constant	symbol	value
Acceleration due to gravity	g	10 m/s^2
Permittivity of vacuum	ϵ_0	$8.85 \times 10^{-12} \text{F/m}$
Charge of electron	e	$1.6 \times 10^{-19}\text{C}$
Mass of electron	m_e	$9 \times 10^{-31}\text{kg}$
Specific heat capacity of steam	C_{steam}	$2.0\text{J/g}°\text{C}$
Coulomb's constant	k	$9 \times 10^9 \text{ N•m}^2\text{ /C}^2$
Magnetic permeability of free space	μ_o	$4\pi \times 10^{-7} \text{ Tm/A}$
Mass of proton	m_p	$1.67 \times 10^{-27}\text{kg}$
Density of water	ρ	1000 kg/m^3
Universal gravitational constant	G	$6.67 \times 10^{-11} \text{ Nm}^2\text{/kg}^2$
One atmosphere	1atm	101.3 kPa
Specific heat capacity of water	c_w	$4200 \text{ J/kg}°\text{c}$
Specific heat capacity of copper	c_{cu}	$420 \text{ J/kg}°\text{c}$

$$\text{Sin}30^0 = \cos60^0 = 0.5$$
$$\text{Sin}60^0 = \cos30^0 = 0.9$$
$$\text{Sin}37^0 = \cos53^0 = 0.6$$
$$\text{Sin}53^0 = \cos37^0 = 0.8$$

1. What is the scalar projection of vector $\vec{A} = 3\hat{\imath}+\hat{\jmath}+\hat{k}$ along vector $\vec{B} = 2\hat{\imath}+2\hat{\jmath}+\hat{k}$ is?

   A. 2   B. 3   C. 4   D. 7

2. Identify the correct order of the scientific method steps:

   A) Observation,→ Question → Research → Hypothesis → Experiment → Analysis→ Conclusion
   B) Research→ Observation→ Question→ Hypothesis→ Experiment→ Analysis→ Conclusion
   C) Experiment→ Hypothesis→ Research→ Observation→ Question→ Analysis→ Conclusion
   D) Observation,→ Question → Hypothesis→ Research → Experiment → Analysis→ Conclusion

3. Two blocks $m_1 = 4$ kg and $m_2 = 8$ kg of identical materials are connected by a light string on a level surface as figure shown below ,the tension in the connecting string when the string attached to m_1 is pulled to the right by a 36 N force. What is the acceleration of the masses system if the coefficient of kinetic friction between each of the blocks and the level surface is 0.25?
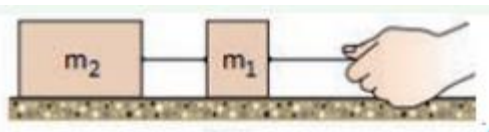

   A) 0.2 m/s²   C) 0.4 m/s²
   B) 0.3 m/s²   D) 0.5 m/s²

4. An object initially rotates at a speed of 6 rad/s along a circular path uniformly angular accelerated After 4 seconds, it attains a speed of 30 rad/s. What is the distance travelled during the 5th second of its motion?

   A) 9 rad   C) 108 rad
   B) 33 rad   D) 85 rad

5. Under what condition the average acceleration is equal to the instantaneous acceleration of the body?

   A. In uniform rectilinear motion

   B. in uniformly accelerated rectilinear motion

   C. In non-uniformly accelerated rectilinear motion

   D. In 2-dimensional motion

6. A particle moves along the x-axis is given by x (t) = ($2t^3 + 6t^2 +6t +1$) m where time t, t ≥ 0 and is measured in seconds. What is the time when the particle's velocity and acceleration are equal at instant of time?

   A) $\sqrt{3}$ B) 1sec   C) 2 sec   D) 3sec

7. A block of mass is pulled along the right a horizontal surface by a constant force that makes an angle of θ above the horizontal. The coefficient of sliding friction b/n the block and the surface is μ.if the block moves with a constant speed what is the magnitude of the applied force required to slide the block on the surface is?

