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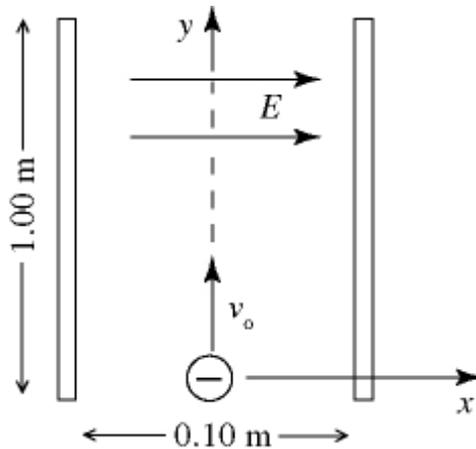
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MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 1) A wire of mass 5.00 grams and length 1.20 m is stretched with a tension of 36.0 N. Waves of frequency 50.0 Hz and amplitude 1.6 mm are traveling along the wire. What is the average power carried by the waves? 1) _____
- A) 1.96×10^{-5} W
 - B) 6.57×10^{-3} W
 - C) 9.66×10^{-3} W
 - D) 1.68×10^{-4} W
 - E) 4.34×10^{-4} W
- 2) A transverse wave traveling along a string transports energy at a rate r . If we want to double this rate, we could 2) _____
- A) quadruple the amplitude of the wave.
 - B) double the amplitude of the wave.
 - C) increase the amplitude by a factor of $\sqrt{2}$.
 - D) increase the tension in the string by a factor of $\sqrt{2}$.
 - E) double the tension in the string.
- 3) A jet aircraft, in level flight at constant speed, is observed directly over head. A sonic boom is heard 9.0 s later, at which time the line of sight to the aircraft forms a 53° angle with respect to the horizontal. The speed of sound is 325 m/s. The altitude of the aircraft, in SI units, is closest to: 3) _____
- A) 9700 B) 4900 C) 1800 D) 3700 E) 6000
- 4) Which of the following is an accurate statement? 4) _____
- A) The open end of a pipe is a pressure antinode for standing waves.
 - B) The fundamental frequency of an organ pipe is determined primarily by the pipe diameter.
 - C) Standing waves can be set up in a pipe closed on both ends, but not in one with one end open and one end closed.
 - D) Standing sound waves can be set up in a pipe open on one end, but not on one open on both ends.
 - E) Displacement nodes and pressure antinodes occur at the same place in an organ pipe.
- 5) A star is moving toward earth at one-third the speed of light and is emitting light of frequency 4.80×10^{14} Hz. The frequency of light measured by an observer on earth is closest to: 5) _____
- A) 9.60×10^{14} Hz
 - B) 6.79×10^{14} Hz
 - C) 3.39×10^{14} Hz
 - D) 6.40×10^{14} Hz
 - E) 3.20×10^{14} Hz

Figure 21.9



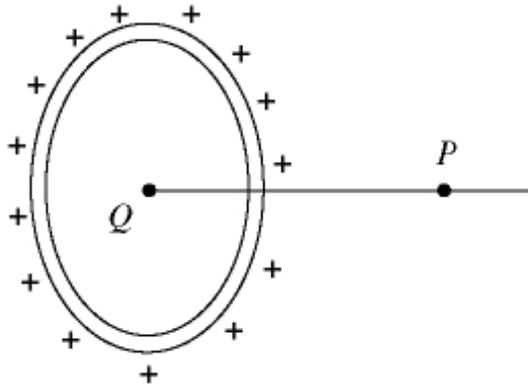
- 6) An electron is projected with an initial velocity $v_0 = 2.9 \times 10^7$ m/s along the y -axis, which is the center line between a pair of charged plates. The plates are 1.00 m long and are separated by 0.10 m. A uniform electric field E , in the positive x -direction, is presented between the plates. The magnitude of the acceleration of the electron is 4.8×10^{15} m/s². In Fig. 21.9, the x - and y -coordinates of the point at which the electron strikes one of the plates are closest to:
- A) $x = 50$ mm, $y = 190$ mm
 - B) $x = -50$ mm, $y = 94$ mm
 - C) $x = -50$ mm, $y = 130$ mm
 - D) $x = 50$ mm, $y = 130$ mm
 - E) $x = 50$ mm, $y = 94$ mm

