بنك الأسئلة في مقرر الفيزياء 112

UNIT - DIMENSION - VECTORS

1. If , $x = \frac{1}{2}at^2$ with meters the units of x, and seconds the units of t, what are the units of a?

   ⓐ m ⓑ s^2 ⓒ m/s^2

2. The magnitude of vector $\vec{\mathbf{A}}$ is 3 m and that of vector $\vec{\mathbf{B}}$ is 4 m. What is the largest magnitude in meters that their sum may have?

   ⓐ 7 ⓑ 9 ⓒ 5

3. The magnitude of vector $\vec{\mathbf{A}}$ is 3 m and that of vector $\vec{\mathbf{B}}$ is 4 m. What is the smallest magnitude in meters that their sum may have?

   ⓐ 3 ⓑ 1 ⓒ 4

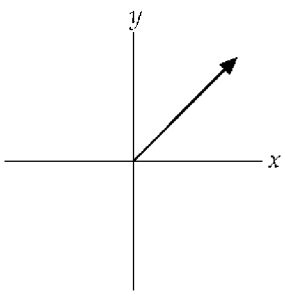
4. The magnitude of vector $\vec{\mathbf{A}}$ is 3 m and that of vector $\vec{\mathbf{B}}$ is 4 m. What is the largest magnitude in meters that their difference may have?

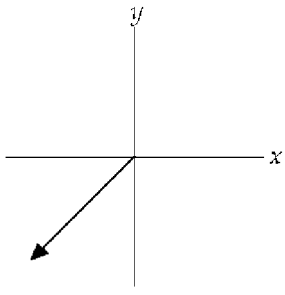
   ⓐ 6 ⓑ 7 ⓒ 9

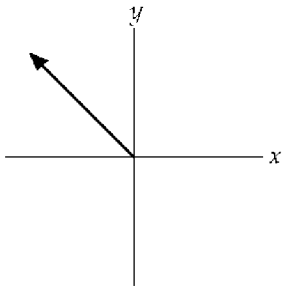
5. The magnitude of vector $\vec{\mathbf{A}}$ is 3 m and that of vector $\vec{\mathbf{B}}$ is 4 m. What is the smallest magnitude in meters that their difference may have?

   ⓐ 3 ⓑ 1 ⓒ 2

6. Which one of the vectors below has negative components in both the x and y directions?

ⓐ 

ⓑ 

ⓒ 

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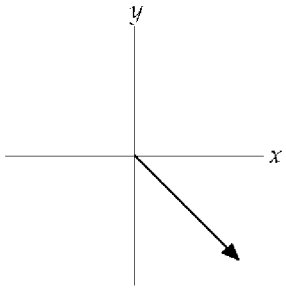
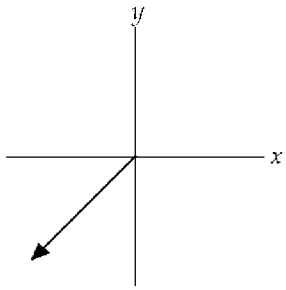
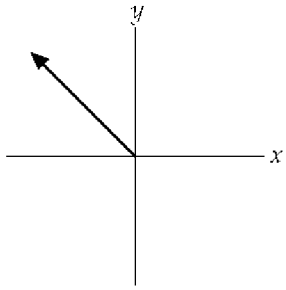
7. Which one of the vectors below has a negative component in the *x* direction and a positive component in the *y* direction?



ⓐ



ⓑ



ⓒ

8. Which of the following is a scalar?
ⓐ Distance ⓑ Velocity ⓒ Acceleration

9. Which of the following is a vector?
ⓐ Momentum ⓑ Volume ⓒ Mass

10. A woman starts at the origin and walks 9 m along the *x*-axis. She then turns 90° and walks parallel to the *y*-axis for 12 m. How far in meters is she from the origin?
ⓐ 9 ⓑ 15 ⓒ 21

11. If $T = 2\pi\sqrt{\dfrac{\ell}{g}}$, where T is measured in seconds and ℓ is measured in meters, what are the units of g?
ⓐ s^2/m ⓑ kg/s^2 ⓒ m/s^2

12. If $K = \dfrac{1}{2}mv^2$, where m is measured in kilograms and v in m/s, what are the units of K?
ⓐ m^2/s^2 ⓑ $\dfrac{\text{kg}\cdot\text{m}^2}{\text{s}^2}$ ⓒ $\dfrac{\text{s}^2}{\text{kg}\cdot\text{m}^2}$

13. If a vector has an *x* component of 11 and a *y* component of 13, what is the magnitude of this vector?
ⓐ 19 ⓑ 16 ⓒ 17

14. Three vectors are given by $\vec{\mathbf{A}} = 2\hat{\mathbf{i}} + 3\hat{\mathbf{j}}$, $\vec{\mathbf{B}} = 3\hat{\mathbf{i}} - 2\hat{\mathbf{j}}$, and $\vec{\mathbf{C}} = -2\hat{\mathbf{i}} + \hat{\mathbf{j}}$. What is the sum of the three vectors?
ⓐ $3\hat{\mathbf{i}} + 2\hat{\mathbf{j}}$ ⓑ $2\hat{\mathbf{j}} - 3\hat{\mathbf{i}}$ ⓒ $2\hat{\mathbf{j}} + 3\hat{\mathbf{i}}$

15. A vector, $\vec{\mathbf{B}}$, when added to the vector $\vec{\mathbf{C}} = 3\hat{\mathbf{i}} + 4\hat{\mathbf{j}}$, yields a resultant vector that is in the positive *y* direction and has a magnitude equal to that of $\vec{\mathbf{C}}$. What is the magnitude of $\vec{\mathbf{B}}$?
ⓐ 3.2 ⓑ 18 ⓒ 9.5

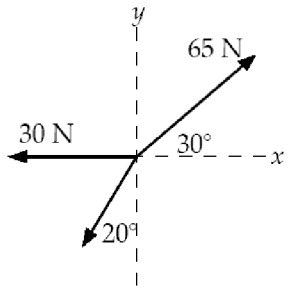
16. If vector $\vec{\mathbf{B}}$ is added to vector $\vec{\mathbf{A}}$, the result is $6\hat{\mathbf{i}} + \hat{\mathbf{j}}$. If $\vec{\mathbf{B}}$ is subtracted from $\vec{\mathbf{A}}$, the result is $-4\hat{\mathbf{i}} + 7\hat{\mathbf{j}}$. What is the magnitude of $\vec{\mathbf{A}}$?
ⓐ 5.1 ⓑ 4.1 ⓒ 8.2

17. If $\vec{\mathbf{A}} = 12\hat{\mathbf{i}} - 16\hat{\mathbf{j}}$ and $\vec{\mathbf{B}} = -24\hat{\mathbf{i}} + 10\hat{\mathbf{j}}$, what is the magnitude of the vector $\vec{\mathbf{C}} = 2\vec{\mathbf{A}} - \vec{\mathbf{B}}$?
ⓐ 90 ⓑ 64 ⓒ 22

18. A vector $\vec{\mathbf{A}}$ is added to $\vec{\mathbf{B}} = 6\hat{\mathbf{i}} - 8\hat{\mathbf{j}}$. The resultant vector is in the positive x direction and has a magnitude equal to that of $\vec{\mathbf{A}}$. What is the magnitude of $\vec{\mathbf{A}}$?
ⓐ 5.1 ⓑ 12.2 ⓒ 8.3

19. If $\vec{\mathbf{A}} = 12\hat{\mathbf{i}} - 16\hat{\mathbf{j}}$ and $\vec{\mathbf{B}} = -24\hat{\mathbf{i}} + 10\hat{\mathbf{j}}$, what is the direction of the vector $\vec{\mathbf{C}} = 2\vec{\mathbf{A}} - \vec{\mathbf{B}}$?
ⓐ -90° ⓑ +49° ⓒ -41°

20. The three forces shown act on a particle. What is the magnitude of the resultant of these three forces?



ⓐ 24 N ⓑ 105 N ⓒ 27 N

21. Given two non-zero vectors $\vec{\mathbf{A}}$ and $\vec{\mathbf{B}}$ such that $|A_x| = |B_x|$ and $|A_y| = |B_y|$, which one of the following can never be correct?
ⓐ $\vec{\mathbf{A}} + \vec{\mathbf{B}} = 2\vec{\mathbf{B}}$ ⓑ $\vec{\mathbf{A}} + \vec{\mathbf{B}} = 2\vec{\mathbf{A}}$ ⓒ $\vec{\mathbf{A}} + \vec{\mathbf{B}} = \vec{\mathbf{A}} - \vec{\mathbf{B}}$

