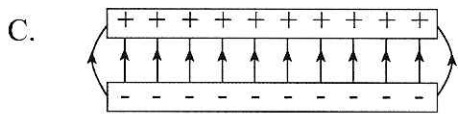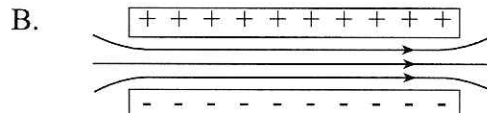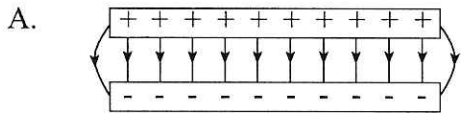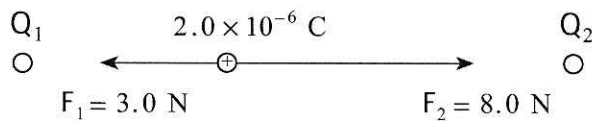28. Which diagram shows the electric field between a pair of charged parallel plates?
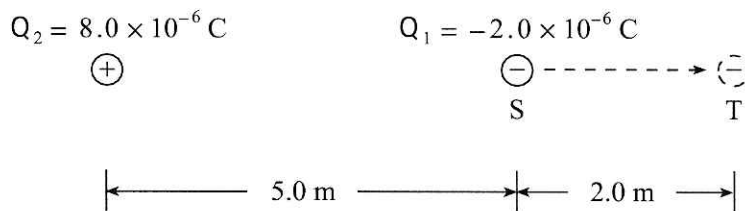
A.

B.

C.

D.
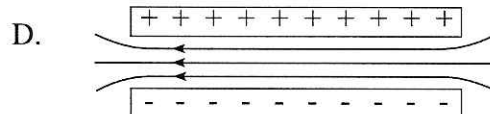
29. In the diagram below, a 2.0×10^{-6} C charge experiences forces of 3.0 N and 8.0 N at its location between charges Q_1 and Q_2.

Find the magnitude of the net electric field strength at the location of the 2.0×10^{-6} C charge.

A. 2.5×10^6 N/C

B. 2.8×10^6 N/C

C. 5.5×10^6 N/C

D. 1.2×10^7 N/C

30. How much work is done moving the -2.0×10^{-6} C charge, Q_1, from S to T in the diagram shown below?

A. 5.6×10^{-3} J

B. 8.2×10^{-3} J

C. 1.2×10^{-2} J

D. 7.2×10^{-2} J

31. A 1.60×10^{-19} C ion is accelerated from rest through a potential difference of 750 V reaching a maximum speed of 8.50×10^4 m/s. What is the mass of this ion?

   A. 9.11×10^{-31} kg
   B. 1.67×10^{-27} kg
   C. 3.32×10^{-26} kg
   D. 4.84×10^{-20} kg

32. Which of the following shows the electric field between two opposite charges of unequal magnitude?

   A.

   B.

   C.

