

**ADDIS ABABA ADMINISTRATION ARADA SUB CITY EDUCATION
BUREAU**

PHYSICS EXAMINATION FOR GRADE 12, 2016 E.C

TIME ALLOWED:-2 HOURS

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	$8.85 \times 10^{-12} \text{ F/m}$
Permittivity of free space	μ_0	$4\pi \times 10^{-7} \text{ Tm/A}$
Faraday`s constant	F	96500 C mol^{-1}
Charge of electrons	e	$1.6 \times 10^{-19} \text{ Coulomb}$
Universal gravitational constant	G	$6.67 \times 10^{-11} \text{ Nm}^2\text{kg}^{-2}$
Planck constant	h	$6.63 \times 10^{-34} \text{ Js}$
$\text{Sin}30^\circ = \text{Cos}60^\circ = 0.5$, coulombs constant $K = 9 \times 10^9 \text{ Nm/c}^2$		
$\text{Sin}60^\circ = \text{Cos}30^\circ = 0.866$		
$\text{Sin}37^\circ = \text{Cos}53^\circ = 0.6$		
$\text{Sin}53^\circ = \text{Cos}37^\circ = 0.8$		

1. Two cars start moving towards each other from point P and Q, the points are 2km apart. One of the car moves with speed of 30 m/s and the other moves at a speed of 20 m/s and they meet, how far are they from the point at which the slower car started?

- A. 1,200m B. 800m C. 400m D. 600m

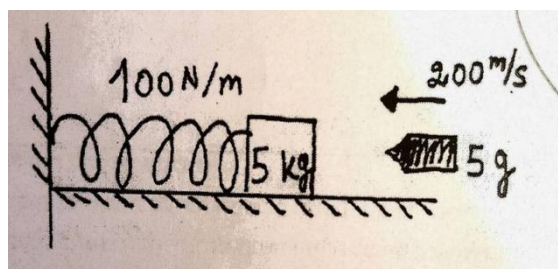
2. A car travel from one 4 kilo bus station to 6 kilo at a constant speed of 40 m/s and returns to the first 4 kilo bus station at a speed of 60 m/s. What is the average speed?

- A. 48 m/s B. 50 m/s C. 20 m/s D. 100 m/s

3. Four students were asked to arrange forces due to rolling, static and sliding frictions in an increasing order. Their arrangements are given below. Choose the correct arrangements?

- A. Rolling, static, sliding C. Static, rolling, sliding
B. Rolling, sliding, static D. sliding, static, rolling

4. The mass spring system rest on friction less surface. How far will the system be displaced from its equilibrium position if a bullet of 5g mass is shut into it at a speed of 200 m/s.



- A. $\frac{\sqrt{2} m}{2}$ B. $100\sqrt{2}m$ C. $\sqrt{2} m$ D. $50\sqrt{2}m$

5. A block weight 5000N is pushed up a ramp of height 10 m by a force of 250 N. What is the length of the ramp? Assume there is no friction.

- A. 50 m B. 200 m C. 150 m D. 300 m

6. When sound waves travel from air to water, which of the following remains constant?

- A. velocity B. frequency C. Wavelength D. All

7. Two student starts at the same point and walk around Andnet park in opposite direction. One has angular speed of $\frac{\pi}{120}$ rad/s, while the other has an angular speed of $\frac{\pi}{240}$ rad/s how long will it be when they meet?

- A. 80 sec B. 120 sec C. 160 sec D. 60 sec

8. The amount of inertia of a body depends on

- A. The mass of the body
- C. The size of the body
- B. The shape of the body
- D. All are correct

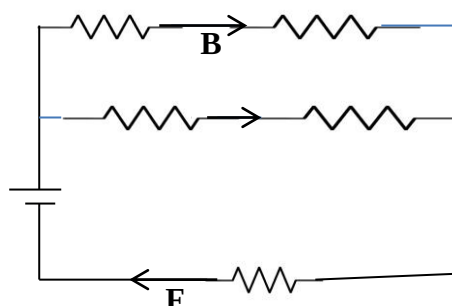
9. If all the resistors in the circuit shown in the figure have equal resistors, and the current flowing into resistor B is 4A, then what is the current flowing into resistor F?