22. The dimension of distance is length, $[\ell]$, and the dimension of time is time, $[t]$. What are the dimensions of flow rate for a liquid exiting a pipe, where the flow rate is the volume leaving the pipe in unit time?
ⓐ $\left[\frac{\ell^2}{t}\right]$ ⓑ $\left[\ell^3 t\right]$ ⓒ $\left[\frac{\ell^3}{t}\right]$

23. The dimension of distance is length, $[\ell]$, and the dimension of time is time, $[t]$. What are the dimensions of the quantity defined by $\sqrt{\frac{g}{L}}$, where L is the length of a pendulum and g is the acceleration of gravity, $9.80\ \text{m/s}^2$?
ⓐ $\left[\frac{\ell^2}{t^2}\right]$ ⓑ $\left[\frac{\ell}{t^2}\right]$ ⓒ $\left[\frac{1}{t}\right]$

24. The magnitude of the vector $\vec{\mathbf{A}}$ is written as A. The magnitude $\left|\vec{\mathbf{A}} + \vec{\mathbf{A}}\right|$ of the vector sum $\vec{\mathbf{A}} + \vec{\mathbf{A}}$, is
ⓐ $\sqrt{2}A$. ⓑ $2A$. ⓒ $4A$.

25. Which type of quantity is characterized by both magnitude and direction?
ⓐ scalar ⓑ vector ⓒ algebraic variable

26. Which of the following is an example of a vector quantity?
ⓐ length ⓑ mass ⓒ velocity

27. When we subtract a velocity vector from another velocity vector, the result is:
ⓐ another velocity. ⓒ a displacement. ⓔ none of the above.
ⓑ an acceleration. ⓓ a scalar.

28. When we add a displacement vector to another displacement vector, the result is:
ⓐ a velocity. ⓒ another displacement. ⓔ none of the above.
ⓑ an acceleration. ⓓ a scalar.

29. Vector $\vec{\mathbf{A}}$ is 3 m long and vector $\vec{\mathbf{B}}$ is 4 m long. The length of the sum of the vectors must be:
ⓐ 7 m. ⓑ some value from 1 m to 7 m. ⓒ some value from 3 m to 4 m.

30. Vector $\vec{\mathbf{A}}$ is 3.0 units in length and points along the positive *x-axis*; vector $\vec{\mathbf{B}}$ is 4.0 units in length and points along a direction 150° from the positive *x-axis*. What is the magnitude of the resultant when vectors $\vec{\mathbf{A}}$ and $\vec{\mathbf{B}}$ are added?
ⓐ 2.1 ⓑ 4.7 ⓒ 6.7

31. Vector $\vec{\mathbf{A}}$ is 3.0 units in length and points along the positive *x-axis*; vector $\vec{\mathbf{B}}$ is 4.0 units in length and points along a direction 150° from the positive *x-axis*. What is the direction of the resultant with respect to the positive *x-axis*?
ⓐ 114° ⓑ 103° ⓒ 86°

UNIT - DIMENSION - VECTORS

Answer Section

MULTIPLE CHOICE

1.	ANS: C	PTS: 1			
2.	ANS: A	PTS: 1			
3.	ANS: B	PTS: 1			
4.	ANS: B	PTS: 1			
5.	ANS: B	PTS: 1			
6.	ANS: B	PTS: 1			
7.	ANS: C	PTS: 1			
8.	ANS: A	PTS: 1			
9.	ANS: A	PTS: 1			
10.	ANS: B	PTS: 1			
11.	ANS: C	PTS: 1			
12.	ANS: B	PTS: 1			
13.	ANS: C	PTS: 1			
14.	ANS: A	PTS: 1			
15.	ANS: A	PTS: 1			
16.	ANS: B	PTS: 1			
17.	ANS: B	PTS: 1			
18.	ANS: C	PTS: 1			
19.	ANS: C	PTS: 1			
20.	ANS: A	PTS: 1			
21.	ANS: C	PTS: 1			
22.	ANS: C	PTS: 1			
23.	ANS: C	PTS: 1			
24.	ANS: B	PTS: 1			
25.	ANS: B	PTS: 1	DIF: 1	TOP:	3.1 Vectors and Their Properties
26.	ANS: C	PTS: 1	DIF: 1	TOP:	3.1 Vectors and Their Properties
27.	ANS: A	PTS: 1	DIF: 1	TOP:	3.1 Vectors and Their Properties
28.	ANS: C	PTS: 1	DIF: 1	TOP:	3.1 Vectors and Their Properties
29.	ANS: B	PTS: 1	DIF: 2	TOP:	3.1 Vectors and Their Properties
30.	ANS: A	PTS: 1	DIF: 2	TOP:	3.2 Components of a Vector
31.	ANS: B	PTS: 1	DIF: 2	TOP:	3.2 Components of a Vector

Rotational motion - elasticity

____ 1. 2 600 rev/min is equivalent to which of the following?
ⓐ 56 rad/s ⓑ 43.3 rad/s ⓒ 273 rad/s

____ 2. A grindstone spinning at the rate of 8.3 rev/s has what approximate angular speed?
ⓐ 97 rad/s ⓑ 3.2 rad/s ⓒ 52 rad/s

____ 3. A 0.12-m-radius grinding wheel takes 5.5 s to speed up from 2.0 rad/s to 11.0 rad/s. What is the wheel's average angular acceleration?
ⓐ 1.6 rad/s^2 ⓑ 9.6 rad/s^2 ⓒ 0.27 rad/s^2

____ 4. A 0.30-m-radius automobile tire rotates how many rad after starting from rest and accelerating at a constant 2.0 rad/s^2 over a 5.0-s interval?
ⓐ 25 rad ⓑ 0.50 rad ⓒ 12.5 rad

____ 5. A fan blade, initially at rest, rotates with a constant acceleration of 0.025 rad/s^2. What is its angular speed at the instant it goes through an angular displacement of 4.2 rad?
ⓐ 0.46 rad/s ⓑ 1.4 rad/s ⓒ 0.11 rad/s

____ 6. A fan blade, initially at rest, rotates with a constant acceleration of 0.025 rad/s^2. What is the time interval required for it to reach a 4.2-rad displacement after starting from rest?
ⓐ 18 s ⓑ 1.8 s ⓒ 2.0 s

____ 7. A ceiling fan is turned on and reaches an angular speed of 120 rev/min in 20 s. It is then turned off and coasts to a stop in 40 s. In the one minute of rotation, through how many revolutions did the fan turn?
ⓐ 60 ⓑ 600 ⓒ 20

____ 8. A Ferris wheel starts at rest and builds up to a final angular speed of 0.70 rad/s while rotating through an angular displacement of 4.9 rad. What is its average angular acceleration?
ⓐ 0.04 rad/s^2 ⓑ 0.05 rad/s^2 ⓒ 0.10 rad/s^2

____ 9. A Ferris wheel, rotating initially at an angular speed of 0.50 rad/s, accelerates over a 7.0-s interval at a rate of 0.040 rad/s^2. What is its angular speed after this 7-s interval?
ⓐ 0.30 rad/s ⓑ 0.20 rad/s ⓒ 0.78 rad/s

____ 10. A ventilation fan has blades 0.25 m in radius rotating at 20 rpm. What is the tangential speed of each blade tip?
ⓐ 5.0 m/s ⓑ 0.02 m/s ⓒ 0.52 m/s

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____ 11. A 0.30-m-radius automobile tire accelerates from rest at a constant 2.0 rad/s^2 over a 5.0-s interval. What is the tangential component of acceleration for a point on the outer edge of the tire during the 5-s interval?
ⓐ 0.30 m/s^2 ⓑ 33 m/s^2 ⓒ 0.60 m/s^2

____ 12. A point on the rim of a 0.30-m-radius rotating wheel has a tangential speed of 4.0 m/s. What is the tangential speed of a point 0.20 m from the center of the same wheel?
ⓐ 2.7 m/s ⓑ 1.0 m/s ⓒ 9.4 m/s