   D.
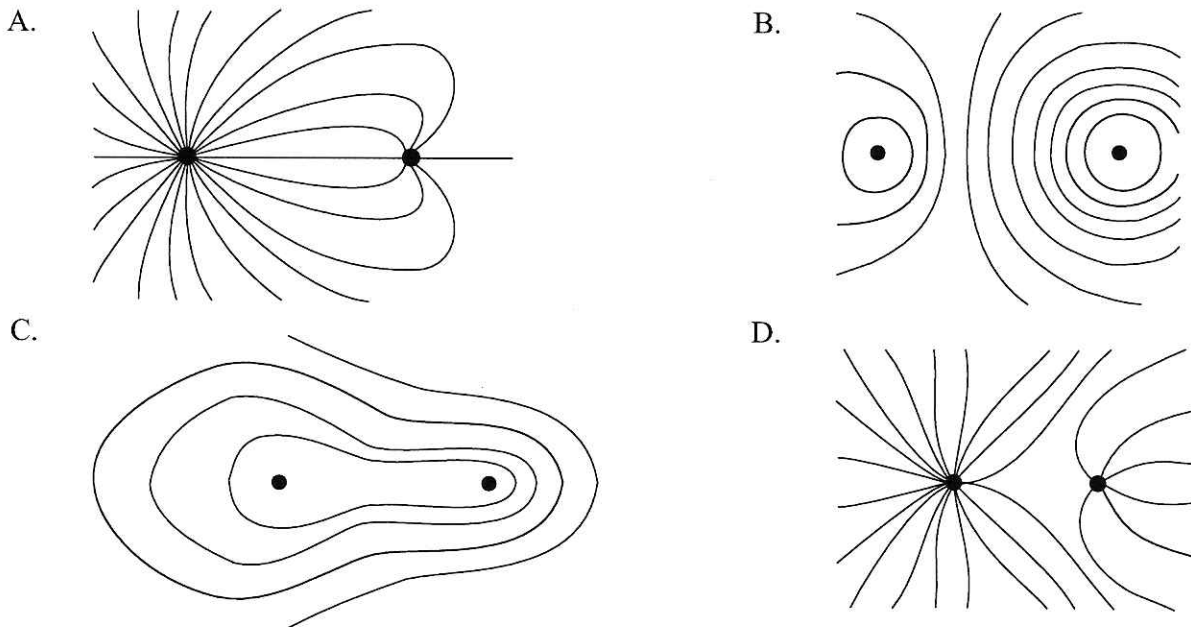
33. Three point charges of equal magnitude but opposite sign are arranged as shown in the diagram below.
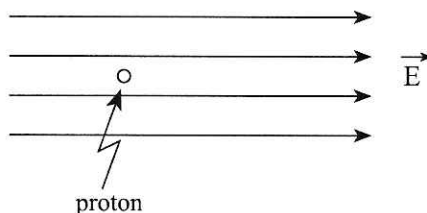
   $\oplus$ Q_3

   $\oplus$
   Q_1

   $\ominus$
   Q_2

   Which of the diagrams below best represents the electric forces acting on Q_3 due to the other two charges?

   A. $\oplus Q_3$ B. $\oplus Q_3$ C. $\oplus Q_3$ D. $\oplus Q_3$

34. What is the acceleration of a proton in a uniform 2.5×10^5 N/C electric field as shown below?

	MAGNITUDE OF ACCELERATION	DIRECTION OF ACCELERATION
A.	2.4×10^{13} m/s^2	Right
B.	2.4×10^{13} m/s^2	Left
C.	1.5×10^{32} m/s^2	Right
D.	1.5×10^{32} m/s^2	Left

35. How much work is needed to move a -2.0×10^{-6} C charge from position S to position T as shown below?
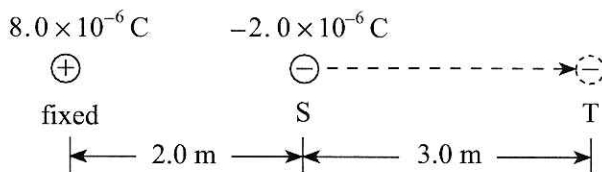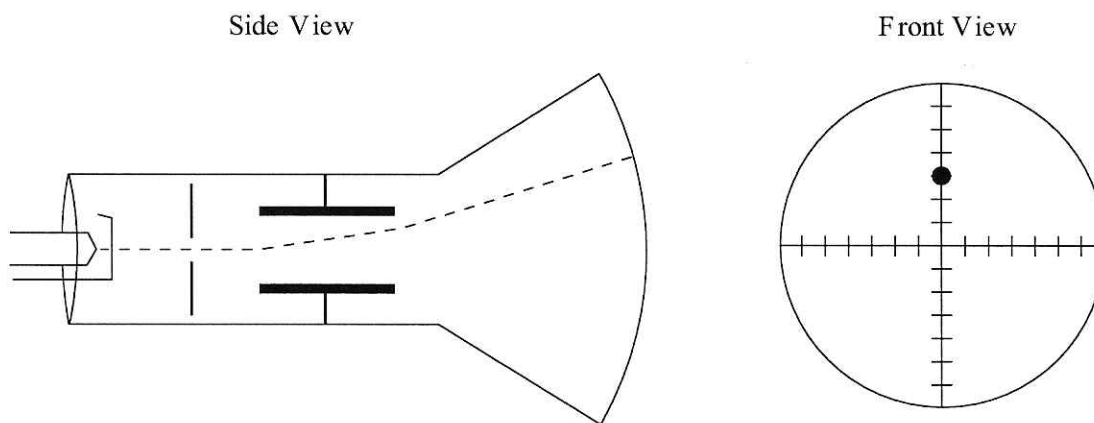

