

1. Which one of the following is **NOT** correct about writing experimental result?

- A. Experimental results should be recorded in a clear and organized manner.
- B. Experimental results are usually recorded in tabular form.
- C. Column heading must be labeled with a quantity and unit.
- D. The tabular form may not necessarily include all collected raw data.

2. A bulb is connected as a part of circuit. The following data is collected.

$$\text{Electric current} = 3.6 \text{ A} \pm 0.1 \text{ A}$$

$$\text{Potential difference} = 12.4 \text{ V} \pm 0.1 \text{ V}$$

What is the resistance of the circuit?

- A. $3.4 \Omega \pm 4.0\%$.
- B. $3.8 \Omega \pm 4.0\%$.
- C. $3.4 \Omega \pm 3.6\%$.
- D. $3.8 \Omega \pm 3.6\%$.

3. Which of the following is **NOT** correct about vectors?

- A. The resultant of a single vector is the vector itself.
- B. Two vectors are equal when they have the same magnitude, direction and units.
- C. The direction of the vectors is shown by the length of arrow.
- D. If the resultant of two vectors is zero, then either the vectors are zero or they are equal and opposite in direction.

4. Two vectors are $\vec{A} = (-3, 4)$ and $\vec{B} = (6, 8)$. What is the scalar projection of $\vec{A}$ on to $\vec{B}$?

- A. 1.4 in the direction of $\vec{B}$.
- B. 11.7 in the direction of $\vec{B}$.
- C. 1.4 in the direction of $\vec{A}$.
- D. 11.7 in the direction of $\vec{A}$.

5. What is the angle between vector $\vec{A} = (3.5, 0)$ units and $\vec{B} = (0, 1.5)$ units?

- A. 90°
- B. 60° .
- C. 30° .
- D. 37° .

6. Which of the following is correct about the acceleration of an object sliding down the inclined plane?

- A. It depends on the mass of the object.
- B. It is independent on the mass of the object.
- C. It depends on both the angle of inclined plane and the mass of the object.
- D. It depends on both the mass of the object and acceleration due to gravity.

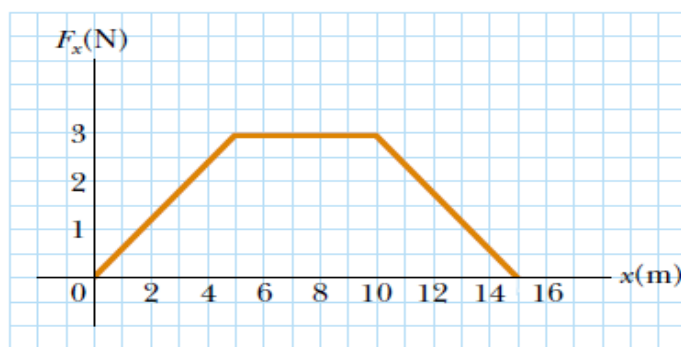
7. A stone is dropped in to water from a bridge of 80 m. Another stone is thrown vertically down one second after the first stone is dropped. Both stone strike the water at the same time. What is the initial speed of the second stone?

- A. $\frac{37}{3}$ m/s.
- B. $\frac{35}{3}$ m/s
- C. $\frac{32}{3}$ m/s.
- D. $\frac{38}{3}$ m/s

14. A 2 kg object uniformly accelerates from rest to the speed of 8 m/s in 4 sec. What average power is delivered by the object in 3 sec?

- A. 16 W. B. 12 W. C. 21 W. D. 8 W.

15. A particle is subject to force F_x that varies with position as in figure shown below. What is work done by the force on the particle as it moves $x = 0$ m to $x = 10$ m?



A. 15J.

B. 30J

C. 22.5J

D. 32.5J

16. Which of the following statement is correct?

- A. If an object is rolling down the inclined plane, the frictional force between the object and the plane is zero.
- B. If an object is rolling down the inclined plane, the energy of the object at the bottom of the plane is only rotational kinetic energy.
- C. If an object is rolling down the inclined plane, there is frictional force between the object and the plane.
- D. If an object is rolling down the inclined plane, the energy of the object at the bottom of the plane is only rotational kinetic energy.

17. A 10 kg wheel rotates with an angular speed of 12 rad/s. If the rotational kinetic energy is 720 J, what is the radius of gyration?

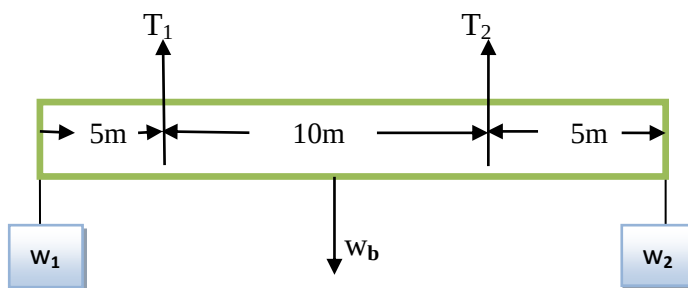
- A. 1 m. B. 0.5 m. C. 1.5 m D. 2 m.