A. 16A

C. 2A

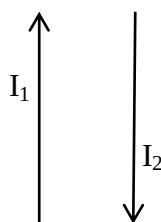
B. 8A

D. 1A



10. The two long parallel conductors shown in figure below carry current I_1 and I_2 in opposite directions. The magnetic field at any point between the wires is

- A. Point out of the page
- B. It is zero
- C. Points into the page
- D. None of the above



11. A 6V battery 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?

A. 24V

B. 6V

C. 12V

D. 3V

12. The majority and minority charge carriers in N-type semiconductors are, respectively?

- A. electron and holes
- C. electrons and electrons
- B. holes and electrons
- D. holes and holes

13. When does a NOR gate have a high output?

- A. When either input is low
- C. When either input is high
- B. When both input are low
- D. When both input are high

14. A certain wave is characterized by wavelength λ , frequency f , and wave speed v . As this wave travels from one medium to another, it gets refracted. Which of these characteristics of the wave are changed due to refraction?

- A. Wavelength, frequency, and wave speed
- B. Wavelength, and frequency
- C. Frequency and wave speed v
- D. Wavelength and wave speed

15. When charged $Q_1 = 6\mu\text{F}$ and $Q_2 = 15\mu\text{F}$ are separated at some distance, they experience an electric force of 900N. What is the separation between the charges?

- A. 1.5 cm
- B. 0.75 cm
- C. 4.25 cm
- D. 3 cm

16. Which one of the following measured value has highest precision when you measure the length of a stick?

- A. 15.60 cm
- B. 15.6 cm
- C. 15.600cm
- D. 16.0 cm

17. The scalar product of non-zero vectors is zero. Which one of the following statement describes the correct relationship between the two vectors?

- A. They are parallel each other
- B. They are perpendicular to each other
- C. They are opposite each other
- D. Cannot be determined

18. Given four vectors $\mathbf{A} = \mathbf{i} - \mathbf{j}$, $\mathbf{B} = 2\mathbf{i} - 3\mathbf{j}$, $\mathbf{C} = \mathbf{i} + \mathbf{j}$ and $\mathbf{D} = 2\mathbf{i} + 2\mathbf{j}$, which pair of these vectors are colinear?

- A. $\mathbf{A}$ and $\mathbf{B}$
- B. $\mathbf{C}$ and $\mathbf{D}$
- C. $\mathbf{B}$ and $\mathbf{C}$
- D. $\mathbf{A}$ and $\mathbf{C}$

19. Which one of the following statement is correct for any nonzero vectors $\mathbf{A}$ and $\mathbf{B}$?

- A. $\mathbf{A} \cdot \mathbf{B} = |\mathbf{A} \times \mathbf{B}|$ if the angle between $\mathbf{A}$ and $\mathbf{B}$ is 45°
- B. $\mathbf{A} \cdot \mathbf{B}$ has maximum value if $\mathbf{A}$ and $\mathbf{B}$ are perpendicular to each other
- C. $\mathbf{A} \cdot \mathbf{B}$ has minimum value if $\mathbf{A}$ and $\mathbf{B}$ are parallel to each other
- D. $\mathbf{A} \times \mathbf{B}$ has minimum value if $\mathbf{A}$ and $\mathbf{B}$ are perpendicular to each other

20. If the acceleration of a moving body is negative, which one of the following will be correct situation or phenomenon about the motion of the body?

- A. Decreasing its original/initial velocity
- B. Changing the direction of velocity
- C. Moving at constant velocity
- D. Increasing the original velocity

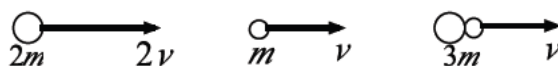
21. Which one of the following is true about a body that has big mass?

