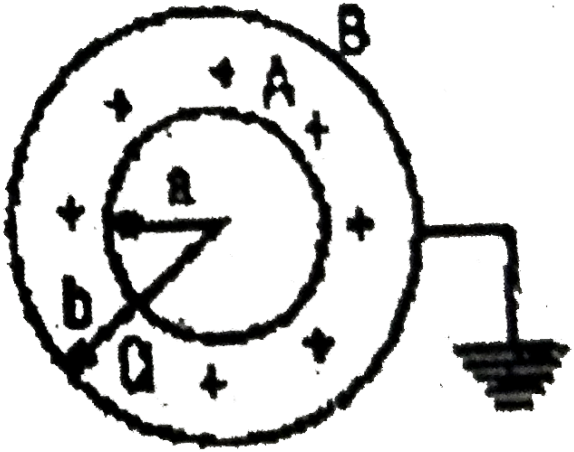
D. The electric field is in the direction of steepest decrease of potential

Answer:

Watch Video Solution

28. Two spherical conductors A and B of radii a and b ($b > a$) are placed concentrically in air. A is given charged +Q while B is earthed. Then

the equivalent capacitance of the system is



A. $4\pi\varepsilon_0 \dfrac{ab}{b-a}$

B. $4\pi\varepsilon_0(b+a)$

C. $4\pi\varepsilon_0 b$

D. $4\pi\varepsilon_0 a$

Answer:

Watch Video Solution

29. A capacitor is chared to store an energy U. The charging battery is disconnected. An edentical is now connected to the first capacitor in parallel. The energy in each capacitor is now.

A. $U/2$

B. $3U/2$

C. U

D. $U/4$

Answer:

Watch Video Solution

30. Equipotentials at a great distance from a collection of charges whose total sum is not zero are approximately

A. spheres

B. planes

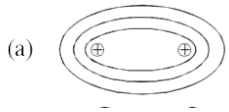
C. paraboloids

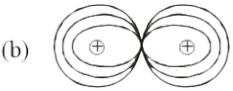
D. ellipsoids

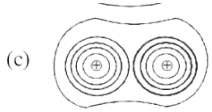
Answer:

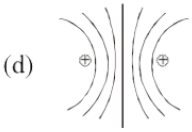
Watch Video Solution

31. Which of the following figure shows the correct equipotential surfaces of a system of two positive charges?

A. 

B. 

C. 

D. 

Answer:

Watch Video Solution

32. Two identical metal plates are given poistive charges Q_1 and Q_2 $(< Q_1)$

respectively. If they are now brought close together to form a parallel plate capacitor with capacitance C, the potencial difference between them is

A. $\frac{Q_1 + Q_2}{2C}$

B. $\frac{Q_1 + Q_2}{C}$

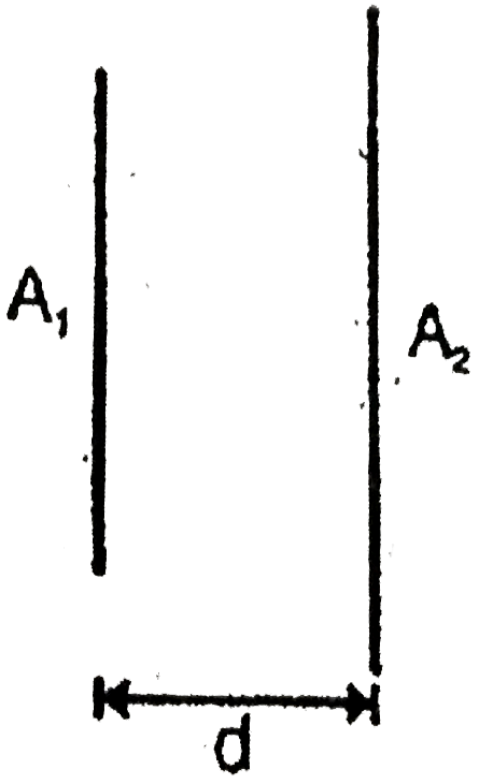
C. $\frac{Q_1 - Q_2}{C}$

D. $\frac{Q_1 - Q_2}{2C}$

Answer:

Watch Video Solution

33. The capacitance of the capacitors of plate areas A_1 and $A_2(A_1 < A_2)$ at a distance d is



A. $\frac{\in_0 (A_1 + A_2)}{2d}$

B. $\frac{\in_0 A_2}{d}$

C. $\frac{\in_0 \sqrt{A_1 A_2}}{d}$

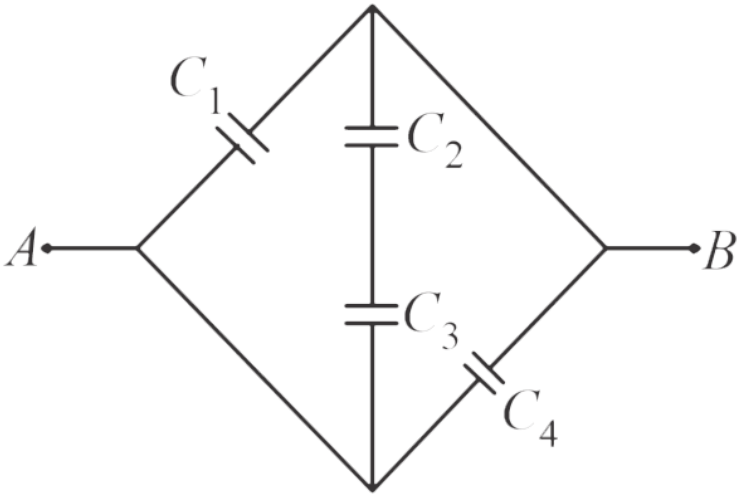
D. $\frac{\in_0 \sqrt{A_1}}{d}$

Answer:

Watch Video Solution

34. In a given network the equivalent capacitance between A and B is

$[C_1 = C_4 = 1\mu F, C0_2 = C_3 = 2\mu F]$



A. $3\mu F$

B. $6\mu F$

C. $4.5\mu F$

D. $2.5\mu F$

Answer:

Watch Video Solution

35. A parallel plate air capacitor is charged to a potential difference of V volts. After disconnecting the charging battery the distance between the plates of the capacitor is increased using an isulating handle. As a result the potential difference between the plates

A. does not change

B. becomes zero

C. increases

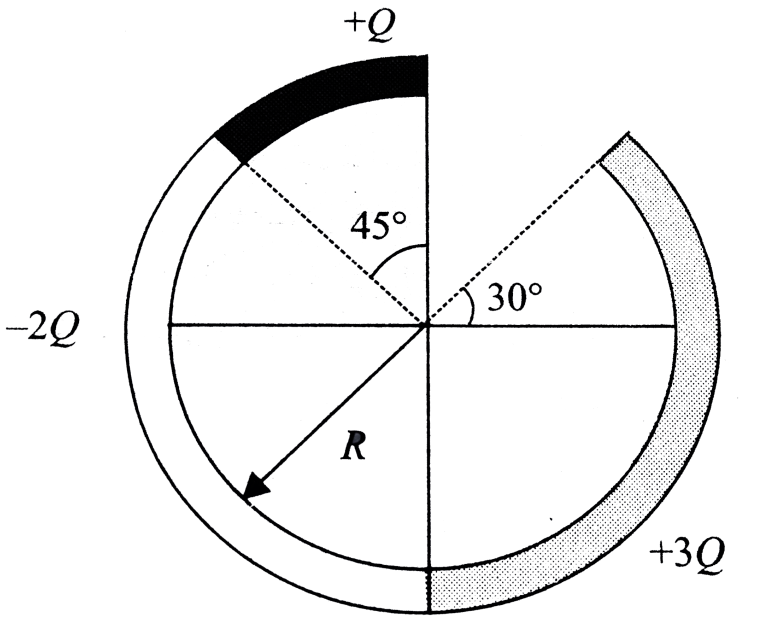
D. decreases

Answer:

Watch Video Solution

36. (Figure 3.139) shows three circular arcs, each of radius R and total charge as indicated. The net electric potential at the center of

curvature.