18. An 8 kg particle moves in the xy-plane with a velocity of 72 km/hr at 37° above the positive x-axis. What is the angular momentum, when its position vector is $\mathbf{r} = (15\hat{i} + -8\hat{j})$

- A. $2464 \text{ kg m}^2/\text{s}\hat{k}$. C. $1024 \text{ kg m}^2/\text{s}\hat{k}$
- B. $246.4 \text{ kg m}^2/\text{s}\hat{k}$. D. $24.6 \text{ kg m}^2/\text{s}\hat{k}$.

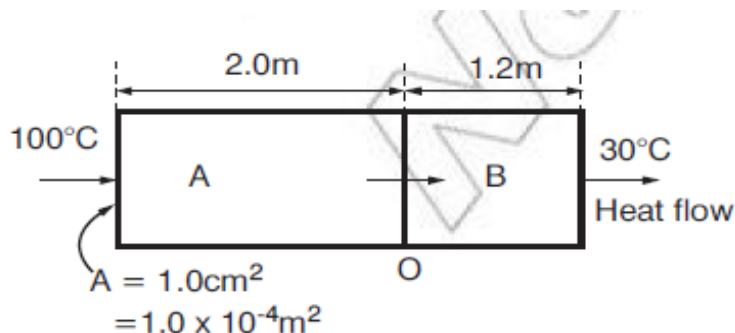
19. The two vertical ropes support a uniform 50 N planks and weight as show below. If the tension in the first rope is 80 N and $W_2 = 100\text{N}$. What are the tension in the second rope and W_1 ?

- A. $T_2 = 70\text{ N}$, $W_1 = 140\text{ N}$.
B. $T_2 = 140\text{ N}$, $W_1 = 140\text{ N}$.
C. $T_2 = 70\text{ N}$, $W_1 = 70\text{ N}$.
D. $T_2 = 140\text{ N}$, $W_1 = 70\text{ N}$.



20. Which one of the following statements is not correct about a particle that is in equilibrium?
- A. It can have a velocity different from zero.
B. Its velocity can be equal to zero
C. It can be under the action of more than one force.
D. It can have acceleration.
21. Which one of the following statements is correct about Newton's law of cooling?
- A. The velocity of a fluid increases, the pressure exerted by that fluid decreases.
B. The rate of change of temperature of an object is proportional to the difference its own temperature and the temperature of its surroundings.
C. The pressure applied to an enclosed fluid is transmitted to every part of the fluid without reducing in value.
D. The buoyant force on an object wholly or partially immersed in a fluid is equal to the weight of the fluid displaced by the object.
22. The rate flow of water through a horizontal pipe is $2\text{m}^3/\text{min}$. What is the velocity of flow at a point where the area of the pipe is 0.002m^2 ?
- A. 18 m/s. B. 17 m/s. C. 15 m/s. D. 19 m/s
23. A measure of the disruption of intermolecular bonds caused by a surface is called:
- A. Surface tension. C. Surface energy.
B. Capillary action. D. Menciuss.

24. What is the rate flow of heat through the bar of area $1 \times 10^{-4} \text{ m}^2$ as shown in figure below? If the thermal conductivity of A be 450 W/m/k and that for B is 150 W/m/k .



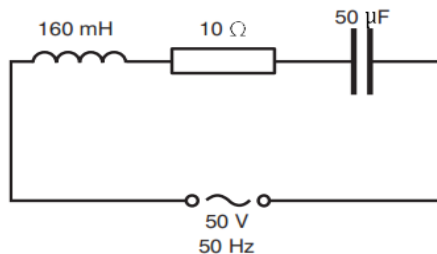
- A. 1.125 W. B. 6.750 W. C. 0.5625 W. D. 0.6750 W.
25. Which of the following is **TRUE** about the assumptions made in the kinetic theory of gases?
- A. The distribution of velocities of particles is uniform.
- B. Collision between particles and between particles and walls are inelastic.
- C. There is an interaction between particles or between particles and the wall.
- D. The volume occupied by the particle is negligible compared to the volume of the gas as a whole.
26. When heating one mole of monoatomic ideal gas at constant volume the heat needed is 300J which causes increase in temperature of 47°C . What temperature increase would there be if the same amount of gas was heated in the same way at constant pressure?
- A. 301 k B. 320 k. C. 192 K. D. 182 k.
27. The first law of thermodynamics takes the form $dU = dQ$. This equation is valid if the process is:-
- A. Isobaric. B. Isochoric. C. Isothermal. D. Adiabatic.
28. One mole of an ideal gas goes an isothermal thermodynamic process at 800 k to reach twice its initial volume. How much work is done by the gas?
- A. 4500 J. B. 4607 J. C. 6400 J. D. 4610 J.
29. A block of mass 200g is attached to a horizontal spring that has a force constant of 3000 N/m . The spring is compressed 4mm and is the released from rest. At what speed will the block pass through the equilibrium position if a constant friction force of 5N retards its motion from the moment it is released?
- A. 2 m/s. B. 4 m/s. C. 0.2 m/s. D. 0.4 m/s.