6) _____

- 7) A point charge $+Q$ is fixed on a very large horizontal frictionless tabletop. A second point charge $+q$ is released from rest near the stationary charge and is free to move. Which statement best describes the motion of $+q$ after it is released?
- A) Its acceleration is zero just after it is released.
 - B) As it moves farther and farther from $+Q$, its speed will keep increasing.
 - C) As it moves farther and farther from $+Q$, its acceleration will keep increasing.
 - D) As it moves farther and farther from $+Q$, its speed will decrease.
 - E) Its speed will be greatest just after it is released.

7) _____

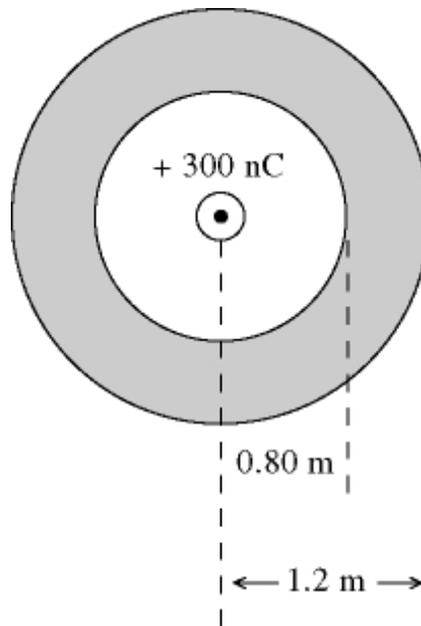
Figure 21.10



- 8) In Fig. 21.10, a conducting ring 0.71 m in radius carries a charge of +580 nC. A point charge Q is placed at the center of the ring. The electric field is equal to zero at field point P , which is on the axis of the ring, and 0.73 m from its center. The point charge Q , in nC, is closest to:
- A) -420 B) -210 C) 300 D) 210 E) -300

8) _____

Figure 22.4

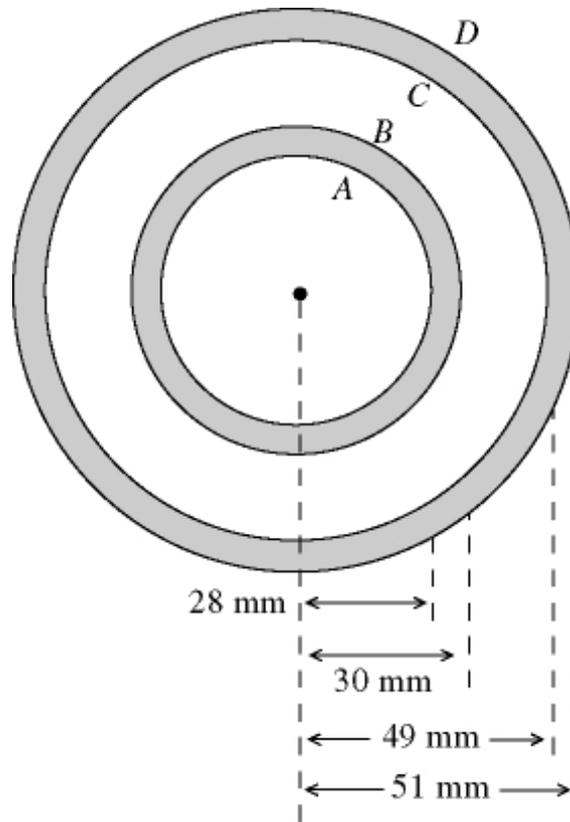


A hollow conducting sphere has radii of 0.80 m and 1.20 m. The sphere carries a charge of -500 nC. A point charge of +300 nC is present at the center.