   A) $\dfrac{\mu mg}{\cos\theta + \mu \sin\theta}$ B) $\dfrac{\mu mg}{\cos\theta - \mu \sin\theta}$ C) $\dfrac{\mu mg}{\cos\theta + \sin\theta}$ D) $\dfrac{\mu mg}{\cos\theta - \sin\theta}$ E) None

8. A 2 kg ball that was moving along a smooth horizontal floor at 2.5 m/s toward the east hits a hard vertical wall surface and rebounds with a speed of 2.3 m/s along the same line. If the time of Interaction between the ball and the wall is 0.20 s, what is the net force exerted on the ball by the surface?

   A. 12 N towards the East   C. 36 N towards the West

   B. 24 N towards the East   D. 48 N towards the West

9. If the voltage across the plates of a parallel-plate capacitor is 50 V and the plate separation is 0.02 m, what is the electric field between the plates?

   A) 2.5 V/m   C) 250 V/m

   B) 25 V/m   D) 2500 V

10. A 2 kg block sliding over a smooth horizontal surface with a constant speed of 8 m/s hits a horizontal spring Whose one end is fixed. If the maximum compression of the spring just before the block comes to rest is 20 cm, what is the spring constant of the spring?


   A. 800 N/m   B. 1600 N/m   C. 2400 N/m   D. 3200 N/m

11. A 10 kg block is released from rest at the top of an inclined plane 10 m in length makes an angle of 30^0 with the horizontal. The block reaches the bottom of the plane. What is the speed of the block at the bottom of the inclined plane if the inclined plane is rough and the coefficient of kinetic friction between the block and the surface is 0.2.? (Use g = 9.8 m/s^2)
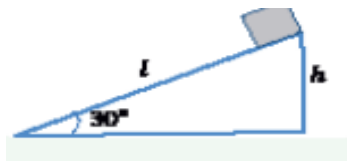
   A) 10 m/s   C) 8m/s

   B) 6 m/s   D) 10 m/s

12. Which of the following is **NOT** true when a dielectric material is inserted in the gap between the plates of an isolated capacitor (disconnected from the source)?
   A) The capacitance of the capacitor increases
   B) The potential difference between the plates decreases
   C) The electric field between the plates increases
   D) The charge stored on the capacitor plates remains constant

13. What fundamental law of physics underlies Kirchhoff's junction rule?
   A. Conservation of energy   C. Conservation of charge
   B. Conservation of momentum   D. Conservation of mass

14. For the network of capacitors shown in the figure below, what are the charge stored on capacitor $4\mu F$, and the voltage across $4\mu F$ capacitor respectively?
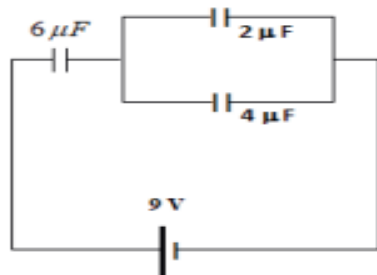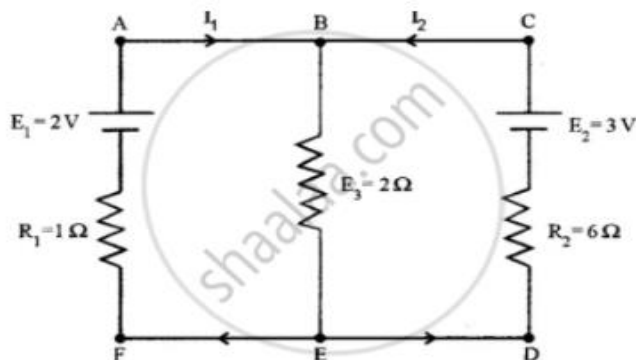

   A) $9\mu C$, 4.5V   B) $18 \mu C$, 4.5 V   C) $27\mu C$, 4.5 V   D) $18 \mu C$, 9 V

15. The speed of sound in water is approximately 1500 meters per second. A sound wave is sent to the bottom of the sea from a **SONAR** device and returns to the device 4 seconds later. What is the depth of the sea at this location?
   A) 6000 m   C) 3000 m
   B) 2000 m   D) 400m

16. In a certain circuit, a battery has an emf of 9V and an internal resistance of 1Ω. If it is connected to a circuit of 2Ω resistance in series, what potential difference will be across the battery's terminal?
   A) 1V   C) 6V
   B) 3V   D) 9V

3

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17. Consider two objects of masses, $m_1 = 4$ kg moves with a velocity of 3 m/s to the right and $m_2 = 6$ kg moving along the same line in opposite direction with velocity of 2 m/s .If the masses make an elastic collision, what are the velocities of each of the masses after collision respectively?