A. 4.3×10^{-2} J
B. 4.8×10^{-2} J
C. 9.1×10^{-2} J
D. 1.1×10^{-1} J

36. An electron, initially at rest, is accelerated through a potential difference of 600 V as shown.
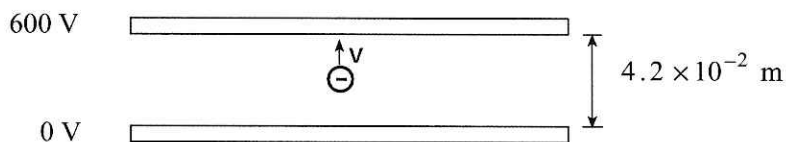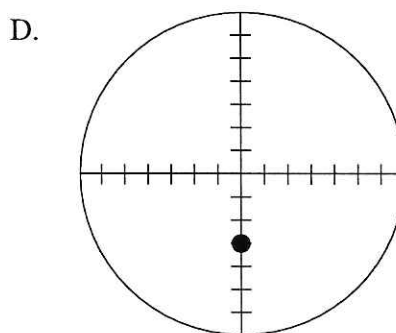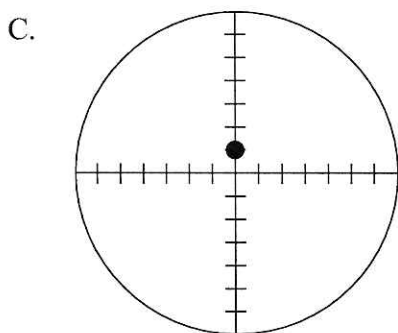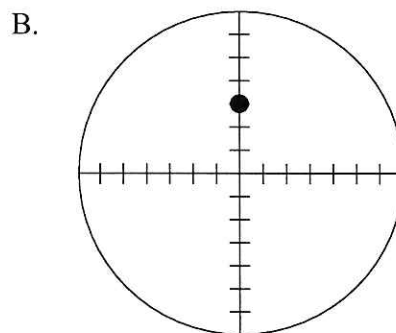

What is the maximum kinetic energy of the electron?

A. 3.7×10^{-31} J
B. 9.6×10^{-17} J
C. 6.0×10^2 J
D. 1.4×10^4 J

37. A cathode ray tube is adjusted so as to deflect the beam as shown.

Side View   Front View

If the deflecting voltage is held constant and the accelerating voltage is then decreased , which diagram displays the new deflection?

A.

B.

C.

D.
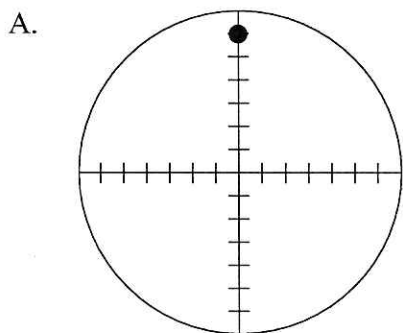
38. A cathode ray tube beam deflects to the location as shown in Diagram I when a certain voltage is applied to the deflecting plates.

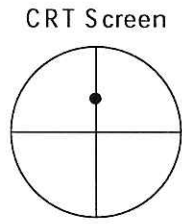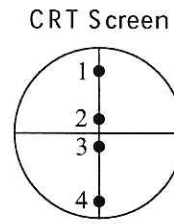CRT Screen

CRT Screen

1
2
3

4

Diagram I

Diagram II

The connections to the deflecting plates are then reversed and the deflecting voltage is reduced. Which location in Diagram II best represents the new beam position?

