

**YEKA SUB-CITY EDUCATION OFFICE KOTEBE CLASTER (YSEOKC)
ETHIOPIAN SECONDARY SCHOOL LEAVING CERTIFICATE PHYSICS
MODEL EXAMINATION (ESSLCME)
TAHISAS 2016/ DECEMBER (2023).**

TIME ALLOWED: 2 HOURS

GENERAL DIRECTIONS

THIS BOOKLET CONTAINS **PHYSICS** EXAMINATION. IN THIS EXAMINATION, THERE ARE A TOTAL OF **50 MULTIPLE CHOICE EQUATIONS**. CAREFULLY SELECT THE BEST ANSWER AND **BLACKEN** ONLY THE LETTER OF YOUR CHOICE ON THE SEPARATE ANSWER SHEET PROVIDED. FOLLOW THE INSTRUCTION ON THE ANSWER SHEET AND THE EXAMINATION PAPER CAREFULLY. USE ONLY **PENCIL** TO MARK YOUR ANSWERS. YOUR ANSWER MARK SHOULD BE **HEAVY** AND DARK, COVERING THE ANSWER SPACE COMPLETELY. PLEASE ERASE ALL UNNECESSARY MARKS COMPLETELY FROM YOUR ANSWER SHEET.

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 OVER UNTIL YOU ARE TOLD TO DO SO.

**Yeka sub City Kotebe Claster Secondary School Leaving Certificate
Model Examination (YSKCSLCME)**

Physics

Tahisas 2016/December 2023

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Number of Items: 50

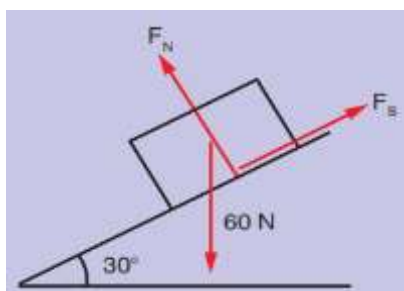
DIRECTIONS: Each of the following questions is followed by **four** possible alternatives. Read each question and carefully **blacken** the letter of your best choice on the separate answer sheet provided.

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	$8.85 \times 10^{-12} \text{ C}^2/\text{N.m}^2$
Charge of an electron	e	$1.6 \times 10^{-19} \text{ C}$
Permittivity of free space	μ_0	$4\pi \times 10^{-7} \text{ Tm/A}$
Universal gas constant	R	8.31 J/mol. k.
Planck's constant	h	$6.63 \times 10^{-34} \text{ J.s}$
Electron mass	M_e	$9.11 \times 10^{-31} \text{ kg}$
Proton mass	M_p	$1.67 \times 10^{-27} \text{ kg}$
$\ln 2 = 0.693,$ $\pi = 3.14$	p	$1.6 \times 10^{-19} \text{ C}$
$\sin 30^\circ = \cos 60^\circ = 0.5,$	$\cos 90^\circ = \sin 0^\circ = 0$	
$\sin 37^\circ = \cos 53^\circ = 0.6,$	$\sin 90^\circ = \cos 0^\circ = 1$	
$\sin 45^\circ = \cos 45^\circ = 0.707$	Speed of light in air, $c = 3 \times 10^8 \text{ m/s}$	
$\sin 53^\circ = \cos 37^\circ = 0.8$	$\rho_{\text{mercury}} = 13.6 \text{ g/cm}^3$	
$\sin 60^\circ = \cos 30^\circ = 0.866$		