- A. It has less acceleration
- B. It has greater inertial effect
- C. It has greater acceleration
- D. A and B are correct answers

22. A person is dragging up a 10 kg box at an angle of 37° from the horizontal on smooth surface which one of the following is false statement about the forces acted on the box if the man will be used 100N applied force on the box (use $\sin 37^\circ = 0.6$ $\cos 37^\circ = 0.8$)?

- A. The friction force is zero
 B. The net force is 80N
 C. The friction force is 80N
 D. The normal force is 60N

23. Two masses collide and stick together after collision as shown in the following figure below. How large is the speed of the combined mass just after collision?



- A. $3V$
 B. $2V$
 C. $3/5V$
 D. $5/3V$

24. A certain constant force is applied on a body whose mass is 5kg in order to change the velocity from 10m/s to 16m/s in the direction of force in 10 seconds. How large is the magnitude of work done by net force on the body? (Assume, friction force is neglected)

- A. 250J
 B. 640J
 C. 390J
 D. 780J

25. A constant force is exerted on a 4kg block attached at the free end of a spring with elastic constant 1000N/m so that the spring is stretched by 10cm in 10seconds. How large elastic potential energy and power are stored in the system respectively?

- A. 5J and 0.5 watt
 B. 2J and 0.2 watt
 C. 40J and 4 watt
 D. 5J and 0.1 watt

26. Two masses 2kg and 3kg are connected by a light rigid rod of length 60cm arranged horizontally. Which one of the following describes the location of center mass of the two masses?

- A. At 45cm from the left of 2kg mass
 B. At 54cm from 2kg mass
 C. At 50cm from 2kg mass
 D. At 36cm from 2kg mass

27. Which one of the following is true statement about the condition of equilibrium of a rigid body?

- A. The sum of torques on the rigid body equal zero in 1st condition of equilibrium
 B. The sum of forces on the rigid body equal zero in 2nd condition of equilibrium
 C. Equilibrium is the statement of Newton's 1st law of motion
 D. Equilibrium is the statement of Newton's 2nd law of motion

28. A 10N force is exerted on a wire that a cross-section area of 0.01 m² causes to produce deformation in the wire. What will be the Young's modulus if the strain is 0.5?

- A. 2×10^3 N/m²
 B. 0.5×10^3 N/m²
 C. 2.5×10^3 N/m²
 D. 1.5×10^3 N/m²

29. At particular location, the pressure exerted by a static fluid does not depends upon the
- Depth of the fluid
 - Acceleration due to gravity
 - Density of the fluid
 - Total mass of the fluid
30. Which one of the following concepts of physics is not important/use in the process of photosynthesis?
- The concepts of matter
 - The concepts of energy
 - The concept of matter and energy interaction
 - The concept of thermodynamics
31. Matters that exists in space between stars, galaxies, and celestial bodies are
- Radiation
 - Galaxies
 - Stars
 - Interstellar medium
32. The branch of engineering that requires the concept of molecular physics and chemical bonding is known as;
- Mechanical engineering
 - Chemical engineering
 - Electrical engineering
 - Civil engineering
33. Which one of the following agent in the blood has important role to extract the magnetic resonance image in medical treatment?
- Oxygen ions
 - Hydrogen ions
 - Ferric ions
 - Sulphate ions
34. Which one of the following is not the concept of physics that does not apply in modern defense?
- Modern electronics
 - Nuclear physics
 - Thermodynamics
 - Hydrodynamics
35. Which of the following does not describe the advantage of radiation therapy correctly?
- The treatment administered without surgery
 - The treatment administered within surgery
 - The treatment of certain types of cancer
 - Applying beam of gamma rays to destroy the cancerous tumors
36. Which one of the following communication system belongs to wired communication system today?
- Micro wave
 - Radio wave
 - Infrared wave
 - Telephone
37. A projectile is thrown upwards with an initial velocity of 10m/s at an angle of 15° from the +X- axis (use $\sin 15^\circ = 0.26$ and $\cos 15^\circ = 0.97$). Which of the followings are the x and y components of the velocity of the stone respectively? (Assume the air resistance is negligible)
- 9.7 m/s & 2.6 m/s
 - 2.6 m/s & 9.7 m/s
 - 2.6 m/s & 8 m/s
 - 6 m/s & 10 m/s