30. Which of the following is TRUE about wave?
- A. Electromagnetic wave is necessarily required material to be produced and travel through.
 - B. Mechanical wave may not require material to be produced and travel through.
 - C. Mechanical wave does not required material to be produced and travel through.
 - D. Electromagnetic wave may not require material to be produced and travel through
31. An object oscillates with simple harmonic motion along the x-axis. Its position varies with time according to the equation, $X = (5\text{m}) \cos (\pi t + \pi/4)$ where t is in seconds and the angles are in radians, what is the acceleration of the object at any time t?
- A. $5\pi^2 \cos (\pi t + \pi/4) \text{ m/s}^2$.
 - B. $-5\pi^2 \sin (\pi t + \pi/4) \text{ m/s}^2$.
 - C. $5\pi^2 \sin (\pi t + \pi/4) \text{ m/s}^2$
 - D. $-5\pi^2 \cos (\pi t + \pi/4) \text{ m/s}^2$
32. In Young's double slit experiment if the distance between the slits and the screen is halved then what is the fringe width?
- A. Halved.
 - B. Unchanged.
 - C. Zero.
 - D. Doubled.
33. What is the minimum thickness of a soap-bubble ($n = 1.33$) film that results in constructive interference in the reflected light if the film is illuminated with light whose wavelength in free space is $\lambda = 600\text{nm}$?
- A. 338.35nm.
 - B. 112.78nm.
 - C. 563.91nm.
 - D. 789.95nm.
34. Suppose the plates of a parallel plate capacitor are a distance 'd' apart and the area of each is A. The gap between the plates is filled with two different dielectric constant k_1 and k_2 but having equal sizes as shown in figure below. What is the capacitance of the parallel plate capacitor?
- A. $\frac{\epsilon_0 A}{d}(K_1 + K_2)$.
 - B. $\frac{\epsilon_0 A}{2d}(K_1 + K_2)$.
 - C. $\frac{2\epsilon_0 A}{d}\left(\frac{K_1 K_2}{K_1 + K_2}\right)$
 - D. $\frac{\epsilon_0 A}{d}\left(\frac{K_1 K_2}{K_1 + K_2}\right)$

K_2	K_1
d	
35. Which of the following is correct about the electric potential due to charged conducting sphere?
- A. The potential inside of the sphere is the same as the potential at the surface of the sphere.
 - B. The potential outside of the sphere is greater than the potential at the surface of the sphere.
 - C. The potential outside of the sphere is the same as the potential at the surface of the sphere.
 - D. The potential at the surface of the sphere is greater than the potential inside of the sphere.



41. If a copper contains 8×10^{28} free electrons per m^3 . A copper wire of cross-sectional area $1.5 \times 10^{-6} \text{ m}^2$ carries a current of 0.5A, then what is the drift velocity of the free electrons in the wire?
- A. $2.6 \times 10^6 \text{ m/s}$. B. $2.6 \times 10^5 \text{ m/s}$. C. $2.6 \times 10^{-6} \text{ m/s}$. D. $2.6 \times 10^{-5} \text{ m/s}$
42. Which of the following is correct statement?
- A. The electric field is zero inside the charged conductor.
B. If the fields cross the given area, then the flux is zero.
C. The electric field strength is the smallest at sharp corners.
D. All of the above is correct.
43. A proton moving at a speed of $2.4 \times 10^6 \text{ m/s}$ enters a region of uniform magnetic field of magnitude 0.04 T, in a direction perpendicular to the field. What is the acceleration of the proton?
- A. $8.2 \times 10^{12} \text{ m/s}^2$. C. $9.2 \times 10^6 \text{ m/s}^2$
B. $9.2 \times 10^{12} \text{ m/s}^2$. D. $8.2 \times 10^6 \text{ m/s}^2$.
44. The tendency of a material to oppose an applied magnetic field is:-
- A. Magnetism. C. Paramagnetic.
B. Diamagnetism. D. Ferromagnetic
45. For the circuit shown in figure below, what is the value of C needed to make the power in this circuit is ideal?



- A. $0.634 \mu\text{F}$.
B. $0.364 \mu\text{F}$.
C. $6.34 \mu\text{F}$.
D. $3.64 \mu\text{F}$.
46. Among the following which one is **NOT** the factor that determines the magnitude of self and mutual inductance?
- A. Current through the coil. C. Number of turns of the coil.
B. Magnetic energy density. D. Magnetic flux.