A. Location 1
B. Location 2
C. Location 3
D. Location 4

39. Two 2.0×10^{-6} C charges are positioned as shown in the diagram below.

X

0.60 m

0.60 m

2.0×10^{-6} C

2.0×10^{-6} C

0.40 m

0.40 m

Y
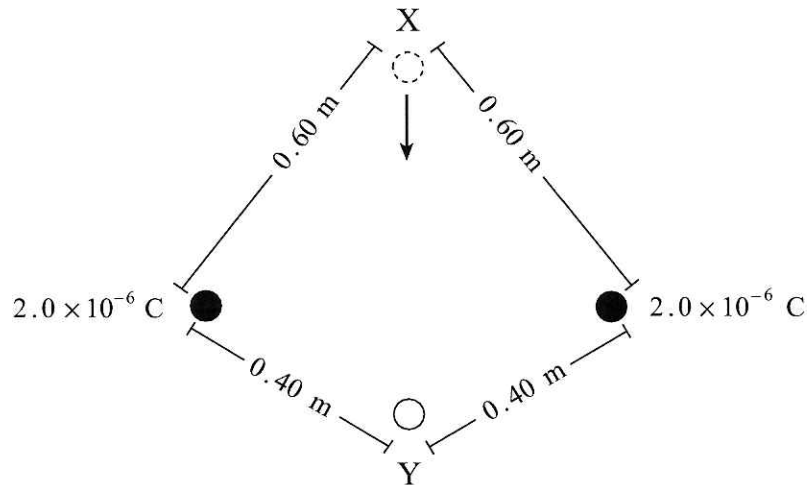
What work must be done to move a 1.2×10^{-7} C charge from location X to location Y?

A. 3.6×10^{-3} J
B. 1.5×10^{-2} J
C. 1.8×10^{-2} J
D. 3.9×10^{-2} J

40. An electron orbits the nucleus of an atom with velocity v. If this electron were to orbit the same nucleus with twice the previous orbital radius, its orbital velocity would now be

A. $\dfrac{v}{2}$

B. $\dfrac{v}{\sqrt{2}}$

C. v

D. 2v

41. In a cathode ray tube,

A. protons are accelerated from anode (positive) to cathode (negative).
B. protons are accelerated from cathode (negative) to anode (positive).
C. electrons are accelerated from anode (positive) to cathode (negative).
D. electrons are accelerated from cathode (negative) to anode (positive).

42. Which pair of values will cause the greatest deflection of an electron beam in a cathode ray tube?

|	ACCELERATING VOLTAGE	DEFLECTION (PLATE) VOLTAGE
A.	400 V	20 V
B.	400 V	40 V
C.	800 V	20 V
D.	800 V	40 V

43. Which diagram shows the electric field near a negative point charge?

A.

B.

C.

D.
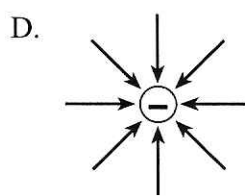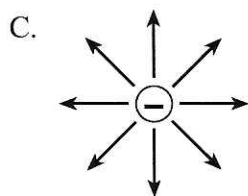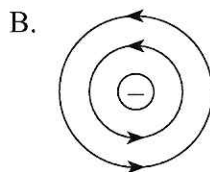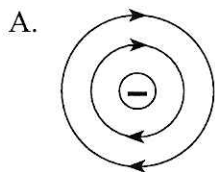
44. In an experiment, a positively charged oil droplet weighing 6.5×10^{-15} N is held stationary by a vertical electric field as shown in the diagram.

    If the electric field strength is 5.3×10^3 N/C, what is the charge on the oil droplet?

    A. 1.2×10^{-18} C
    B. 3.4×10^{-11} C
    C. 4.1×10^4 C
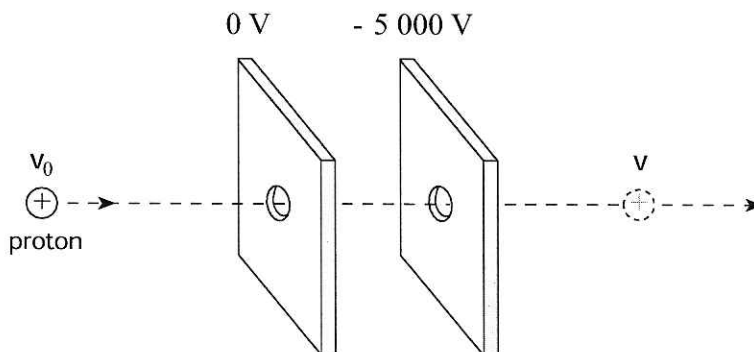   D. 8.2×10^{17} C
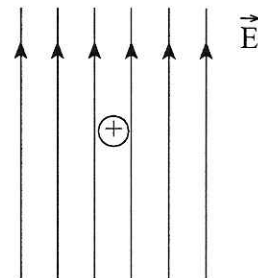
45. A proton with kinetic energy of 2.1×10^{-17} J is moving into a region of charged parallel plates. The proton will be stopped momentarily in what region?
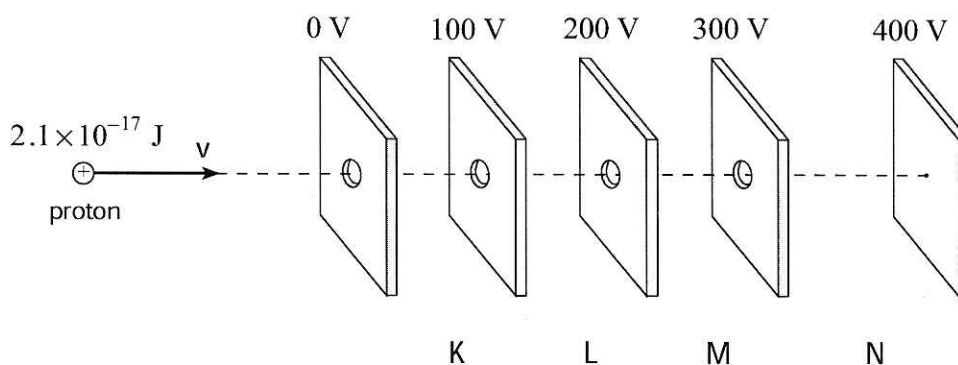
    A. Region K
   B. Region L
    C. Region M
    D. Region N

