

ADDIS ABABA ADMINISTRATION ARADA SUB CITY EDUCATION OFFICE
PHYSICS EXAMINATION FOR GRADE 12, 2016 E.C

THIS BOOKLET CONTAINS PHYSICS EXAMINATION. IN THIS EXAMINATION THERE ARE A TOTAL OF 50 MULTIPLE CHOICE ITEMS. ATTEMPT ALL THE ITEMS. FOLLOW THE INSTRUCTIONS ON THE ANSWER SHEET AND THE EXAMINATION PAPER ONLY. USE ONLY PENCIL TO MARK YOUR ANSWERS.

THERE IS ONLY ONE BEST ANSWER FOR EACH ITEM. CHOOSE THE BEST ANSWER FROM THE SUGGESTED OPTIONS AND BLACKEN THE LETTER OF YOUR CHOICE ON THE ANSWER SHEET. YOUR ANSWER MARK SHOULD BE HEAVY AND DARK, COVERING THE ANSWER SPACE COMPLETELY FROM YOUR ANSWER SHEETS.

YOU ARE ALLOWED TO WORK ON THE EXAM FOR **2 HOURS**. WHEN TIME IS CALLED, YOU MUST IMMEDIATELY STOP WORKING. PUT YOUR PENCIL DOWN, AND WAIT FOR FURTHER INSTRUCTIONS.

ANY FORM OF CHEATING OR AN ATTEMPT TO CHEAT IN THE EXAMINATION WILL RESULT IN AN AUTOMATIC DISMISSAL FROM THE EXAMINATION HALL AND CANCELLATION OF YOUR SCORE(S).

PLEASE MAKE SURE THAT YOU HAVE WRITTEN ALL THE REQUIRED INFORMATION ON THE ANSWER SHEET BEFORE YOU START TO WORK ON THE EXAMINATION.

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO.

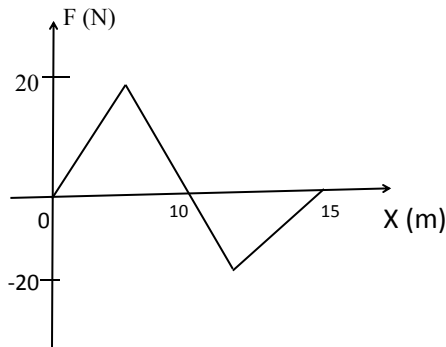
DIRECTIONS; each of the following questions is followed by four possible alternatives. Read each question and carefully blacken the letter of your best choice on the separate answer sheet provided.

You may refer to the information given below when you work on some of the questions.

Constant	Symbol	Value
Acceleration due to gravity	g	10m/s ²
Permittivity of vacuum	ϵ_0	8.85×10^{-12} F/m
Permittivity of free space	μ_0	$4\pi \times 10^{-7}$ Tm/A
Faraday`s constant	F	96500 C mol ⁻¹
Charge of electrons	q	1.6×10^{-19} Coulomb
Universal gravitational constant	G	6.67×10^{-11} Nm ² kg ⁻²
Planck constant	H	6.63×10^{-34} Js
Specific heat capacity of water	C	4,200 J/kg k
Coulomb`s constant	k	9×10^9 kgm ² /c ²
Mass of electron	m	9.1×10^{-31} kg
Sin30° = Cos60° = 0.5		
Sin60° = Cos60° = 0.866		
Sin37° = Cos53° = 0.6		
Sin53° = Cos37° = 0.8		
$\Pi = 3.14$		

1. If the tail of vector B is placed at the tip of A and the tail of C is placed at the tip of B, the sum of the three vectors is drawn from the
- A. Tail of A to tip of B C. Tail of B to tip of C
B. Tail of A to tip of C D. Tip of C to tail of B
2. A, B, and C are three points on a straight line road with AB=40km and BC=90km. A woman travel from A to B at 10km/h and then B to C at 15km/h. What is the average speed of the woman for the journey from A to C?
- A. 25km/h B. 5km/h C. 13km/h D. 6km/h
3. A man standing on a friction less surface continuously fired 120 bullets horizontally in 1 minutes using machine gun. If each bullet has a mass 10g and leaves the muzzle of the gun with a speed of 800m/s. what is the average force exerted by the gun on the man?
- A. 8N B. 16N C. 960N D. 16,000N
4. Two men A and B are loading identical boxes onto a truck. A lifts his box straight up from the ground to the bed of the truck, whereas B slides his box up rough ramp to the truck. Which statement is correct about the change in the potential energy on the box Earth system?
- A. A and B change the Potential energy by the same amount
B. A changes more Potential energy than B
C. B changes more Potential energy A
D. None of those statement is necessarily true
5. What do we mean when we say a certain machine is 98 percent efficient?
- A. The machine wastes 2 joules of an input energy
B. The machine wastes 2 percent of an input energy
C. The machine multiplying an input force by a factor of 98
D. The machine multiplying energy by a factor of 98
6. Two solid spheres made of gold and silver having equal masses are suspending by a springs and fully submerged in a tank of water. The density of gold is greater than that of silver, which one of the following statements is true?
- A. The buoyant force on each sphere is the same
B. The volume of water displaced by the gold sphere is larger than that of the silver sphere
C. The tension in the string supporting each sphere is the same
D. The buoyant force on the silver sphere is greater that on the gold sphere
7. An electrical heating system with an average power rating of 4KW is used to heat 400kg of water from 20°C to 80°C . How long will the process take?
- A. 4hours B. 10hours C. 7hours D. 5hours