   A) $v_1 = -3$ m/s , $v_2 = -2$ m/s   C) $v_1 = 2$ m/s , $v_2 = -3$ m/s

   B) $v_1 = -3$ m/s , $v_2 = 2$ m/s   D) $v_1 = -2$ m/s , $v_2 = 3$ m/s

18. Two charges $Q_1 = - 4 \times 10^{-9}$ C and $Q_2 = 6 \times 10^{-9}$ C are separated in air at a distance of 2cm. how much Electrostatic potential is produced by the two charges at mid distance between them?

   A) 1.8kV   C) 1.2kV

   B) 9kV   D) 18k

19. A Wheatstone bridge circuit is shown on the diagram 5 below and the value of $R_1 = 3\Omega$, $R_2 = 5\Omega$ and $R_3 = 6\Omega$ are given to limit the current in the galvanometer. What is the value of R_x to balance the bridge?
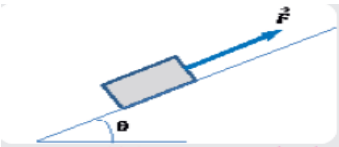

   A) 2.5Ω B) 10Ω C) 3.6Ω D) 14Ω
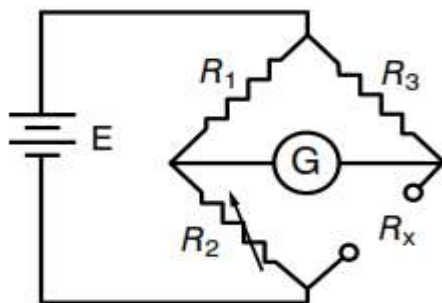
20. Which of the following statements is **FALSE** about the electric field lines?

   A. Electric field lines emerge from positive charge and terminate to negative charge.

   B. Electrostatic field lines form closed loops.

   C. Electric field lines can never cross each other.

   D. Electric field lines show how a proton would move in an electric field

21. In the circuit shown in the figure below E_1 and E_1 are two cells having 2v and 3 v respectively and neglecting internal resistance. Applying Kirchhoff's law of electrical networks, determine the values of currents the currents I_1 and I_2 in the circuit shown below


   A) $I_1 = 0.5A$, $I_2 = 0.25$ C) $I_1 = 5A$, $I_2 = 0.25$

   B) $I_1 = 0.25A$, $I_2 = 0.5$ D) $I_1 = 0.5A$, $I_2 = 5$

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22. A galvanometer with 10 Ω resistance and a full-scale deflection current of 25 mA is to be used as a voltmeter for measuring 5 V. What is the required series resistance?

A) 190 Ω   B) 180 Ω   C) 200 Ω   D) 150 Ω

23. What condition must be satisfied for a particle in an equilibrium?

A) The net torque acting on the particle must be zero.
B) The net force acting on the particle must be zero
C) The net external force and the net external torque acting on the body must be zero
D) The particle must be moving with constant velocity in a straight line

24. Which one of the following is **NOT** correct about transverse wave?

A) The maximum displacement either from equilibrium position is called amplitude
B) The time taken for one complete wave pass a given point is called the period of the wave
C) The distance between two identical points on the adjacent wave is called wavelength
D) The number of complete waves that passes a given point per time is called the period of the wave

25. A block of mass 10kg is pulled up a rough inclined plane with a force of 100N parallel to the inclined Plane that makes an angle of 37^0 with the An instant when the forced pulled up the block has a speed of 2m/s. If the coefficient of kinetic friction is 0.4, and the block is pulled up 5m long. What is the change in the kinetic energy?