____ 13. A 0.15-m-radius grinding wheel starts at rest and develops an angular speed of 12.0 rad/s in 4.0 s. What is the average tangential acceleration of a point on the wheel's edge?
ⓐ 0.45 m/s^2 ⓑ 6.8 m/s^2 ⓒ 28 m/s^2

____ 14. The end of the cutting cord on a gas-powered weed cutter is 0.15 m in length. If the motor rotates at the rate of 20 rev/s, what is the tangential speed of the end of the cord?
ⓐ 19 m/s ⓑ 63 m/s ⓒ 75 m/s

____ 15. A bucket in an old well is hoisted upward by a rope which winds up on a cylinder having a radius of 0.050 m. How many rev/s must the cylinder turn if the bucket is raised at a speed of 0.15 m/s?
ⓐ 0.18 rev/s ⓑ 0.24 rev/s ⓒ 0.48 rev/s

____ 16. A ventilation fan has blades 0.25 m long rotating at 20 rpm. What is the centripetal acceleration of a point on the outer tip of a blade?
ⓐ 1.1 m/s^2 ⓑ 0.18 m/s^2 ⓒ 0.23 m/s^2

____ 17. A 0.30-m-radius automobile tire accelerates from rest at a constant 2.0 rad/s^2. What is the centripetal acceleration of a point on the outer edge of the tire after 5.0 s?
ⓐ 33 m/s^2 ⓑ 2.5 m/s^2 ⓒ 30 m/s^2

____ 18. A point on the rim of a 0.25-m-radius fan blade has centripetal acceleration of 0.20 m/s^2. Find the centripetal acceleration of a point 0.05 m from the center of the same wheel.
ⓐ 0.04 m/s^2 ⓑ 0.01 m/s^2 ⓒ 0.08 m/s^2

____ 19. A point on the rim of a 0.25-m-radius rotating wheel has a centripetal acceleration of 4.0 m/s^2. What is the angular speed of the wheel?
ⓐ 2.0 rad/s ⓑ 3.2 rad/s ⓒ 4.0 rad/s

____ 20. A point on the rim of a 0.15-m-radius rotating disk has a centripetal acceleration of 5.0 m/s^2. What is the angular speed of a point 0.075 m from the center of the disk?
ⓐ 6.2 rad/s ⓑ 0.89 rad/s ⓒ 5.8 rad/s

____ 21. A 0.150-m-radius grinding wheel, starting at rest, develops an angular speed of 12.0 rad/s in a time interval of 4.00 s. What is the centripetal acceleration of a point 0.100 m from the center when the wheel is moving at an angular speed of 12.0 rad/s?
ⓐ 14.4 m/s^2 ⓑ 30.6 m/s^2 ⓒ 0.450 m/s^2

____ 22. The distance from the center of a Ferris wheel to a passenger seat is 12 m. What centripetal acceleration does a passenger experience when the wheel's angular speed is 0.50 rad/s?
ⓐ 16.9 m/s^2 ⓑ 3.0 m/s^2 ⓒ 9.0 m/s^2

____ 23. A copper wire of length 2.0 m, cross sectional area 7.1×10^{-6} m^2 and Young's modulus 11×10^{10} N/m^2 has a 200-kg load hung on it. What is its increase in length? (g = 9.8 m/s^2)
ⓐ 0.50 mm ⓑ 5.0 mm ⓒ 2.5 mm

____ 24. In an elastic solid there is a direct proportionality between strain and:
ⓐ elastic modulus. ⓒ cross-sectional area. ⓔ none of the above.
ⓑ temperature. ⓓ stress.

____ 25. The quantity "stress" expressed in terms of the fundamental quantities (mass, length, time) is equivalent to:
ⓐ $ML^{-1}T^{-2}$. ⓑ $M^2L^{-1}T^{-2}$. ⓒ MLT^{-1}.

____ 26. The quantity "strain" expressed in terms of the fundamental quantities (mass, length, time) is equivalent to:
ⓐ MLT^{-1}. ⓒ $M^2L^{-1}T^{-3}$. ⓔ none of the above.
ⓑ $ML^{-1}T^{-2}$. ⓓ a dimensionless quantity.

____ 27. The bulk modulus of a material, as a meaningful physical property, is applicable to which of the following?
ⓐ only solids ⓑ solids, liquids and gases ⓒ only gases

____ 28. Consider two steel rods, A and B. B has three times the area and twice the length of A, so Young's modulus for B will be what factor times Young's modulus for A?
ⓐ 1.0 ⓑ 1.5 ⓒ 2.0

____ 29. A tire stops a car by use of friction. What modulus should we use to calculate the stress and strain on the tire?
ⓐ Young's modulus ⓒ shear modulus ⓔ none of the above.
ⓑ compression modulus ⓓ bulk modulus

____ 30. How large a force is necessary to stretch a 2.0-mm-diameter steel wire ($Y = 2.0 \times 10^{11}$ N/m^2) by 1.0%?
ⓐ 3.1×10^3 N ⓑ 2.5×10^4 N ⓒ 6.3×10^3 N

____ 31. The quantity "pressure" expressed in terms of the fundamental quantities (mass, length, time) is equivalent to:

ⓐ MLT^{-2}. ⓑ $ML^{-1}T^{-2}$. ⓒ MLT^{-1}.

____ 32. A wheel of radius R rotates about a fixed axis. When a point at a distance R from the center is moving with angular speed ω, a point located at a distance $R/2$ from the center is moving at angular speed

ⓐ $\frac{\omega}{4}$. ⓑ $\frac{\omega}{2}$. ⓒ ω.

____ 33. When a wheel of radius R rotates about a fixed axis, a point R m from the center of the wheel moves a distance of 4.0 m. How far in m does a point at a distance $R/2$ from the center move in the same time?

ⓐ 2.0 ⓑ 0.33 ⓒ 1.0

____ 34. When a wheel of radius R rotates about a fixed axis, a point R m from the center of the wheel moves at a speed of 4.0 m/s. How fast in m/s does a point located at a distance $R/2$ from the center move?

ⓐ 0.33 ⓑ 0.25 ⓒ 2.0

____ 35. What is the magnitude in rad/s of the angular velocity of the second hand of a clock?

ⓐ $\frac{\pi}{30}$ ⓑ $\frac{\pi}{40}$ ⓒ $\frac{\pi}{50}$

____ 36. What is the magnitude in rad/s^2 of the angular acceleration of the second hand of a clock?

ⓐ $\frac{\pi}{2400}$ ⓑ $\frac{\pi}{1200}$ ⓒ 0

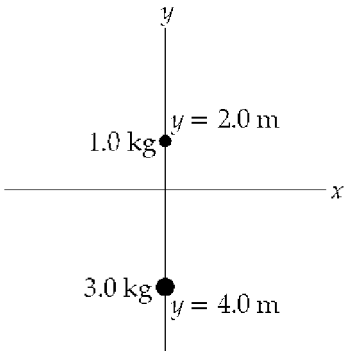
____ 37. What is the angular speed in rad/s of a turntable rotating at 78 rev/min?

ⓐ 8.17 ⓑ 7.18 ⓒ 6.32

____ 38. The moment of inertia of a body is $3.0\,kg \cdot m^2$. When its angular velocity is 6.0 rad/s, its rotational kinetic energy in J is

ⓐ 18. ⓑ 36. ⓒ 54.

____ 39. Two particles, connected by a rigid rod of negligible mass, are lying along the *y*-axis. The system rotates about the *x*-axis at 3 rad/s. Calculate the kinetic energy of the system in J.



ⓐ 420 ⓑ 54 ⓒ 230

____ 40. The net work done in accelerating a propeller from 0 to 30 rad/s is 6000 J. What is the moment of inertia of the propeller in $\text{kg} \cdot \text{m}^2$?

ⓐ 26 ⓑ 13 ⓒ 30

____ 41. The magnitude of the moment of inertia of a rigid object depends on

ⓐ the angular position of the object. ⓑ the location of the rotation axis. ⓒ the angular velocity of the object.