8. The force acting on a body varies with position as shown below. What is the work done by the force from $x = 0$ to $x = 15\text{m}$?



A. 50J

C. 25J

B. 75J

D. 0J

9. The temperature of a body is directly proportional to

A. The average speed of the body in motion

B. The average potential energy of the whole

C. the average speed of the molecules of the body

D. the average kinetic energy of the molecules of the body

10. A mixture of gas is made of two types of molecules. The molecules of A are lighter than the molecules of B. The gas mixture has the same temperature everywhere. Which one is correct about the speed of the molecules?

A. The molecules of B move faster than those of A

B. The molecules of A move faster than those of B

C. The molecules of A move the same as B

D. The mass of the molecules and their speed are unrelated

11. Which quantities decrease as sound travels from water to air

A. speed and frequency B. frequency and wavelength C. wavelength and speed D. only frequency

12. Two force exerted on a block as shown in the figure below. What is the horizontal component of the force?

A. 14N, West

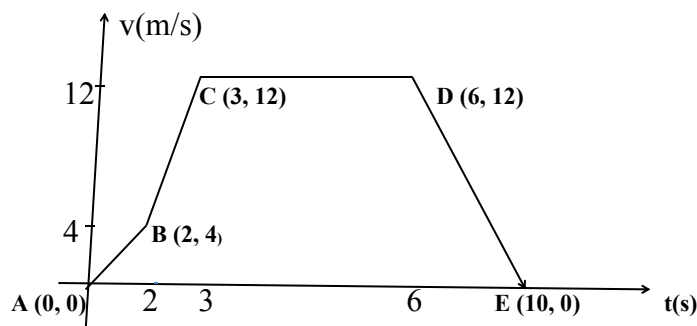
C. 30N, West

B. 70N, East

D. 28N, West



13. Which of the following is correct about the motion shown in the velocity –time graph below?



- A. Between C and D, the motion is constant acceleration
- B. Between B and C, the acceleration is 4m/s^2
- C. Total displacement is 84m
- D. Between D and E, the motion is with constant positive acceleration

14. If the Earth shrinks, what will the effective on the value of gravitational acceleration?

- A. decrease
- B. increase
- C. become zero
- D. become infinite

15. A girl can throw a stone to a maximum horizontal distance of 64m. If she throws the stone vertically upward with the same speed. What is the maximum height reached by the stone?

- A. 64m
- B. 32m
- C. 16m
- D. 8m

16. Each of two small spheres is positively charged and combined charge is $4 \times 10^{-8}\text{C}$. What is the charge on each sphere if they are repelled with a force of $27 \times 10^{-5}\text{N}$? The centers of the sphere are 0.1m apart.

- A. $3 \times 10^{-8}\text{C}$ and 10^{-8}C
- B. $2 \times 10^{-8}\text{C}$ and 10^{-8}C
- C. $2 \times 10^{-8}\text{C}$ and $1 \times 10^{-8}\text{C}$
- D. both have the same $3 \times 10^{-8}\text{C}$

17. The capacitance of a parallel plate capacitor is $10\mu\text{F}$. If the distance between the plate is halved, keeping all other quantities constant, then what is the new capacitance of the capacitor?

- A. $0.2\mu\text{F}$
- B. $5\mu\text{F}$
- C. $10\mu\text{F}$
- D. $20\mu\text{F}$

18. An electron is projected with a velocity of $8 \times 10^6\text{m/s}$ into a uniform magnetic field of $9.1 \times 10^{-4}\text{T}$ perpendicular to the to the direction of the field. What is the radius of the path of the electron?