A) 20J   B) 30J   C) 40J   D) 45.5J   E) None

26. Three particles of mass 2kg, 5kg, and 3kg are situated at points with position vectors , $\vec{r_1} = (t^2 i + 4tj – 7k)$, $\vec{r_2} = (3t^2 i – 2tj +k)$ m and, $\vec{r_3} = (t^2 i – 6tj +13k)$ m respectively. What are the position vector of the center of mass and the velocity vector of the center of mass in m/s at t= 1sec respectively

A) 3i−2j+k, 6i −2j
B) 4i −4j + 6k, 4i−2j

C) 2i −2j +3k, 4i −2j
D) 2i −4j+3k, 4i + 2j

27. Which one of the following **NOT** correct about the three classes of lever?

A) For the first class lever, velocity ratio could have a value greater then, less than or equal to 1
B) For the second class lever, the velocity ratio is always greater than 1
C) For the third class lever, the velocity ratio is always less than 1
D) For second class lever, the velocity ratio is always less than 1

28. A person walks 10 m, 37^0 North of West and then 10m in the direction 37^0 South of East. Find the magnitude and the direction of his displacement

A. $2\sqrt{2}$ m, due North east   C. $2\sqrt{2}$ m, due South west

B. Zero   D. $\sqrt{2}$ m, due South west

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29. Which of the following statements best describes impulse in physics? Impulse is
   A) The product of an object's mass and its velocity.
   B) The change in momentum of an object when a force is applied over time
   C) The total energy transferred to an object during a collision.
   D) The force acting on an object divided by the time duration of the force

30. Which form of heat transfer is responsible for the warming of the Earth's surface by the sun?
   A) Conduction   C) Radiation
   B) Convection   D) Evaporation

31. What is the maximum speed with which a car can be driven safely along a curved road of a radius of 30m and banked at an angle of 37° with the horizontal?
   A) 13 m/s   C) 15 m/s
   B) 12 m/s   D) 18 m/s

32. A ball is thrown vertically upward with a velocity of 20 m/s from the top of a building. The height of the point from where the ball is thrown is 25 m from the ground. What are the total time taken for a ball to hit the ground and the velocity with which the ball hits the ground respectively?
   A) 2sec and 20 m/s   C) 5sec and 30 m/s
   B) 3 sec and 30 m/s   D) 4 sec and 35 m/s

33. An unknown vector $\vec{A}$ is added to vector $\vec{B}$ = (-4i + 5j) units and the resultant vector $\vec{C}$ has x and y components of each -1 and 1 units, respectively What is the unit vector in the direction of unknown vector $\vec{A}$ of the vector?
   A) 3i – 4j   C) $\frac{3}{5}i + \frac{4}{5}j$
   B) $\frac{3}{5}i - \frac{4}{5}j$ D) $\frac{4}{5}i - \frac{3}{3}j$

34. Which of the following displacement-time graphs represents a uniform motion?
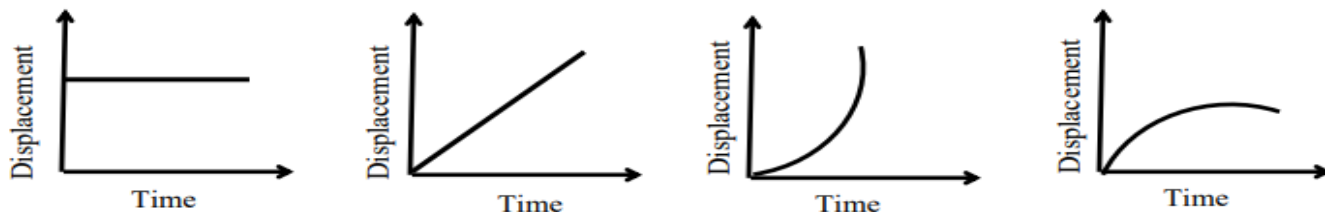
35. Which one of the following is true about order of the four fundamental forces in nature?
   A   Strong Nuclear Force: This is the strongest force in nature short range force and is responsible for holding the nuclei of atoms together.
   B) Electromagnetic Force: This force acts between charged particles and is responsible for electricity, magnetism, and light.
   C) Weak Nuclear Force: This force is responsible for radioactive decay and certain nuclear reactions.
   D) Gravitational Force: This is the weakest force in nature but has an infinite range and is responsible for the attraction between masses.
   D) None of the above