Rotational motion - elasticity

Answer Section

MULTIPLE CHOICE

1. ANS: C PTS: 1 DIF: 1
   TOP: 7.1 Angular Speed and Angular Acceleration
2. ANS: C PTS: 1 DIF: 1
   TOP: 7.1 Angular Speed and Angular Acceleration
3. ANS: A PTS: 1 DIF: 1
   TOP: 7.1 Angular Speed and Angular Acceleration
4. ANS: A PTS: 1 DIF: 1
   TOP: 7.2 Rotational Motion Under Constant Angular Acceleration
5. ANS: A PTS: 1 DIF: 2
   TOP: 7.2 Rotational Motion Under Constant Angular Acceleration
6. ANS: A PTS: 1 DIF: 2
   TOP: 7.2 Rotational Motion Under Constant Angular Acceleration
7. ANS: A PTS: 1 DIF: 2
   TOP: 7.2 Rotational Motion Under Constant Angular Acceleration
8. ANS: B PTS: 1 DIF: 2
   TOP: 7.2 Rotational Motion Under Constant Angular Acceleration
9. ANS: C PTS: 1 DIF: 2
   TOP: 7.2 Rotational Motion Under Constant Angular Acceleration
10. ANS: C PTS: 1 DIF: 1
    TOP: 7.3 Relations Between Angular and Linear Quantities
11. ANS: C PTS: 1 DIF: 1
    TOP: 7.3 Relations Between Angular and Linear Quantities
12. ANS: A PTS: 1 DIF: 2
    TOP: 7.3 Relations Between Angular and Linear Quantities
13. ANS: A PTS: 1 DIF: 2
    TOP: 7.3 Relations Between Angular and Linear Quantities
14. ANS: A PTS: 1 DIF: 2
    TOP: 7.3 Relations Between Angular and Linear Quantities
15. ANS: C PTS: 1 DIF: 2
    TOP: 7.3 Relations Between Angular and Linear Quantities
16. ANS: A PTS: 1 DIF: 2 TOP: 7.4 Centripetal Acceleration
17. ANS: C PTS: 1 DIF: 2 TOP: 7.4 Centripetal Acceleration
18. ANS: A PTS: 1 DIF: 2 TOP: 7.4 Centripetal Acceleration
19. ANS: C PTS: 1 DIF: 2 TOP: 7.4 Centripetal Acceleration
20. ANS: C PTS: 1 DIF: 2 TOP: 7.4 Centripetal Acceleration
21. ANS: A PTS: 1 DIF: 2 TOP: 7.4 Centripetal Acceleration
22. ANS: B PTS: 1 DIF: 2 TOP: 7.4 Centripetal Acceleration
23. ANS: B PTS: 1 DIF: 2
    TOP: 9.1 States of Matter | 9.2 The Deformation of Solids

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24. ANS: D PTS: 1 DIF: 1
TOP: 9.1 States of Matter | 9.2 The Deformation of Solids
25. ANS: A PTS: 1 DIF: 1
TOP: 9.1 States of Matter | 9.2 The Deformation of Solids
26. ANS: D PTS: 1 DIF: 1
TOP: 9.1 States of Matter | 9.2 The Deformation of Solids
27. ANS: B PTS: 1 DIF: 1
TOP: 9.1 States of Matter | 9.2 The Deformation of Solids
28. ANS: A PTS: 1 DIF: 2
TOP: 9.1 States of Matter | 9.2 The Deformation of Solids
29. ANS: C PTS: 1 DIF: 2
TOP: 9.1 States of Matter | 9.2 The Deformation of Solids
30. ANS: C PTS: 1 DIF: 2
TOP: 9.1 States of Matter | 9.2 The Deformation of Solids
31. ANS: B PTS: 1 DIF: 1 TOP: 9.3 Density and Pressure
32. ANS: C PTS: 1
33. ANS: A PTS: 1
34. ANS: C PTS: 1
35. ANS: A PTS: 1
36. ANS: C PTS: 1
37. ANS: A PTS: 1
38. ANS: C PTS: 1
39. ANS: C PTS: 1
40. ANS: B PTS: 1
41. ANS: B PTS: 1

HEAT

1) Which type of heating causes sunburn?
   Ⓐ radiation Ⓑ convection Ⓒ conduction

2) Heat flow occurs between two bodies in thermal contact when they differ in what property?
   Ⓐ specific heat Ⓑ volume Ⓒ temperature

3) The use of fiberglass insulation in the outer walls of a building is intended to minimize heat transfer through the wall by what process?
   Ⓐ conduction Ⓑ radiation Ⓒ convection

4) If one's hands are being warmed by holding them to one side of a flame, the predominant form of heat transfer is what process?
   Ⓐ conduction Ⓑ radiation Ⓒ convection

5) Temperature is a property which determines

   Ⓐ Whether a body will feel hot or cold to touch
   Ⓑ How much total absolute energy a body has
   Ⓒ In which direction heat will flow between two systems

6) In the science lab, a student heats up a chemical from 10 °C to 25 °C which requires the thermal energy of 30000 J. If the mass of the object is 40 kg, the specific heat capacity of the chemical would be

   Ⓐ 25 J kg-1 °C-1 Ⓑ 50 J kg-1 °C-1 Ⓒ 75 J kg-1 °C-1

7) The specific heat capacity of a substance is equal to

   Ⓐ the amount of heat required to raise the temperature of a 1 kg of a substance by 1 K
   Ⓑ the amount of heat required to change the phase of a substance from solid to liquid without any change
   Ⓒ the amount of heat required to raise the temperature of a substance by 1 K

8) A machine gear consists of 0.10 kg of Iron. How much total heat is generated in the part if its temperature increases by 35 C°? (Specific heats of Iron and copper are 450 J/kg·°C.
   Ⓐ 1575 J Ⓑ 3575 J Ⓒ 2575 J

9) By using Q = mCΔT, calculate the heat energy needed to increse the temperature of 2kg of water by 13°C. The specific heat of water is 4186 J/kg°C
   Ⓐ 108836 Ⓑ 109936 Ⓒ 108800

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HEAT

Answer Section

MULTIPLE CHOICE

1) ANS: A PTS: 1 DIF: 1 TOP: 11.5 Energy Transfer
2) ANS: C PTS: 1 DIF: 1
TOP: 11.1 Heat and Internal Energy | 11.2 Specific Heat
3) ANS: A PTS: 1 DIF: 1 TOP: 11.5 Energy Transfer
4) ANS: B PTS: 1 DIF: 1 TOP: 11.5 Energy Transfer
5) ANS: A PTS: 1
6) ANS: B PTS: 1
7) ANS: A PTS: 1
8) ANS: A PTS: 1 DIF: 2
TOP: 11.1 Heat and Internal Energy | 11.2 Specific Heat
9) ANS: A PTS: 1

SOUND WAVES

____ 1. If $y = (2A \sin kx)\cos \omega t$, we have
ⓐ a standing wave. ⓑ destructive interference. ⓒ a Doppler shift.

____ 2. When there is a node at $x = 0\,\text{m}$, a maximum amplitude on a standing wave of wavelength occurs λ at $x =$
ⓐ λ. ⓑ $\frac{\lambda}{4}$. ⓒ $\frac{\lambda}{5}$.

____ 3. The origin of an x coordinate axis is located at one end of a string of length L. When a standing wave of wavelength $L/4$ causes the string to vibrate, the location closest to the origin of a point of minimum amplitude other than an end is $x =$
ⓐ $\frac{L}{8}$. ⓑ $\frac{L}{2}$. ⓒ L.

____ 4. When standing waves are present on a string of length L with both ends fixed the frequency of the first harmonic is
ⓐ $\frac{v}{2L}$. ⓑ $\frac{2v}{L}$. ⓒ $\frac{3v}{2L}$.

____ 5. When standing waves are present on a string of length L with both ends fixed the frequency of the fourth harmonic is
ⓐ $\frac{2v}{L}$. ⓑ $\frac{v}{L}$. ⓒ $\frac{5v}{2L}$.

____ 6. The closed end of an air column is a(n)
ⓐ place of maximum vibration. ⓑ displacement antinode. ⓒ displacement node.

____ 7. The wavelength of the first harmonic at which resonance occurs in the air in a tube of length L open at both ends is
ⓐ $4L$. ⓑ $\frac{1}{4}L$. ⓒ $2L$.

____ 8. The wavelength of the first harmonic at which resonance occurs in the air in a tube of length L closed at one end is
ⓐ $2L$. ⓑ $\frac{1}{4}L$. ⓒ $4L$.