- 9) In Fig. 22.4, the charge on the outer spherical surface, in nC, is closest to:
- A) zero B) -800 C) -300 D) -500 E) -200

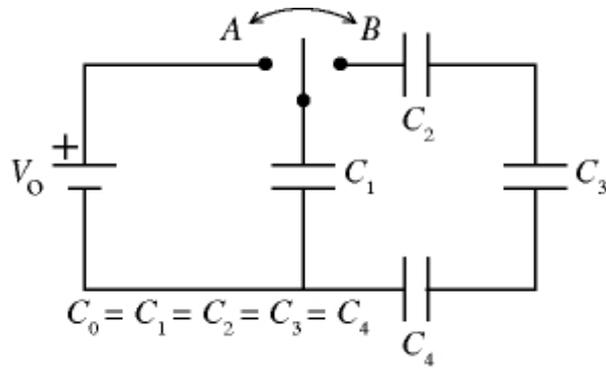
9) _____

Figure 22.6



- 10) The cross section of a long coaxial cable is shown, with radii as given. The linear charge density on the inner conductor is -80 nC/m and the linear charge density on the outer conductor is -30 nC/m . The inner and outer cylindrical surfaces are respectively denoted by A , B , C , and D , as shown. In Fig. 22.6, the magnitude of the electric field at a point that is 58 mm from the axis is closest to: 10) _____
- A) $34,000 \text{ N/C}$
 B) 9300 N/C
 C) $28,000 \text{ N/C}$
 D) $22,000 \text{ N/C}$
 E) $16,000 \text{ N/C}$
- 11) Two conducting spherical shells are concentric, with radii of 0.30 m and 2.20 m . The electric potential of the inner shell, with respect to the outer shell, is $+1250 \text{ V}$. The maximum electric field magnitude between the shells is closest to: 11) _____
- A) 1000 V/m B) 4200 V/m C) 4800 V/m D) 6800 V/m E) 570 V/m
- 12) Two conducting spheres that carry equal charges are very far from each other and from all other charges. One of these spheres has twice the radius of the other one. If the potential of the smaller sphere (relative to infinity) is 100 V , the potential of the larger sphere (relative to infinity) is closest to: 12) _____
- A) 50 V B) 200 V C) 100 V D) 25 V E) 400 V

Figure 24.6



- 13) In Fig. 24.6, the four identical capacitors in the circuit shown here are initially uncharged. The switch is thrown first to position A and then to position B. After this is done: 13) _____
- A) $Q_1 = 3Q_2$
 B) $V_1 = V_2 = V_3 = V_4$
 C) $V_1 + V_2 + V_3 + V_4 = V_0$
 D) $Q_1 = Q_2$
 E) $V_1 = V_0$
- 14) The square plates of a 2000-pF capacitor measure 20 mm by 20 mm and are separated by a dielectric that is 0.27 mm thick. The voltage rating of the capacitor is 500 V. The dielectric constant of the dielectric is closest to: 14) _____
- A) 110 B) 120 C) 140 D) 150 E) 170
- 15) The density of free electrons in gold is $5.90 \times 10^{28} \text{ m}^{-3}$. The resistivity of gold is $2.44 \times 10^{-8} \Omega \cdot \text{m}$ at a temperature of 20°C and the temperature coefficient of resistivity is $0.004 (\text{C}^\circ)^{-1}$. A gold wire, 1.8 mm in diameter and 11 cm long, carries a current of 170 mA. The power dissipated in the wire is closest to: 15) _____
- A) 0.0076 mW
 B) 0.025 mW
 C) 0.019 mW
 D) 0.031 mW
 E) 0.013 mW

Situation 16.4

A car on a road parallel to and right next to a railroad track is approaching a train. The car is traveling eastward at 30.0 m/s while the train is going westward at 50.0 m/s. There is no wind, and the speed of sound is 344 m/s. The car honks its horn at a frequency of 1.00 kHz as the train toots its whistle at a frequency of 1.50 kHz.