- A. $5 \times 10^{-2}\text{m}$
- B. $4 \times 10^{-2}\text{m}$
- C. $5 \times 10^{-3}\text{m}$
- D. $4 \times 10^{-3}\text{m}$

19. Two students A and B with masses M_A and M_B , respectively stand on a wheeled trolley. If student A has larger mass and pushes student B, then what can be said their acceleration?
- A. The acceleration of student B is less than that of student A
 - B. Both boys will be accelerated by the same magnitude but in opposite direction
 - C. The acceleration of student A is less than that of student B
 - D. There would be no acceleration because the forces are equal and opposite
20. What happens when a P-N junction is forward biased?
- A. The depletion layer size increase
 - C. Current cannot flow through the diode
 - B. The depletion layer size decrease
 - D. Electron flow from P-type to N-type
21. Among the following errors, which type of error is caused by unpredicted factors when you measure the length of a ruler made of steel?
- A. Zero error
 - B. Systematic error
 - C. Parallax error
 - D. Random error
22. If $A = kB$, where k is a positive constant without measuring unit; according to the information, which one the following statement describes the relationship between A and B?
- (Hint; A and B are non zero vectors)
- A. A and B are parallel to each other
 - C. A and B are opposite in directions
 - B. A and B are perpendicular to each other
 - D. No relationship between A and B
23. Which one the following statement describes the motion of a certain body is moving with constant acceleration on friction less surface in the given interval of time?
- A. The motion of the body at constant velocity
 - C. The net applied force on the body is zero
 - B. The change in velocity of the body is constant
 - D. Cannot be described
24. A block starts from rest at the top of the 37° incline surface and slide down 5.85 m length in 1.5s on the incline surface. What is the magnitude of the acceleration of the block if the coefficient of friction between the block and the surface will be 0.1?
- A. 3.0 m/s^2
 - B. 6.0 m/s^2
 - C. 5.2 m/s^2
 - D. 3.8 m/s^2

25. If two isolated bodies are collided each other at a point elastically, then which one of the following will be correct statement about the collision of the two bodies? (Assume the effect of friction force is negligible in the process)
- A. Kinetic energies of the isolated bodies are conserved
 - B. Momenta of the isolated bodies are conserved
 - C. Kinetic energies and momenta of the isolated bodies are conserved
 - D. Neither energies nor momenta are conserved
26. A wooden block is released at the upper edge of friction less incline surface. At what value of θ does the wooden block is moving at variable velocity (non-constant velocity) down the incline surface?
- A. $10^\circ \leq \theta \leq 15^\circ$
 - B. $16^\circ \leq \theta \leq 30^\circ$
 - C. $3^\circ \leq \theta \leq 44^\circ$
 - D. $45^\circ \leq \theta \leq 90^\circ$
27. A floating ice block is pushed through a displacement of $S = (15i - 10j)$ m along a straight embracement by rushing water, which exerts force $F = (200i - 150j)$ N on the block. How much work does the force do on the block?
- A. 3000J
 - B. 1500J
 - C. 6000J
 - D. 4500J
28. Which of the following is not true statement about couple forces acted on the wheel of car used to control car's motion about a fixed axis of rotation?
- A. They have equal magnitude in opposite directions
 - B. The net torque has rotational effect on the wheel
 - C. They produce zero net torque
 - D. They produce net non-zero torque
29. What amount of force is exerted on a wire that a cross-section area of 0.01 m^2 causes to yield Young's modulus $2.5 \times 10^5 \text{ N/m}^2$ if the strain is 0.5?
- A. $2.0 \times 10^3 \text{ N}$
 - B. $1.25 \times 10^3 \text{ N}$
 - C. $2.0 \times 10^2 \text{ N}$
 - D. $1.25 \times 10^2 \text{ N}$
30. Which one of the following statement is wrong about surface tension?
- A. It is caused by the effect of inter molecular forces
 - B. It depends on the nature of liquid and temperature
 - C. Strong attractive force between molecules has large surface tension
 - D. It increases as impurity added in to the liquid

31. Which one the following statement does not express the rate of heat flow/ transfer of heat energy in our environment correctly?
- A. Heat can be transfer due to collision of solid molecules
 - B. Rate of heat flow equals the amount of heat transfer per unit time
 - C. Heat can be transfer in gas due to actual moment of molecules
 - D. Heat can be transfer in water at constant temperature
32. Which one of the following concepts of physics is not important/use in the process of bricks and tiles manufactures?
- A. The concepts of matter
 - C. The concept of leather technology
 - B. The concepts of energy
 - D. The concept of thermodynamics
33. The branch of engineering that requires/emphasizes the concept of magnetism and mechanical energy due to movement of wind molecules is known as;
- A. Mechanical engineering
 - C. Electrical engineering
 - B. Chemical engineering
 - D. Civil engineering
34. Which of the following does not describe the advantage of medical physics in medical treatment and diagnosis?
- A. The treatment administered by radiation of gamma ray
 - B. The treatment is mainly administered within surgery
 - C. The diagnostic process administered by modern electronic equipment
 - D. Sound plays important role to detect the injured tissue of a patient
35. A ball is thrown horizontally from the top of a cliff which is 20 m high. What is the velocity of the stone just it hits the ground?
- A. 28 m/s
 - B. 32 m/s
 - C. 40m/s
 - D. 20m/s
36. Which one of the quantity remains constant if a ball is moved along a parabolic trajectory/path through warm air? (Assume the effect of air resistance is neglected)
- A. Horizontal component velocity of the ball
 - C. The velocities in both components of the ball
 - B. Vertical component velocity of the ball
 - D. Vertical component displacement of the ball