____ 9. Two harmonic waves are described by: $y_1 = 3.0 \sin\left[(4x - 700t)\,\text{rad}\right]$ and $y_2 = 3.0 \sin\left[(4x - 700t - 2)\,\text{rad}\right]$. What is the amplitude of the resultant wave?
ⓐ 6.0 ⓑ 3.2 ⓒ 4.3

____ 10. Nodes are points of
ⓐ maximum wave number. ⓑ minimum amplitude. ⓒ maximum frequency.

____ 11. Antinodes are points of
ⓐ maximum amplitude. ⓑ maximum frequency. ⓒ amplitude of $2\pi A$.

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____ 12. Antinodes, not necessarily adjacent, may be separated by any of the distances below except

ⓐ $\frac{\lambda}{4}$. ⓑ λ. ⓒ $\frac{\lambda}{2}$.

____ 13. The distance from an antinode to a node nearest to that antinode is

ⓐ 3λ. ⓑ $\frac{\lambda}{4}$. ⓒ $\frac{\lambda}{2}$.

____ 14. The closed end of an air column is a(n)

ⓐ beat node. ⓑ pressure antinode. ⓒ displacement antinode.

____ 15. An organ pipe, 2.5 m long and open at both ends, has a fundamental wavelength of

ⓐ 1.0 m. ⓑ 0.5 m. ⓒ 5.0 m.

____ 16. The open end of an air column is a(n)

ⓐ beat node. ⓑ refraction node. ⓒ pressure node.

SOUND WAVES

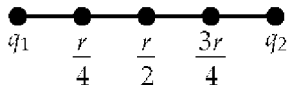
Answer Section

MULTIPLE CHOICE

1. ANS: A PTS: 1
2. ANS: B PTS: 1
3. ANS: A PTS: 1
4. ANS: A PTS: 1
5. ANS: A PTS: 1
6. ANS: C PTS: 1
7. ANS: C PTS: 1
8. ANS: C PTS: 1
9. ANS: B PTS: 1
10. ANS: B PTS: 1
11. ANS: A PTS: 1
12. ANS: A PTS: 1
13. ANS: B PTS: 1
14. ANS: B PTS: 1
15. ANS: C PTS: 1
16. ANS: C PTS: 1

CAPACITENCE - ELECTRIC FORCE - ELECTRIC FIELD - CURRENT - RESISTORS

____ 1. Two equal charges are separated by a distance r. At what point, between the two charges, would a third test charge experience no net electrical force?



ⓐ $\frac{r}{2}$ ⓑ $\frac{3}{2}r$ ⓒ $\frac{3}{4}r$

____ 2. The Coulomb force between two positive charges is
ⓐ repulsive. ⓑ linear. ⓒ attractive.

____ 3. The Coulomb force between two negative charges is
ⓐ attractive. ⓑ a cross product. ⓒ repulsive.

____ 4. The Coulomb force between a positive and a negative charge is
ⓐ linear. ⓑ attractive. ⓒ a dot product.

____ 5. The force between two charges q_1 and q_2 is proportional to

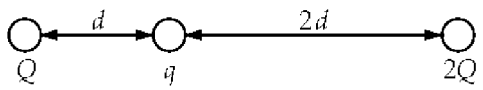
ⓐ $\frac{{q_1}^2{q_2}^2}{r^2}$. ⓑ $\frac{q_1 q_2}{r^2}$. ⓒ $\frac{q_1+q_2}{r}$.

____ 6. The electric field at a distance r from a charge q is

ⓐ $k_e\frac{q}{r^2}$. ⓑ $k_e\frac{q^2}{r}$. ⓒ $k_e\frac{q^2}{r^2}$.

____ 7. A particle (charge = +40 μC) is located on the x-axis at the point $x = -20$ cm, and a second particle (charge = –50 μC) is placed on the x-axis at $x = +30$ cm. What is the magnitude of the total electrostatic force in N on a third particle (charge = –4.0 μC) placed at the origin ($x = 0$)? ($k_e = 8.99\times10^9$ Nm^2/C^2)
ⓐ 72 ⓑ 56 ⓒ 16

____ 8. If $Q = 30$ μC, $q = 5.0$ μC, and $d = 30$ cm, what is the magnitude of the electrostatic force on q in N? ($k_e = 8.99\times10^9$ Nm^2/C^2)



ⓐ 23 ⓑ 38 ⓒ 7.5

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____ 9. A charge of +80 μC is placed on the x-axis at $x = 0$. A second charge of −50 μC is placed on the x-axis at $x = 50$ cm. What is the magnitude of the electrostatic force in N on a third charge of 4.0 μC placed on the x-axis at $x = 30$ cm? ($k_e = 8.99 \times 10^9$ Nm^2/C^2)

ⓐ 25 ⓑ 45 ⓒ 77

____ 10. Three point charges are positioned on the x-axis: +32 μC at $x = 0$, +20 μC at $x = 40$ cm and −60 μC at $x = 60$ cm. What is the magnitude of the electrostatic force on the +32 μC charge? ($k_e = 9.0 \times 10^9$ Nm^2/C^2)

ⓐ 48 ⓑ 36 ⓒ 12

____ 11. A 50 μC point charge is placed at the origin, and an identical charge is placed on the x-axis at $x = 4.0$ m. What is the magnitude of the electrostatic force in N on a 20 μC charge placed on the x-axis at $x = 3.0$ m? ($k_e = 8.99 \times 10^9$ Nm^2/C^2)

ⓐ 8.0 ⓑ 6.4 ⓒ 0.5

____ 12. A point charge Q is placed on the x-axis at $x = 2.0$ m. A second point charge -Q is placed at $x = 3.0$ m. If $Q = 40$ μC, what is the magnitude of the electrostatic force in N on a 30 μC charge placed at the origin? ($k_e = 8.99 \times 10^9$ Nm^2/C^2)

ⓐ 8.1 ⓑ 1.5 ⓒ 7.2

____ 13. A point charge Q is placed on the x-axis at $x = -2.0$ m. A second point charge, $-Q$ is placed at $x = 1.0$ m. If $Q = 60$ μC, what is the magnitude of the electrostatic force in N on a 40 μC charge placed at the origin? ($k_e = 8.99 \times 10^9$ Nm^2/C^2)

ⓐ 3.0 ⓑ 16 ⓒ 27

____ 14. A point charge Q is placed on the x-axis at the origin. An identical point charge is placed on the x-axis at $x = -1.0$ m and another at $x = +1.0$ m. If $Q = 40$ μC, what is the magnitude of the electrostatic force in N on the charge at $x = +1.0$ m? ($k_e = 8.99 \times 10^9$ Nm^2/C^2)

ⓐ 18 ⓑ 29 ⓒ 11

____ 15. The electrical potential energy of a pair of like charges is

ⓐ proportional to the square of the distance. ⓑ positive. ⓒ neutral.

____ 16. When the potential difference between the plates of a capacitor is doubled, the magnitude of the charge stored on one of the plates

ⓐ remains the same. ⓑ is doubled. ⓒ is tripled.

____ 17. The units of electrical potential are

ⓐ Nm ⓑ $\frac{\text{C}}{\text{r}^2}$ ⓒ $\frac{\text{J}}{\text{C}}$

____ 18. In a uniform electric field directed along the positive x-axis, ΔV is

ⓐ $-Ed$ ⓑ $\frac{q^2}{r}$ ⓒ Ed

____ 19. In a uniform electric field directed along the positive x-axis, ΔU is

ⓐ $q_0 EC$ ⓑ $q^2 E$ ⓒ $-q_0 Ed$

____ 20. The electric potential at a distance r from a point charge q is

ⓐ $\frac{k_e q}{r^2}$ ⓑ $k_e \varepsilon_0 q$ ⓒ $\frac{k_e q}{r}$

____ 21. Capacitance is defined as

ⓐ $\frac{V}{Q}$ ⓑ QV ⓒ $\frac{Q}{V}$

____ 22. The capacitance of a parallel plate capacitor is

ⓐ $\frac{A}{\varepsilon_0 d}$ ⓑ QV ⓒ $\frac{\varepsilon_0 A}{d}$

____ 23. A parallel plate capacitor has an area of $4.00\ \text{cm}^2$ and a plate separation of 2.00 mm. What is its capacitance in pF? ($\varepsilon_0 = 8.85 \times 10^{-12}\ \text{C}^2/\text{Nm}^2$)

ⓐ 1.77 ⓑ 3.54 ⓒ 3.14

____ 24. The measured difference in potential between two points in a circuit is called the

ⓐ resistance. ⓑ inductance. ⓒ voltage.