38. A boy is kicked a ball into the air at an angle of θ with the reference of horizontal line. When the ball reaches at the maximum height, which one of the following is true statement about the ball?
- The acceleration depends on θ along Y
 - The acceleration is zero along Y
 - The acceleration along Y is perpendicular to velocity along X
 - The acceleration is zero along Y
39. As a projectile is moved through its parabolic trajectory, which one of the quantity remains constant?
- Horizontal component velocity
 - Vertical component velocity
 - The velocities in both components
 - Does not known
40. Which one of the following quantity is constant in uniform circular motion?
- Velocity
 - Displacement
 - Acceleration
 - Speed
41. At constant acceleration, the angular velocity of a wheel of sewing machine is rotating about a fixed axis of rotation changed from 28 rad/s to 32 rad/s in 3 seconds. What are the magnitudes of average angular velocity and angular displacement respectively?
- 28 rad/s and 84 rad
 - 30 rad/s and 90 rad
 - 28 rad/s and 90 rad
 - 32 rad/s and 96 rad
42. What is the angular acceleration of a rotating rigid body about an axis if the angular speed of the body changes from 40 rad/s to by 60 rad/s in 10 seconds?
- 2rad/s^2
 - 6rad/s^2
 - 4rad/s^2
 - 8rad/s^2
43. If a net torque is applied to a rigid body, then the body will experience;
- Constant angular velocity
 - Constant acceleration
 - Non-constant inertia
 - Cannot be determined
44. According to Kepler's law of planetary motion in the universe, which one of the following statement is true about the speed of a certain planet orbiting around the sun?
- It is maximum at perihelion
 - It is maximum at aphelion
 - It is constant at any point
 - It is minimum at perihelion
45. Which one of the following stamen is not correct about planetary motion in the universe?
- Kepler's 2nd law states about the law of equal areas
 - The proportionality constant is nearly equal to all planets in the universe
 - Kepler's 3rd law describes about period and mean distance between the sun and a planet
 - Another name of Kepler's 2nd law is called the law of ellipse

46. According to Newton's universal Gravitation law, which one of the following statement is incorrect about the magnitude of gravitational force between two bodies in the universe?

- A. It is inversely proportional to the square of distance between the two bodies
- B. It is directly proportional to the square of distance between the two bodies
- C. It is directly proportional to the product of the masses of the two bodies
- D. It is always attraction force between the two masses in the universe everywhere

47. As the distance between two different bodies in the universe doubled, which one of the following statements is corrects about the force between the two bodies?

- A. The force is doubled compare to the original force
- B. The force is halved compare to the original force
- C. The force is quartered compare to the original force
- D. The force as similar as the original force

48. A water pipe has a radius of 2.5 cm in the inlet side and 0.75cm outlet side. Water flows at the rate of 0.0083m^3 per second at the inlet point. What is the approximate value of speed at the outlet point?

- A. 27 m/s
- B. 13 m/s
- C. 47 m/s
- D. 148 m/s

49. Why are gases easy to compress, while liquid and solids are almost incompressible?

- A. The force between gas atoms is very strong
- B. There is much space and little molecular force between atoms
- C. There is no inter molecular force between atoms
- D. The gases are stay longer at affixed positions

50. According to Newton's law of universal Gravitation, which one of the following statement is incorrect about the magnitude of gravitational force between two bodies in the universe?

- A. It is inversely proportional to the square of distance between the two bodies
- B. It is directly proportional to the square of distance between the two bodies
- C. It is directly proportional to the product of the masses of the two bodies
- D. It is always attraction force between the two masses in the universe everywhere