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36. A body moving with uniform acceleration covers 65 cm in the 5th second and 105 cm in the 9th second. What are the initial velocity (u) and the acceleration (a) of the body, respectively?
   A) u = 5 cm/s , a = 15 cm/s²
   B) u = 10 cm/s, a=15 cm/s²
   C) u = 20 cm/s, a=10 cm/s²
   D) u = 15 cm/s, a=20 cm/s²

37. A 4kg object explodes and breaks up in to three pieces. One piece has a mass of 1kg and has a velocity (3i + 2 j) m/s. A second piece has a mass of 2kg and has a velocity of (5i – 2j) m/s. the velocity of the third piece in m/s will be
   A) 10i - 4j
   B) 13i + 2j
   C) -13i + 2j
   D) 7i + 2j

38. A 2-kg object is suspended by a string from a celling of an elevator moving vertically upward with an acceleration of 4 m/s²,what is the tension in the string?
   A) 12N
   B) 20 N
   C) 28 N
   D) 8N

39. A 100g metal has a specific heat of $c_m = 0.3$ cal/g°c and is at a temperature of 100°C. It is added to 150g of water with a specific heat of $c_w = 1$ cal/g°c at 40°C. Assuming no heat loss to the environment, what is the final equilibrium temperature of the water and metal?
   A. 30°C
   B. 40°C
   C. 50°C
   D. 60°C

40. In charging by induction, if a negatively charged rod is brought near a neutral metallic conductor sphere and the sphere is grounded, what charge will the sphere have once the ground connected is removed and the rod is taken away?
   A) Positively charged
   B) Negatively charged
   C) Neutral
   D) Both positively and negatively charged

41. When a substance changes state from gas to liquids state, which one of the following occurs,
   A. Heat is absorbed by the substance
   B. Heat is given off by the substance
   C. The temperature of the substance increases.
   D. The temperature of the substance decreases

42. A circular plane of aluminum sheet has a cross-sectional area of $400 cm^2$ at a temperature of $0^0 c$? What is the area of the plate when its temperature raised to 100°C (take the linear coefficient of $α = 2.3 \times 10^{-5} /^0 c$)
   A. 400.9 cm²
   B. 401.4 cm²
   C. 401.8 cm²
   D. 398.2 cm²

43. The speed of sound in air at a place where a temperature is 0^0 c is 331m/s. what is its speed when temperature rises to $30^0 C$?
   A. 331m/s
   B. 349m/s
   C. 346m/s
   D. 361m/s

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44. A glass flask whose volume is exactly 1000 cm³ at 0⁰c is totally filled with 1000 cm³ of mercury at this temperature. When flask and mercury are heated to 100⁰C, 15.2 cm³ of mercury overflow. If the coefficient of volume expansion of mercury is 1.82 x 10⁻⁴ / ⁰c, what should be the coefficient of volume expansion of the glass?

   A. 1.5 x 10⁻⁵ /⁰c.   C. 1.82 x 10⁻⁴ /⁰c
   B. 3.00 x 10⁻⁵ /⁰c.   D. 1.00 x 10⁻⁵ /⁰c

45. A 1000 W electric heater is used to heat 1000g of water from 20°C to 80°C. If the specific heat capacity of water is 4.18 J/g°c, how long will it take to heat the water? (Assume no heat loss)

   A. 251 seconds   C. 350 seconds
   B. 300 seconds   D. 200 seconds

46. Which of the following statement is **NOT** true about equipotential surface?

   A. Equipotential lines are always perpendicular to electric field lines
   B. No work is needed to move a charge along an equipotential line.
   C. Equipotential lines of a uniform field are parallel.
   D. Two equipotential surfaces can intersect each other
   E. Equipotential surfaces are the surface where every point on the surface has the same electric potential.