____ 25. The potential at a point is -4.5×10^3 V. How much work in J is done to bring a 0.94 C charge from infinity to the point?

ⓐ -4.2×10^3 ⓑ -2.4×10^3 ⓒ -1.2×10^3

____ 26. Two conductors are made of the same material and have the same cross sectional area. Their length ratios are 2:1. What is the ratio of their resistances?

ⓐ 1:1 ⓑ 2:1 ⓒ 1:2

____ 27. Two conductors are made of the same material and have the same length. The ratio of their cross sectional areas is 2:1. What is the ratio of their resistances?

ⓐ 1:1 ⓑ 1:4 ⓒ 1:2

____ 28. Two conductors are made of the same material and have the same length. They each have circular cross sectional areas. The ratio of their radii is 2:1. What is the ratio of their resistances?

ⓐ 4:1 ⓑ 1:4 ⓒ 2:1

____ 29. Two conductors are made of the same material and have the same cross sectional area. The ratio of their lengths is 2:1. They have the same electrical potential across their lengths. What is the ratio of the current through the conductors?

ⓐ 1:1 ⓑ 1:2 ⓒ 4:1

____ 30. Two conductors are made of the same material and have the same length. The ratio of their cross sectional areas is 2:1. They have the same electrical potential across their lengths. What is the ratio of the current through the conductors?

ⓐ 2:1 ⓑ 1:1 ⓒ 1:4

____ 31. Two conductors are made of the same material and have the same length. They each have circular cross sectional areas. The ratio of their radii is 2:1. They have the same electrical potential across their lengths. What is the ratio of the current through the conductors?
ⓐ 4:1 ⓑ 1:1 ⓒ 1:2

____ 32. Two conductors are made of the same material and have the same cross sectional area. The ratio of their lengths is 2:1. They carry the same current. What is the ratio of the electrical potential across their lengths?
ⓐ 1:2 ⓑ 1:1 ⓒ 2:1

____ 33. Two conductors are made of the same material and have the same length. They each have circular cross sectional areas. The ratio of their radii is 2:1. They carry the same current. What is the ratio of the electrical potential across their lengths?
ⓐ 1:4 ⓑ 1:1 ⓒ 1:2

____ 34. When two resistances are connected in series, the total resistance
ⓐ is greater than the larger resistance. ⓑ is an inverse square relationship. ⓒ is directly proportional to the squares of the individual resistances.

____ 35. When two resistances are connected in parallel, the total resistance
ⓐ is an inverse square relationship. ⓑ is less than the smaller resistance. ⓒ is directly proportional to the square root of the sum of the squares of the individual resistances.

____ 36. If the voltage is 120V and the current is 2A, what is the resistance in ohms?
ⓐ 120 ⓑ 60 ⓒ 30

____ 37. A 150 watt light bulb is plugged into a 120 volt circuit. What current in A flows through the bulb?
ⓐ 10000 ⓑ 1.25 ⓒ 0.08

____ 38. A 100 watt light bulb is connected to a 120 volt source. What is the resistance of the bulb in ohms?
ⓐ 12000 ⓑ 144 ⓒ 0.834

____ 39. Three resistors are connected in series. Their resistances are 2Ω, 3Ω, and 4Ω. What is their total resistance in Ω?
ⓐ 3 ⓑ 9 ⓒ 2

____ 40. Three resistors are connected in parallel. Their resistances are 16Ω, 24Ω, and 48Ω. What is their total resistance in Ω?
ⓐ 8 ⓑ 36 ⓒ 54

____ 41. A heater with 2Ω resistance is plugged into a 120 V circuit. What is the current in the heater in A?
ⓐ 40 ⓑ 10 ⓒ 60

____ 42. A heater with 2Ω resistance is plugged into a 120 V circuit. How much power in watts is dissipated?
ⓐ 7200 ⓑ 900 ⓒ 3600

____ 43. The power dissipated in a circuit is 100 watts. What is the resistance in Ω if the current is 10 A?
ⓐ 5 ⓑ 7 ⓒ 1

____ 44. A rod of 2.0 m length and a square (2.0 mm × 2.0 mm) cross section is made of a material with a resistivity of $6.0 \times 10^{-8}\ \Omega \cdot \text{m}$. If a potential difference of 0.50 V is placed across the ends of the rod, at what rate is heat in W generated in the rod?

ⓐ 8.3 ⓑ 1.3 ⓒ 5.3

____ 45. An electric heater is constructed by applying a potential difference of 110 V across a wire with a resistance of 5.0 Ω. What is the power rating of the heater in kW?

ⓐ 2.4 ⓑ 60 ⓒ 1.5

____ 46. How much energy in J is dissipated as heat during a two-minute time interval by a 1.5 kΩ resistor that has a constant 20 V potential difference across its leads?

ⓐ 58 ⓑ 16 ⓒ 32

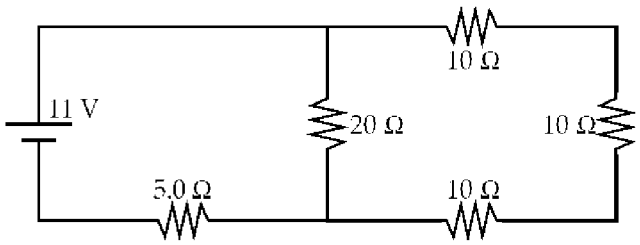
____ 47. A wire (length = 2.0 m, diameter = 1.0 mm) has a resistance of 0.45 Ω. What is the resistivity in Ωm of the material used to make the wire?

ⓐ 7.1×10^{-7} ⓑ 2.3×10^{-7} ⓒ 1.8×10^{-7}

____ 48. What is the resistance in Ω of a wire made of a material with a resistivity of 3.2×10^{-8} Ωm if its length is 2.5 m, and its diameter is 0.50 mm?

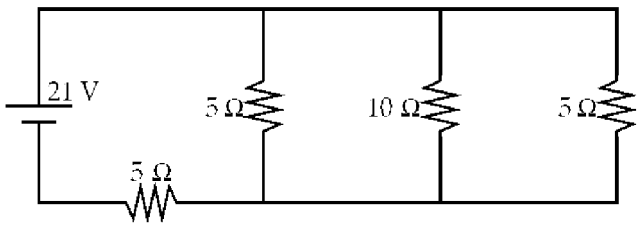
ⓐ 0.81 ⓑ 1.28 ⓒ 0.41

____ 49. What is the magnitude (in V) of the potential difference across the 20 Ω resistor?



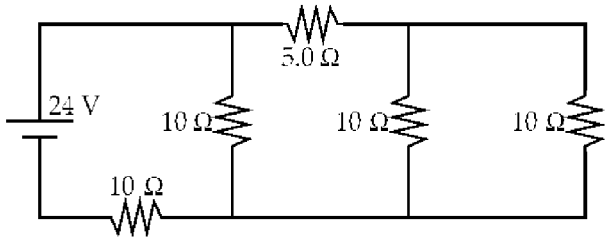
ⓐ 11 ⓑ 7.8 ⓒ 8.6

____ 50. What is the current in A in the 10 Ω resistor?



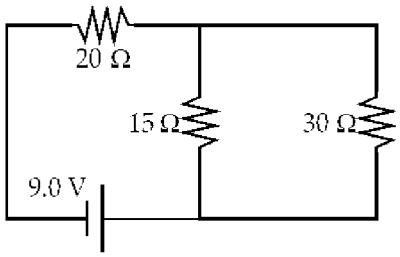
ⓐ 0.60 ⓑ 3.0 ⓒ 1.2

____ 51. At what rate (in W) is thermal energy generated in the 5 Ω resistor?



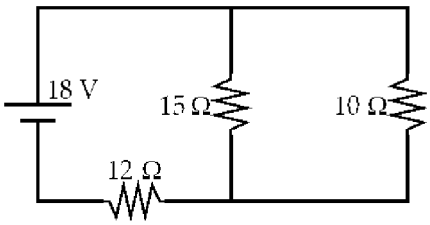
ⓐ 51 ⓑ 13 ⓒ 3.2

____ 52. What is the current in A in the 15 Ω resistor?



ⓐ 0.60 ⓑ 0.30 ⓒ 0.20

____ 53. How much internal energy in J is produced in the 10 Ω resistor in 5.0 s?



ⓐ 18 ⓑ 90 ⓒ 32

____ 54. A uniform wire 30 m long has a resistance of 90 Ω and a cross sectional area of 6.0×10^{-6} m^2. What is its resistivity in Ω · m?

