1. Four 1.5×10^{-3} fC charges are placed on the corners of a square. If the potential at the center of the square is 18 V, what is the most nearly length of a side of the square?

   A) 2.0 m

   B) 2.1 m

   C) 3.0 m

   D) 4.2 m

   E) 6.0 m

2. A point P is 3.0 m away from a point charge of 1.0 C and 1.0 m away from a point charge of –0.5 C.

   What is the electric potential at point P?

   A) -5.0×10^8

   B) -1.5×10^9

   C) -3.5×10^9

   D) -5.5×10^9

   E) -7.5×10^9

Base your answers to questions **3** and **4** on the following. Point P is located 3.0 m from a point charge of –5.0 C and point Q is located 5.0 m from the same charge.
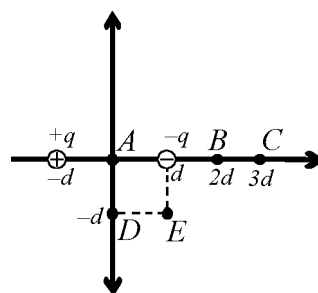
3. What is the electric potential at point P?

   A) -1.8×10^9

   B) -5.0×10^9

   C) -5.4×10^9

   D) -9.0×10^9

   E) -15×10^9

4. What is the electric potential at point Q?

   A) -1.8×10^9

   B) -5.0×10^9

   C) -5.4×10^9

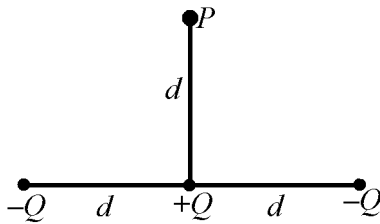   D) -9.0×10^9

   E) -15.0×10^9

5. Base your answer to the following question on the diagram below which shows two charges, magnitude q, of opposite sign. Each are located a distance d from the origin A of a coordinate system.

   At which of the following points is the electric potential *least* in magnitude?

   A) A

   B) B
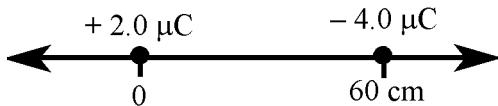
   C) C

   D) D

   E) E

6. Base your answer to the following question on the diagram below showing three point charges arranged in a horizontal line.

The electric potential at point P is most nearly

A) $-\dfrac{kQ}{d^2}$

B) $-\dfrac{kQ}{2d^2}$

C) $-\dfrac{kQ}{d}$

D) $-\dfrac{0.4\,kQ}{d}$

E) $\dfrac{2.4\,kQ}{d}$

7.

Two point charges of +2.0 microcoulombs and –4.0 microcoulmbs are located at the origin and +60 cm on the x-axis respectively. At which point on the x axis is the electrostatic potential zero?

A) –60 cm

B) –30 cm

C) +20 cm

D) 0 cm

E) –20 cm

8. Four positive point charges of magnitude Q are placed at the corners of a square with a diagonal length of a. The potential at the center of the square is

A) 0

B) $\dfrac{kQ}{a}$

C) $\dfrac{2kQ}{a}$

D) $\dfrac{4kQ}{a}$

E) $\dfrac{8kQ}{a}$

9. Which of the following statements is/are true?
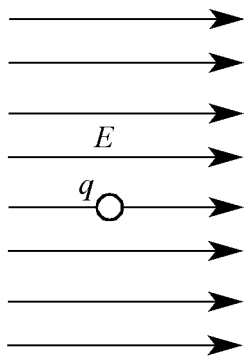
    I. If the electric field at a certain point is zero, then the electrostatic force on a charge at the same point is also zero.
    II. If the electrostatic force on a charge at a certain point is zero, then the electric potential at the same point is zero.
    III. The electric potential is inversely proportional to the strength of the electric field.

A) I only

B) II only

C) III only

D) I and II only

E) None of the above are true

10. Which of the following statements is necessarily true?

A) If the electric field at a certain point is zero, then the electric potential at the same point is also zero.

B) If the electric potential at a certain point is zero, then the electric field at the same point is also zero.

C) The electric potential is inversely proportional to the strength of the electric field.

D) The electric potential is directly proportional to the strength of the electric field.
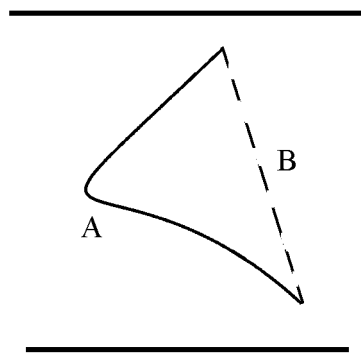
E) None of the above.

11.

If the charge q at rest in the above electric field E is negative, it will accelerate

A) towards the left, which has a lower electric potential.

B) towards the left, which has a higher electric potential.

C) towards the right, which has a lower electric potential.

D) towards the right, which has a higher electric potential.

E) towards the top of the page, which has a constant electric potential.

12. Which of the following is always true about electric field lines?

A) They are perpendicular to equipotential surfaces and go in the direction of higher potential.

B) They are parallel to equipotential surfaces and go in the direction of higher potential.

C) They are parallel to equipotential surfaces and go in the direction of ⚎ constant potential.

D) They are perpendicular to equipotential surfaces and go in the direction of lower potential.

E) They are parallel to equipotential surfaces and go in the direction of lower potential.

13.

A small charged particle is moved from one point to another within a uniform electrical field between charged plates by two different paths. Which of the following is true?

A) The change in potential along Path A is greater than the change in potential along Path B, and the work done by the electric field along Path A is greater than the work done along Path B.

B) The change in potential along Path A is greater than the change in potential along Path B, and the work done by the electric field along Path A is the same as the work done along Path B.

C) The change in potential along Path A is the same as the change in potential along Path B, and the work done by the electric field along Path A is greater than the work done along Path B.

D) The change in potential along Path A is the same as the change in potential along Path B, and the work done by the electric field along Path A is less than the work done along Path B.

E) The change in potential along Path A is the same as the change in potential along Path B, and the work done by the electric field along Path A is the same as the work done along Path B.

14. A charge of magnitude $+4Q$ is placed at the origin of the x-axis. A second charge of magnitude $+Q$ is placed at the point $+5$ meters on the x-axis. At which point on the x-axis, besides infinity, is the electrostatic potential zero?

A) +2.1 meters

B) +2.5 meters

C) +4 meters

D) +7.2 meters

E) There exist no points on the x-axis, besides infinity, where the electrostatic potential is zero.

15. A charge of magnitude $-4Q$ is placed at the origin of the x-axis. A second charge of magnitude $+Q$ is placed at the point $+5$ meters on the x-axis. At which point on the x-axis, besides infinity, is the electrostatic potential zero?

A) +2.1 meters

B) +2.5 meters

C) +4 meters

D) +7.2 meters

E) There exist no points on the x-axis, besides infinity, where the electrostatic potential is zero.

1. _____D_____

2. _____B_____

3. _____E_____

4. _____D_____

5. _____A_____

6. _____D_____

7. _____C_____

8. _____E_____

9. _____A_____

10. _____D_____

11. _____B_____

12. _____D_____

13. _____E_____

14. _____E_____

15. _____C_____

Name _____   Class _____   Date _____

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

11. _____

12. _____

13. _____

14. _____

15. _____