47. A big post weighing 50N is hanging from a vertical cable tied to two other cables that are fastened to a support as shown in the Figure below. The upper cables make angles of 37^0 and 53^0 with the horizontal.
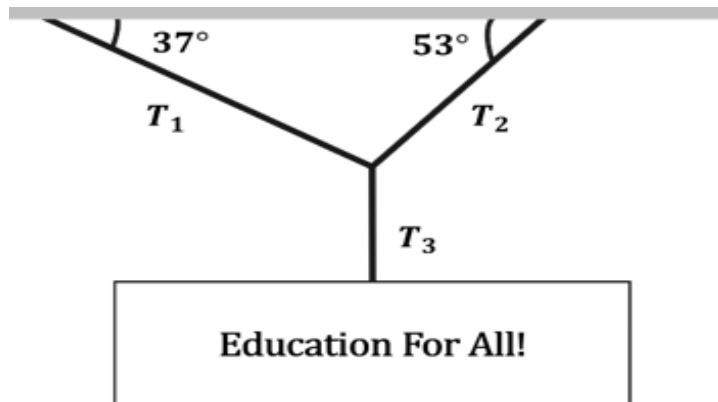
   Find the tension in each of the three cables
   A. $T_1 = 40N, T_2 = 50N, T_3 = 20N$ C. $T_1 = 40N, T_2 = 50N, T_3 = 30N$
   B. $T_1 = 30N, T_2 = 40N, T_3 = 50N$ D. $T_1 = 40N, T_2 = 30N, T_3 = 50N$

48. Which physical quantity remain a constant during a change of state?
   A. Volume   C. Temperature
   B. Heat energy   D. density

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49. There is a current flow in the wire of 10^{-5} m^2 of cross-sectional area with the drift velocity of 2.5 x10^{-4} m/s. If the number of free electrons per unit volume is 10^{29} .What is the current density of the electron flow in the wire?

A. 4×10^6A/m^2 C. 4×10^5 A/m^2

B. 2×10^5 A/m^2 D. 5×10^5 A/m^2

50. A simple machine has an efficiency of 75% and M.A of 9. If an effort applied to the machine to push the weighs of an object of 900N up the plane, then which of the following is **NOT** true about the machine?

A. V.R of the machine is 12   C. 25% of energy lost due to friction

B. The magnitude of the effort applied is 100N   D. The machine used as speed multiplier

51. The figure shown below descries the velocity time graph of an object moving in one dimension due east. What is the total displacement moved by the object?

(A) 240 m
(B) 40 m
(C) 160 m
(D) 170 m

52. The particular temperature and pressure at which the solid, liquid, and gaseous phases of a given substances are all equilibrium with another is known as:

A. Triple point   C. Heat capacity

B. Phase change   D. Critical point

53. Consider a gas that is being heated and compressed. There is a heat flow into the gas of 500 J, from the surrounding and 200 J of work is done on the gas by compressing it. What is the change in the internal energy of the gas?

A) Internal energy decreases by 700 J   C) Internal energy increases by 300J

B) Internal energy increases by 700 J   D) Internal energy decreases by 300 J

54. What is the definition of specific heat capacity?

A. The amount of heat required to change the temperature of 1 kg of a substance by 1°C.
B. The amount of heat required to change the phase of 1 kg of a substance.
C. The amount of heat required to change the temperature of a substance by 1°C.
D. The amount of heat required to change the phase of a substance.

55 .What is the heat required to raise the temperature from 10 g of ice at -10^0c (c_{ice} = 2.1 J/g^{0}c, latent heat of fusion, L_f = 334J/g) completely to steam at 100^0c? (c_{water} = 4.18J/g^{0}c, latent heat of vaporization, L_v = 2260J/g)

A) 3340J   C) 22600J

B) 4180J   D) 30330J

56. What is the total heat energy required to convert 40g of water (c_w = 4.2J/g°C) at 25^0c to steam at 125^0c?
    (Specific heat capacity of steam C_{steam} = 2.0J/g^{0}c, latent heat of vaporization L_v = 2268J/g)
    A. 12600J   D. 90720J
    B. 2000J   D. 105320J

57. A physics student wants to investigate Ohms law using an Ammeter (A) and a voltmeter (V) to measure current through and potential difference across a resistor R. They employs a rheostat to vary potential difference across the resistor. Which of the following material must be placed at letter D and E respectively to make correct set up of the circuit to perform the experiment?