- 16) In Situation 16.4, the wavelength of the sound from the train's whistle, as measured by the driver of the car, is closest to: 16) _____
- A) 0.196 m B) 0.263 m C) 0.229 m D) 0.180 m E) 0.249 m

17) When two point charges are a distance d apart, the electric force that each one feels from the other has magnitude F . In order to make this force twice as strong, the distance would have to be changed to: 17) _____

A) $2d$ B) $\sqrt{2}d$ C) $d/4$ D) $d/2$ E) $d/\sqrt{2}$

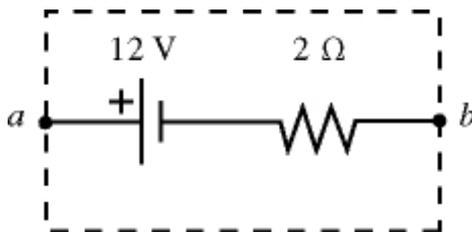
18) A proton is projected toward a fixed nucleus of charge $+Ze$ with velocity v_0 . Initially the two particles are very far apart. When the proton is a distance R from the nucleus its velocity has decreased to $1/2 v_0$. How far from the nucleus will the proton be when its velocity has dropped to $1/4 v_0$? 18) _____

A) $1/4 R$
 B) $1/16 R$
 C) $1/2 R$
 D) $4/5 R$
 E) None of these.

19) The square plates of a 2000-pF capacitor measure 80 mm by 80 mm and are separated by a dielectric that is 0.20 mm thick. The voltage rating of the capacitor is 500 V. The dielectric strength of the dielectric, in kV/m, is closest to: 19) _____

A) 2300 B) 2500 C) 2800 D) 3300 E) 3000

Figure 25.2



The emf and the internal resistance of a battery are as shown.

20) In Fig. 25.2, when the terminal voltage of the battery V_{ab} is equal to 20 V, the current which passes through the battery, including direction, is closest to: 20) _____

A) 5 A, from a to b
 B) 4 A, from a to b
 C) 6 A, from a to b
 D) 5 A, from b to a
 E) 4 A, from b to a

21) A point charge Q is located a short distance from a point charge $3Q$, and no other charges are present. If the electrical force on Q is F , the electrical force on $3Q$ is: 21) _____

A) $F\sqrt{3}$ B) F C) $\sqrt{3}F$ D) $F/3$ E) $3F$

Situation 22.1

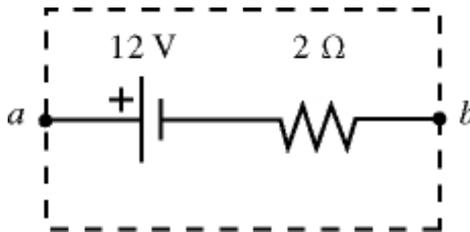
Electric charge is uniformly distributed inside a sphere of radius 0.30 m. The electric field at a point which is 0.50 m from the center of the sphere is 15,000 N/C, and is directed radially outward.

- 22) In Situation 22.1, the electric field vector is given, at a point that is within the sphere of charge. The distance of this point from the center of the sphere is closest to: 22) _____
 A) 0.15 m B) 0.19 m C) 0.17 m D) 0.13 m E) 0.11 m

- 23) Two conductors are joined by a long copper wire. Thus 23) _____
 A) each conductor must be at the same potential.
 B) the electric field at the surface of each conductor is the same.
 C) the potential on the wire is the average of the potential of each conductor.
 D) no free charge can be present on either conductor.
 E) each carries the same free charge.

- 24) Each plate of a parallel-plate air capacitor has an area of 0.0040 m^2 , and the separation of the plates is 0.080 mm. An electric field of $5.3 \times 10^6 \text{ V/m}$ is present between the plates. The energy density between the plates is closest to: 24) _____
 A) 250 J/m^3 B) 130 J/m^3 C) 170 J/m^3 D) 210 J/m^3 E) 84 J/m^3

Figure 25.2



The emf and the internal resistance of a battery are as shown.

- 25) In Fig. 25.2, the power dissipated in an external resistor, which is connected across the terminals of the battery, is equal to 18 W. The terminal voltage of the battery V_{ab} is closest to: 25) _____
 A) 10.8 V B) 8.4 V C) 9.6 V D) 7.2 V E) 6.0 V

Answer Key

Testname: PHYSICS 3 PRACTICE FINAL

- 1) A
- 2) C
- 3) B
- 4) E
- 5) B
- 6) C
- 7) B
- 8) B
- 9) E
- 10) A
- 11) C
- 12) A
- 13) A
- 14) D
- 15) D
- 16) A
- 17) E
- 18) D
- 19) B
- 20) B
- 21) B
- 22) E
- 23) A
- 24) B
- 25) E