A. $\dfrac{Q}{2\pi\varepsilon_0 R}$

B. $\dfrac{Q}{4\pi\varepsilon_0 R}$

C. $\dfrac{2Q}{\pi\varepsilon_0 R}$

D. $\dfrac{Q}{\pi\varepsilon_0 R}$

Answer:

Watch Video Solution

37. An electric field $E = \left(20\hat{i} + 30\hat{j}\right)$ N/C exists in the space. If thepotential at the origin is taken be zero, find the potential at $(2m, 2m)$.

A. $-110V$

B. $-140V$

C. $-120V$

D. $-130V$

Answer:

Watch Video Solution

38. If a unit positive charge is taken from one point to another over an equipotential surface ,then

A. work is done on the charge

B. work is done by the charge

C. work done is constant

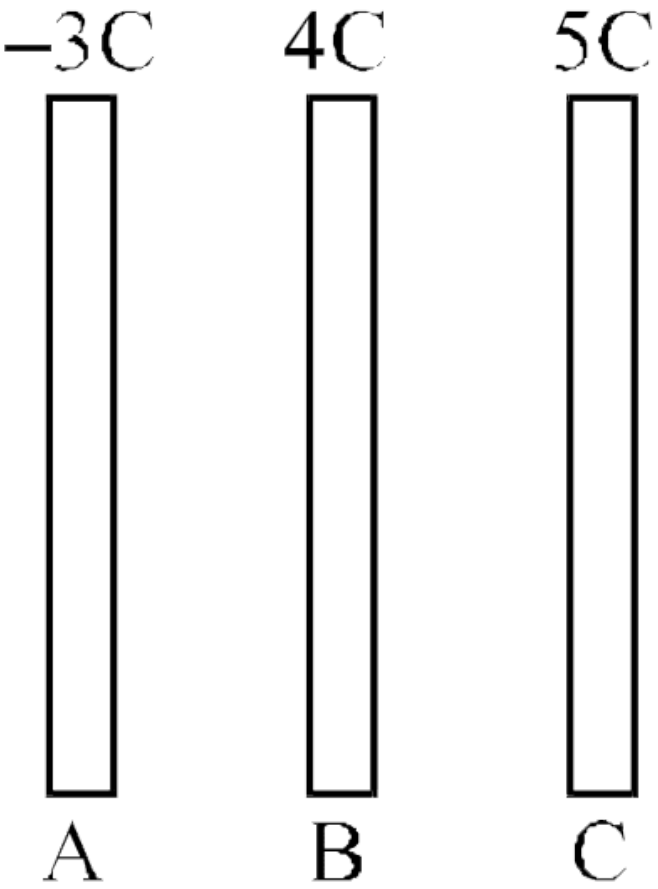
D. no work is done

Answer:

Watch Video Solution

39. Three large plates A, B and C are placed parallel to each other and charges are given as shown. The charge that appears on the left

surface of plate B is



A. 5C

B. 6C

C. 3C

D. $-3C$

Answer:

Watch Video Solution

40. Three charges $2q, -q,$ and $-q$ are located at the vertices of an equilateral triangle. At the center of the triangle,

A. the field is zero but potential is non-zero

B. the field is non-zero, but potential is zero

C. both field and potential are zero

D. both field and potential are non-zero

Answer:

Watch Video Solution

41. If a charge -150 nC is given to a concentric spherical shell and a charge $+50$ nC is placed

at its centre then the charge on inner and outer surface of the shell is

A. $-50nC, -100nc$

B. $+50nC, -200nC$

C. $-50nC, -200nC$

D. $50nC, 100nC$

Answer:

Watch Video Solution

42. Two capacitors of capacitances $C_{\_1}$ and C_2 are connected in parallel across a battery. If Q_1 and Q_2 respectively be the charges on the capacitors, then $\frac{Q_1}{Q^2}$ will be equal to

A. $\frac{C^2}{C^1}$

B. $\frac{C^1}{C^2}$

C. $\frac{C_1^2}{C_2^2}$

D. $\frac{C_2^2}{C_1^2}$

Answer:

Watch Video Solution

Watch Video Solution