Exercises

33.1 Electric Fields (pages 665–666)

1. What is an electric field?

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_____

2. Like a gravitational field, an electric field has both _____ and _____.

3. How can the magnitude of an electric field be measured?

_____

_____

4. Is the following statement true or false? The direction of an electric field at any point, by convention, is the direction of the electrical force on a small *negative* test charge, placed at that point. _____

5. Consider the electric field around a small positive charge. How can you describe the direction of the field?

_____

_____

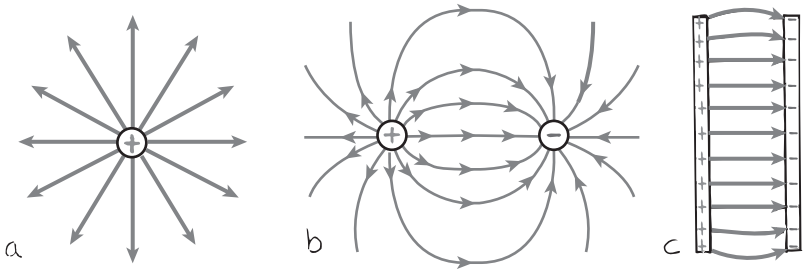
33.2 Electric Field Lines (pages 666–667)

6. Since an electric field has both magnitude and direction, it is a _____.

7. Is the following sentence true or false? In a vector representation of an electric field, the magnitude of an electric field is indicated by the length of the vector arrows. _____

8. Electric fields can also be described by using field lines (or lines of force). In a field lines representation of an electric field, the field is weaker where the lines are _____.

Match the illustrations to the correct description.



9. _____ The field lines emanate from the positive charge and terminate on the negative charge.

10. _____ Field lines are evenly spaced between two oppositely charged plates.

11. _____ The field lines extend to infinity.

33.3 Electric Shielding (pages 668–669)

12. If the charge on a conductor is not moving, the electric field inside the conductor is exactly _____.

13. Circle the letter of each statement that is true about charged conductors.

a. The absence of an electric field within a conductor holding static charge arises from the inability of an electric field to penetrate metals.

b. The absence of an electric field comes about because free electrons within the conductor stop moving when the electric field is zero.

c. The charges arrange themselves to ensure a zero field within the material.

d. If the conductor is not spherical, then the charge distribution will not be uniform.

14. Why are some electronic components and some cables encased in a metal covering?

_____

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33.4 Electrical Potential Energy (pages 669–670)

15. Is the following sentence true or false? A charged object has potential energy by virtue of its location in an electric field. _____

16. Circle the letter of each statement that is true.

a. No work is required to push a charged particle against the electric field of a charged body.

b. The electrical potential energy of a charged particle decreases when work is done to push it against the electric field of something else that is charged.

c. The energy a charge has due to its location in an electric field is called electrical potential energy.

d. If a charge with electrical potential energy is released, its electrical potential energy will transform into kinetic energy.

33.5 Electric Potential (pages 670–671)

17. What is electric potential?

_____

_____

_____

18. Is the following sentence true or false? Electric potential is *not* the same as electrical potential energy. _____

19. The SI unit of measurement for electric potential is the _____.

20. Write an equation that expresses the relationship between volts, joules, and coulombs.

_____

21. What is voltage?

_____

_____

33.6 Electrical Energy Storage (pages 672–673)

22. What are two applications of capacitors?

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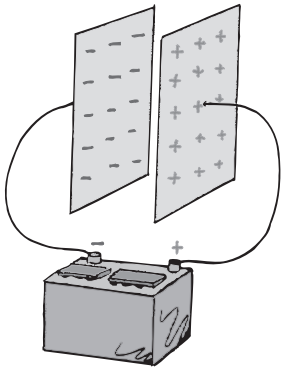
23. The diagram shows a simple capacitor. Explain how the capacitor is charged.



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24. A charged capacitor is discharged when a _____ is provided between the plates.

25. The energy stored in a capacitor comes from the _____ done to charge it.

33.7 The Van de Graaff Generator (pages 673–674)

26. Is the following sentence true or false? In a Van de Graaff generator, as electrons leak off the belt and onto the conducting sphere, the electric field inside the sphere steadily increases in magnitude.

_____

27. How can the voltage of a Van de Graaff generator be increased?

_____

_____

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