ⓐ 1.8×10^{-5} ⓑ 5.6×10^{4} ⓒ 1.8×10^{9}

____ 55. A wire is replaced by another of half its diameter. By what factor does this change its resistance?

ⓐ 4 ⓑ 1 ⓒ 1/2

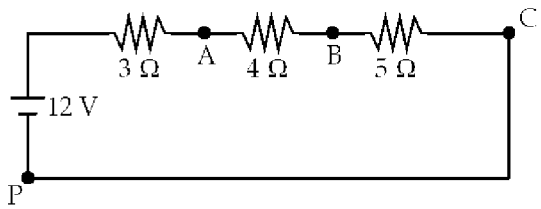
____ 56. What is the resistance in Ω of a 40 watt light bulb rated at 120 volts?

ⓐ 480 ⓑ 360 ⓒ 180

____ 57. A battery with an emf of 18 volts has a terminal voltage of 16 V when delivering 32 W of power to an external resistor *R*. What is the value of *R*?

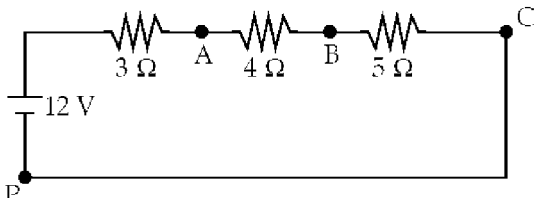
ⓐ 36 Ω ⓑ 8.0 Ω ⓒ 16 Ω

____ 58. A 12 V battery applies a potential difference to three resistors in series. If the potential at point P is 0 V, the potential at point A is



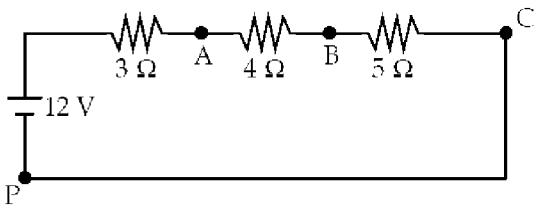
ⓐ 0 V. ⓑ 9 V. ⓒ 3 V.

____ 59. A 12 V battery applies a potential difference to three resistors in series. If the potential at point P is 0 V, the potential at point B is



ⓐ 7 V. ⓑ 3 V. ⓒ 5 V.

____ 60. A 12 V battery applies a potential difference to three resistors in series. If the potential at point P is 0 V, the potential at point C is



ⓐ 3 V. ⓑ 7 V. ⓒ 0 V.

____ 61. You measure a 25.0-V potential difference across a 5.00-Ω resistor. What is the current flowing through it?

ⓐ 0.125 A ⓑ 5.00 A ⓒ 1.00 A

____ 62. The unit of electric current, the ampere, is equivalent to which of the following?

ⓐ V/s ⓑ V/Ω ⓒ Ω/V

____ 63. The unit of electric resistance, the ohm, is equivalent to which of the following?

ⓐ V/A ⓑ A/m ⓒ A/s

____ 64. A metallic conductor has a resistivity of 18×10^{-6} Ω·m. What is the resistance of a piece that is 30 m long and has a uniform cross sectional area of 3.0×10^{-6} m^2?

ⓐ 180 Ω ⓑ 0.056 Ω ⓒ 160 Ω

____ 65. A 60-W light bulb is in a socket supplied with 120 V. What is the current in the bulb?
ⓐ 7 200 A ⓑ 0.50 A ⓒ 60 A

____ 66. The quantity volt is equivalent to which of the following?
ⓐ C/Ω ⓑ J·m ⓒ J/C

____ 67. The unit for rate of energy transformation, the watt, in an electric circuit is equivalent to which of the following?
ⓐ A·Ω ⓑ V·A ⓒ V/s

____ 68. If a 500-W heater carries a current of 4.00 A, what is the voltage across the ends of the heating element?
ⓐ 250 V ⓑ 125 V ⓒ 0.008 V

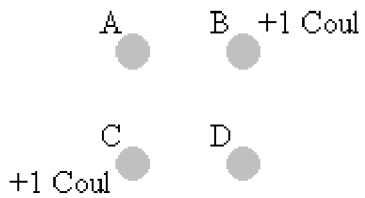
____ 69. If a 500-W heater carries a current of 4.00 A, what is the resistance of the heating element?
ⓐ 11.2 Ω ⓑ 85.7 Ω ⓒ 31.3 Ω

____ 70. If a lamp has a resistance of 120 Ω when it operates at 100 W, what current does it carry?
ⓐ 0.91 A ⓑ 1.2 A ⓒ 2.10 A

____ 71. An electric toaster requires 1 100 W at 110 V. What is the resistance of the heating coil?
ⓐ 13.0 Ω ⓑ 11.0 Ω ⓒ 9.0 Ω

____ 72. A light bulb has resistance of 240 Ω when operating at 120 V. Find the current in the light bulb.
ⓐ 0.20 A ⓑ 0.50 A ⓒ 0.30 A

____ 73. Four charges are at the corners of a square, with B and C on oppositecorners. Charges A and D, on the other two corners, have equal charge, while both B and C have a charge of +1.0 C. What is the charge on A so that the force on B is zero?



ⓐ –0.35 C ⓑ –0.50 C ⓒ –1.0 C

____ 74. Charge A and charge B are 3.00 m apart, and charge A is +2.00 C and charge B is +3.00 C. Charge C is located between them at a certain point and the force on charge C is zero. How far from charge A is charge C?
ⓐ 1.80 m ⓑ 0.555 m ⓒ 1.35 m

____ 75. Two equal charges, each Q, are separated by some distance. What third charge would need to be placed half way between the two charges so that the net force on each charge would be zero?
ⓐ –Q/16 ⓑ –Q/4 ⓒ –Q/2

____ 76. A 6.0 μC charge is placed at the origin and a second charge is placed on the x-axis at x = 0.30 m. If the resulting force on the second charge is 5.4 N in the positive x-direction, what is the value of its charge?
ⓐ -9.0 nC ⓑ -9.0 μC ⓒ 9.0 μC

____ 77. A 6.00 μC charge is placed at the origin and a second charge is placed on the x-axis at x = 0.300 m. If the resulting force on the second charge is 6.40 N in the positive x-direction, what is the force on the charge at the origin?

ⓐ 6.40 N in the negative x-direction ⓑ not able to be determined until the second charge is known ⓒ 0 N

____ 78. Two point charges each have a value of 30.0 mC and are separated by a distance of 4.00 cm. What is the electric field midway between the two charges? ($k_e = 8.99 \times 10^9$ N·m^2/C^2)

ⓐ 10.1×10^7 N/C ⓑ 20.3×10^7 N/C ⓒ zero

____ 79. Two point charges are separated by 10.0 cm and have charges of +2.00 μC and −2.00 μC, respectively. What is the electric field at a point midway between the two charges? ($k_e = 8.99 \times 10^9$ N·m^2/C^2)

ⓐ 28.8×10^6 N/C ⓑ 3.59×10^6 N/C ⓒ 14.4×10^6 N/C

____ 80. Electric field is dimensionally equivalent to which of the following?

ⓐ N/C ⓑ N/C^2 ⓒ N·m/C

____ 81. An electron with a charge value of 1.6×10^{-19} C is moving in the presence of an electric field of 400 N/C. What force does the electron experience?

ⓐ 6.4×10^{-17} N ⓑ 4.9×10^{-17} N ⓒ 2.3×10^{-22} N

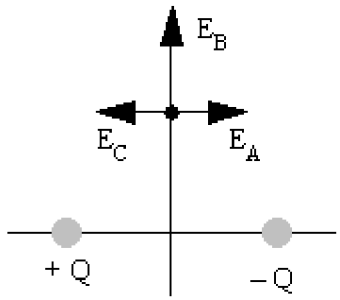
____ 82. Charges of 4.0 μC and −6.0 μC are placed at two corners of an equilateral triangle with sides of 0.10 m. At the third corner, what is the electric field magnitude created by these two charges? ($k_e = 8.99 \times 10^9$ N·m^2/C^2)

ⓐ 1.6×10^6 N/C ⓑ 4.8×10^6 N/C ⓒ 4.5×10^6 N/C

____ 83. Two point charges are placed along a horizontal axis with the following values and positions: +3.0 μC at x = 0 cm and −7.0 μC at x = 20 cm. At what point along the x axis is the electric field zero?