37. The angular velocity of a wheel is rotating about a fixed axis of rotation changed from 40 rad/s to 44 rad/s in 5 seconds. What are the magnitudes of average angular velocity and angular displacement respectively? (Assume the rotational acceleration is constant in the entire process)

- A. 40 rad/s and 210 rad
B. 42 rad/s and 210 rad
C. 44 rad/s and 210 rad
D. 40 rad/s and 44 rad

38. Which one of the following quantity is constant, where a particle is undergoing in uniform circular motion with respect to a fixed axis of rotation?

- A. Speed B. Displacement C. Velocity D. Acceleration

39. How large net torque is required to change the angular velocity of a rotating rigid body that has a moment of inertia $10 \text{ Kg}\cdot\text{m}^2$ in order to change the velocity by 20 rad/s in 10 seconds about an axis of rotation?

- A. 2 Nm B. 1 Nm C. 10 Nm D. 20 Nm

40. Which one of the following stamen is not correct about planetary motion in the universe?

- A. Kepler's 1st law states about the law of equal areas
- B. The proportionality constant is nearly equal to all planets in the universe
- C. Kepler's 3rd law describes about period and mean distance between the sun and a planet
- D. Another name of Kepler's 1st law is called the law of ellipse

41. Which one of the following statement is correct about the final gravitational force if the new distance between two isolated bodies in the universe is doubled compare to the original distance measured between them? (Hint: the distance is measured from the center of the two bodies)

- A. It is as similar as the original force
B. It is four times the original force
C. Quarter of the original force
D. Twice the original force

42. Which one the following phenomenon more describes why gases are easy to compress, while liquid and solids are almost incompressible?

- A. The molecular force between neighboring gas molecules is strong
- B. The molecular force between neighboring gas molecules is strong
- C. There is much inter molecular space between neighboring gas molecules
- D. The inter molecular space is short between neighboring gas molecules

43. At particular location, the static pressure of incompressible liquid inside an open container does not depend upon the;

A. Depth of the liquid B. Atmospheric pressure C. Density of the fluid D. Acceleration due to gravity

44. Among the following principles, which one of the following express the pressure applied in confined system distributes equally in all directions?

A. Archimedes's principle B. Pascal's principle C. Bernoulli's of flotation D. Principle of flotation

45. A water pipe has a radius of 1.0 cm at the inlet side and 0.5cm at the outlet side. Water flows at the rate of $3.14 \times 10^{-3} \text{ m}^3$ per second at the inlet point. What are the approximate values of speed of water at the inlet and the outlet points respectively?

A. 10 m/s and 40m/s B. 40 m/s and 10m/s C. 5m/s and 40m/s D. 14 m/s and 28m/s

46. The volume ratio of displaced fluid and wooden block is 90% as the fraction of wooden lies below the fluid level. What will be the density of the wooden block, if the density of fluid is 900 Kg/m^3 ?

A. 90 Kg/m^3 B. 900 Kg/m^3 C. 81 Kg/m^3 D. 810 Kg/m^3

47. Which one of the following factor does not affect the magnitude of magnetic field strength around straight current carrying conductors?

A. Magnitude of current flow C. Distance from the current carrying conductor
B. Resistance of the conductor D. The nature of medium near to the conductor

48. Which one of the following statement is not correct about magnetic flux produced by strong magnet in a particular region/surface?

A. It is the measure of strength of magnetic field
B. It is the scalar of product magnetic field and area
C. It has maximum value as the field crosses perpendicularly the surface
D. It has maximum value as the field is perpendicular to the direction vector area

49. A coil has 10 turns and the magnitude of magnetic field changed by 40 Weber in 0.1s. What is the magnitude of the induced electromotive force?

A. 400V B. 800V C. 4000V D. 8000V

50. A 220 V AC source is connected across the primary coil of a transformer having 50 turns. If the secondary coil of the transformer has 100 turns, what voltage appears across the secondary and describes the type of transformer?

A. 220V, it is step up transformer C. 440 V, it is step up transformer
B. 100V, it is step down transformer D. 50V, it is step down transformer