    (A) Voltmeter, Ammeter
    (B) Ammeter, Voltmeter
    (C) Potentiometer, Galvanometer
    (D) Voltmeter, Galvanometer
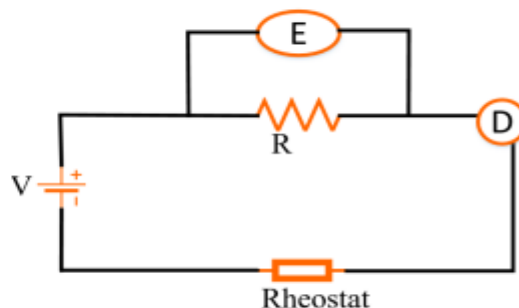
58. Which of the following statements is true about latent heat of fusion?
    A. It is the heat required to change a solid into liquid at its melting point without changing its temperature
    B. It is the heat required to change a liquid into gas at its boiling point without changing its temperature
    C. It is the heat required to raise the temperature of a solid by 1°C
    D. It is the heat required to raise the temperature of a liquid by 1°C

59. Which one of the following statement is correct about propagation of waves?
    A. Transverse wave occurs when the vibrations of the particles are parallel to the direction of the propagation of the wave.
    B. Longitudinal wave occurs when the vibrations of the particles are perpendicular to the direction of the propagation of the wave.
    C. Transverse wave occurs when the vibrations of the particles are perpendicular to the direction of the propagation of the wave.
    D. Longitudinal wave consists of series of crest and through, whereas transverse wave consist series of compressions and rarefactions.

60. What is the electric flux through the square with sides 20cm by 20cm lies in the x-y plane for the electric field vector $\vec{E}$ = (30i + 20j + 50k) N/C?
    A) 1.2 Nm^2/C   C) 2 Nm^2/C
    B) 0.8 Nm^2/C   D) 0.2 Nm^2/C

61. A canonical pendulum is constructed by attaching a mass to a string of length 2 meters. The mass is set in motion in a horizontal circular path about the vertical axis. If the angle the string makes with the vertical axis is 37^0, what are the angular speed and linear speed of the pendulum respectively?
    A. ω = 1.5 rad/s, v = 3 m/s   C. ω = 2.5 rad/s, v = 5 m/s
    B. ω = 2.0 rad/s, v = 4 m/s   D. ω = 2.5 rad/s, v= 3 m/s

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WU SPECIAL BOARDING SECONDARY SCHOOL PHYSICS MODLE -2 EXAM FOR GRADE 12TH IN 2017E.C

Physics Answer Sheet

Name_____Grade & Section_____Roll No_____

1. _____	2. _____	3. _____	4. _____	5. _____	6. _____ _
7. _____	8. _____	9. _____	10. _____	11. _____	12. _____
13. _____	14. _____	15. _____	16. _____	17. _____	18. _____
19. _____	20. _____	21. _____	22. _____	23. _____	24. _____
25. _____	26. _____	27. _____	28. _____	29. _____	30. _____
31. _____	32. _____	33. _____	34. _____	35. _____	36. _____
37. _____	38. _____	39. _____	40. _____	41. _____	42. _____
43. _____	44. _____	45. _____	46. _____	47. _____	48. _____
49. _____	50. _____	51. _____	52. _____	53. _____	54. _____
55. _____	56. _____	57. _____	58. _____	59. _____	60. _____

"1"

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Physics Answer Sheet

Name_____Grade & Section_____Roll No_____

1. _____	2. _____	3. _____	4. _____	5. _____	6. _____ _
7. _____	8. _____	9. _____	10. _____	11. _____	12. _____
13. _____	14. _____	15. _____	16. _____	17. _____	18. _____
19. _____	20. _____	21. _____	22. _____	23. _____	24. _____
25. _____	26. _____	27. _____	28. _____	29. _____	30. _____
31. _____	32. _____	33. _____	34. _____	35. _____	36. _____
37. _____	38. _____	39. _____	40. _____	41. _____	42. _____
43. _____	44. _____	45. _____	46. _____	47. _____	48. _____
49. _____	50. _____	51. _____	52. _____	53. _____	54. _____
55. _____	56. _____	57. _____	58. _____	59. _____	60. _____

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