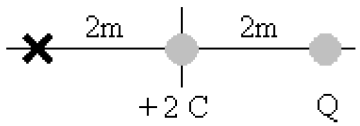
ⓐ −44 cm ⓑ −38 cm ⓒ −69 cm

____ 84. Two charges, +Q and −Q, are located two meters apart and there is a point along the line that is equidistant from the two charges as indicated. Which vector best represents the direction of the electric field at that point?



ⓐ The electric field at that point is zero. ⓑ Vector E_C ⓒ Vector E_A

____ 85. A charge of +2 C is at the origin. When charge Q is placed at 2 m along the positive x axis, the electric field at 2 m along the negative x axis becomes zero. What is the value of Q?



ⓐ −3 C ⓑ −8 C ⓒ −6 C

____ 86. An electron with a speed of 2.0×10^6 m/s moves into a uniform electric field of 500 N/C that is parallel to the electron's motion. How long does it take to bring the electron to rest? ($m_e = 9.11 \times 10^{-31}$ kg, $e = 1.6 \times 10^{-19}$ C)

ⓐ 3.5×10^{-8} s ⓑ 2.3×10^{-6} s ⓒ 2.3×10^{-8} s

____ 87. The electric field of a point charge has an inverse ____ behavior.

ⓐ r^2 ⓑ $r^{1/2}$ ⓒ r

____ 88. Wire A and Wire B are each carrying the same current. If the diameter of Wire A is twice that of Wire B, how does the drift velocity v_{dA} in Wire A compare to that in Wire B?

ⓐ $v_{dA} = v_{dB}$ ⓑ $v_{dA} = v_{dB}/4$ ⓒ $v_{dA} = 4\, v_{dB}$

____ 89. A nichrome wire has a radius of 0.50 mm and a resistivity of 1.5×10^{-6} Ω·m. What is the resistance per unit length of this wire?

ⓐ 1.6 Ω/m ⓑ 1.9 Ω/m ⓒ 7.4 Ω/m

____ 90. If a 9.0-V battery, with negligible internal resistance, and an 18-Ω resistor are connected in series, what is the amount of electrical energy transformed to heat per coulomb of charge that flows through the circuit?

ⓐ 72 J ⓑ 0.50 J ⓒ 9.0 J

____ 91. A resistor is connected to a battery with negligible internal resistance. If you replace the resistor with one that has twice the resistance, by what factor does the power dissipated in the circuit change?

ⓐ 0.50 ⓑ 4.0 ⓒ 1.0

____ 92. A high-voltage transmission line carries 1 000 A at 700 000 V. What is the power carried by the line?

ⓐ 700 MW ⓑ 70 MW ⓒ 35 MW

____ 93. Three 4 Ω resistors are connected in series. What is their total resistance in Ω?

ⓐ 2 ⓒ 24
ⓑ 12

CAPACITENCE - ELECTRIC FORCE - ELECTRIC FIELD - CURRENT - RESISTORS
Answer Section

MULTIPLE CHOICE

1. ANS: A PTS: 1
2. ANS: A PTS: 1
3. ANS: C PTS: 1
4. ANS: B PTS: 1
5. ANS: B PTS: 1
6. ANS: A PTS: 1
7. ANS: B PTS: 1
8. ANS: C PTS: 1
9. ANS: C PTS: 1
10. ANS: C PTS: 1
11. ANS: A PTS: 1
12. ANS: B PTS: 1
13. ANS: C PTS: 1
14. ANS: A PTS: 1
15. ANS: B PTS: 1
16. ANS: B PTS: 1
17. ANS: C PTS: 1
18. ANS: A PTS: 1
19. ANS: C PTS: 1
20. ANS: C PTS: 1
21. ANS: C PTS: 1
22. ANS: C PTS: 1
23. ANS: A PTS: 1
24. ANS: C PTS: 1
25. ANS: A PTS: 1
26. ANS: B PTS: 1
27. ANS: C PTS: 1
28. ANS: B PTS: 1
29. ANS: B PTS: 1
30. ANS: A PTS: 1
31. ANS: A PTS: 1
32. ANS: C PTS: 1
33. ANS: A PTS: 1
34. ANS: A PTS: 1
35. ANS: B PTS: 1
36. ANS: B PTS: 1
37. ANS: B PTS: 1
38. ANS: B PTS: 1
39. ANS: B PTS: 1

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40. ANS: A PTS: 1
41. ANS: C PTS: 1
42. ANS: A PTS: 1
43. ANS: C PTS: 1
44. ANS: A PTS: 1
45. ANS: A PTS: 1
46. ANS: C PTS: 1
47. ANS: C PTS: 1
48. ANS: C PTS: 1
49. ANS: B PTS: 1
50. ANS: A PTS: 1
51. ANS: C PTS: 1
52. ANS: C PTS: 1
53. ANS: A PTS: 1
54. ANS: A PTS: 1
55. ANS: A PTS: 1
56. ANS: B PTS: 1
57. ANS: B PTS: 1
58. ANS: B PTS: 1
59. ANS: C PTS: 1
60. ANS: C PTS: 1
61. ANS: B PTS: 1 DIF: 1 TOP: 17.4 Resistance and Ohm's Law
62. ANS: B PTS: 1 DIF: 1 TOP: 17.4 Resistance and Ohm's Law
63. ANS: A PTS: 1 DIF: 1 TOP: 17.4 Resistance and Ohm's Law
64. ANS: A PTS: 1 DIF: 2 TOP: 17.5 Resistivity
65. ANS: B PTS: 1 DIF: 1 TOP: 17.8 Electrical Energy and Power
66. ANS: C PTS: 1 DIF: 1 TOP: 17.8 Electrical Energy and Power
67. ANS: B PTS: 1 DIF: 1 TOP: 17.8 Electrical Energy and Power
68. ANS: B PTS: 1 DIF: 1 TOP: 17.8 Electrical Energy and Power
69. ANS: C PTS: 1 DIF: 2 TOP: 17.8 Electrical Energy and Power
70. ANS: A PTS: 1 DIF: 2 TOP: 17.8 Electrical Energy and Power
71. ANS: B PTS: 1 DIF: 2 TOP: 17.8 Electrical Energy and Power
72. ANS: B PTS: 1 DIF: 1 TOP: 17.8 Electrical Energy and Power
73. ANS: A PTS: 1 DIF: 3 TOP: 15.3 Coulomb's Law
74. ANS: C PTS: 1 DIF: 3 TOP: 15.3 Coulomb's Law
75. ANS: B PTS: 1 DIF: 2 TOP: 15.3 Coulomb's Law
76. ANS: C PTS: 1 DIF: 2 TOP: 15.3 Coulomb's Law

77. ANS: A PTS: 1 DIF: 2 TOP: 15.3 Coulomb's Law
78. ANS: C PTS: 1 DIF: 2 TOP: 15.4 The Electric Field
79. ANS: C PTS: 1 DIF: 2 TOP: 15.4 The Electric Field
80. ANS: A PTS: 1 DIF: 1 TOP: 15.4 The Electric Field
81. ANS: A PTS: 1 DIF: 2 TOP: 15.4 The Electric Field
82. ANS: B PTS: 1 DIF: 3 TOP: 15.4 The Electric Field
83. ANS: B PTS: 1 DIF: 3 TOP: 15.4 The Electric Field
84. ANS: C PTS: 1 DIF: 2 TOP: 15.4 The Electric Field
85. ANS: B PTS: 1 DIF: 2 TOP: 15.4 The Electric Field
86. ANS: C PTS: 1 DIF: 2 TOP: 15.4 The Electric Field
87. ANS: A PTS: 1 DIF: 1 TOP: 15.4 The Electric Field
88. ANS: B PTS: 1 DIF: 2
TOP: 17.2 A Microscopic View: Current and Drift Speed
89. ANS: B PTS: 1 DIF: 2 TOP: 17.5 Resistivity
90. ANS: C PTS: 1 DIF: 2 TOP: 17.8 Electrical Energy and Power
91. ANS: A PTS: 1 DIF: 2 TOP: 17.8 Electrical Energy and Power
92. ANS: A PTS: 1 DIF: 2 TOP: 17.8 Electrical Energy and Power
93. ANS: C PTS: 1