46. A moving proton has 6.4×10^{-16} J of kinetic energy. The proton is accelerated by a potential difference of 5 000 V between parallel plates.

    The proton emerges from the parallel plates with what speed?

    A. 8.8×10^5 m/s
    B. 9.8×10^5 m/s
    C. 1.3×10^6 m/s
    D. 1.8×10^6 m/s

- 16 -

1. a) A 2.5×10^{-7} C charge is initially located 7.0 m from a fixed 8.0×10^{-6} C charge. What is the minimum amount of work required to move the 2.5×10^{-7} C charge 2.0 m closer as shown?   **(5 marks)**

2.5×10^{-7} C

8.0×10^{-6} C

$\longleftarrow$ 2.0 m $\longrightarrow$

$\longleftarrow$ 7.0 m $\longrightarrow$
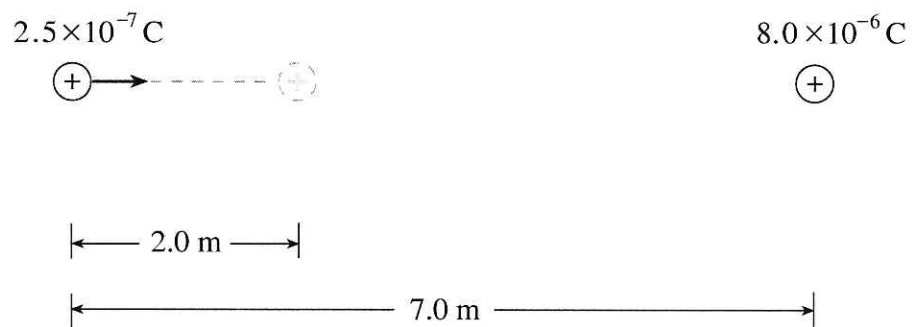
b) If the 2.5×10^{-7} C charge is moved a further 2.0 m closer to the 8.0×10^{-6} C charge, will the additional work required be less than, the same as or greater than the work required in (a)? Using principles of physics, explain your answer. **(4 marks)**

_____

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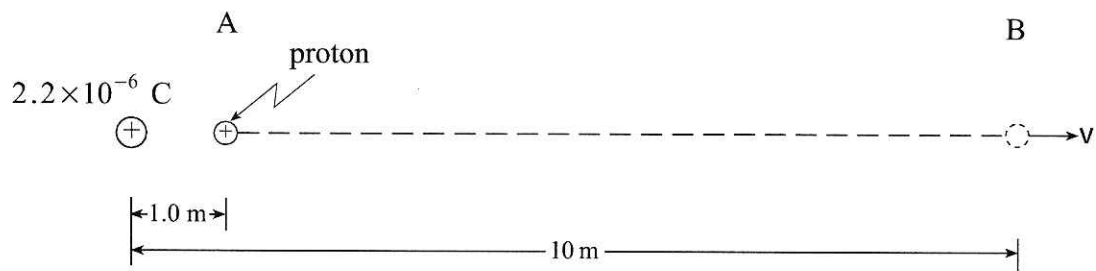_____

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2. A proton is located at A, 1.0 m from a fixed $+2.2 \times 10^{-6}$ C charge.

a) What is the change in potential energy of the proton as it moves to B, 10 m from the fixed charge? **(5 marks)**

b) If the proton started from rest at A, what would be its speed at B? **(2 marks)**