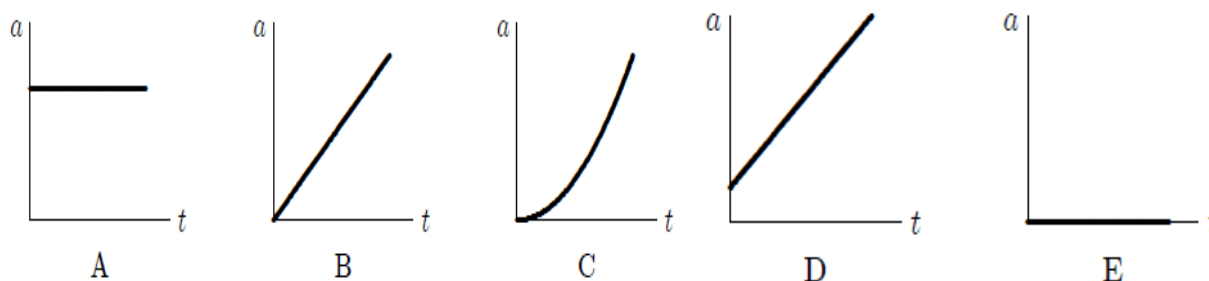
1. The area under acceleration-time graph represents:
A. Displacement
B. Change in acceleration
C. Change in velocity
D. change in velocity
2. The magnitude of two vectors A and B are 12 units and 5 units, respectively. Which one of the following is not the possible value for the magnitude of the resultant vector A + B?
A. 60 units
B. 17 units
C. 13 units
D. 7 units
3. An object is placed 80 cm in front of a concave mirror whose focal length is 30 cm. What are the location and nature of the image formed by the mirror respectively?
A. 22 cm, real.
B. 48 cm, real.
C. 22 cm virtual.
D. 48 cm virtual.
4. Which one the following will happen as a ray of light passes from air to water?
A. The angle of incident is less than the angle of reflection.
B. The angle of incident is less than the angle of refraction.
C. The angle of incident is greater than the angle of reflection.
D. The angle of incident is greater than the angle of refraction.
5. Two balls are kicked from the ground with same initial speed at an angle of 37° and 53° from the horizontal. When the two balls strike the ground, they will have the same:
A. Horizontal distance.
B. Time of flight
C. Maximum height.
D. Final velocity
6. The position of a particle moving along the x-axis is given by $x = t^2 + 4t$. Where x is in meters and t in seconds. What is speed of the particle at $t = 1$ sec?
A. 2 m/s
B. 4 m/s
C. 6 m/s
D. 8 m/s
7. A newly discovered planet has three times the mass of and four times the radius of the earth. What is the free fall acceleration as its surface in terms of the free fall acceleration of a body at the surface of the Earth? (Use $g = GM / R^2$)
A. $\frac{1}{3}g$
B. $\frac{9}{16}g$
C. $\frac{3}{8}g$
D. $\frac{3}{16}g$
8. At certain instant, a particle experience a force $F = (4i + 6j + 2k)$ N while having a velocity $v = (2i - 3k)$ m/s. What is the instantaneous rate at which the force does work on the particle?
A. 38W.
B. 50W.
C. 2W.
D. 8W.

9. Two masses 4 kg and 6 kg are attached to the end of a light string passing over a pulley. Assume pulley is massless, what are the **tension** and **acceleration** respectively?
- A. 24N, 2m/s^2 . B. 48N, 2m/s^2 C. 48N, 4m/s^2 D. 24N, 4m/s^2 .
10. Newton's first law means a force is always required to make an object:
- A. Remains at rest. C. speed up
B. Moves in uniform motion. D. A and B.
11. What is the necessary and sufficient condition for conservation of linear momentum?
- A. The presence of more linear than non-linear forces in the system
B. Net force on the system is zero
C. The presence of only non-linear forces
D. Internal forces exceed external forces
12. A box that weights 60N is on a ramp, which is inclined at 30° to the horizontal as shown in figure below. The box is in limiting equilibrium. What is the coefficient of friction between the box and the plane? A. 0.73. B. 0.58. C.0.63. D. 0.43.



13. A bullet is fired at an angle of 30° above the horizontal. If air resistance is neglected, what should be the bullet's horizontal acceleration (a_x) and vertical acceleration (a_y) when it reaches its maximum height?
- A. Both a_x and a_y are zero C. a_x is 10m/s^2 downward and a_y is zero
B. Both a_x and a_y are 10m/s^2 , downward D. a_x is zero and a_y is 10m/s^2 downward
14. Water flows through a horizontal pipe between two points having cross-sectional areas $A_1 = 10\text{cm}^2$ and $A_2 = 2\text{cm}^2$. If the speed of the water at the first point is 2 m/s, what is the speed of the water on the second point?
- A. 10m/s B. 20m/s C. 30m/s D. 5m/s

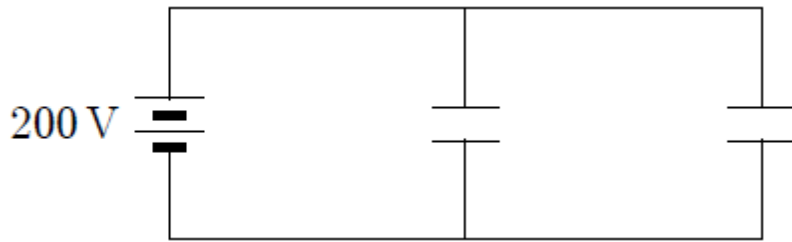
15. An air plane flying at a speed of 400m/s drops a box at a height of 4500m above the ground. What is the speed of the box the instant its strikes the ground?
- A. 300m/s B. 400m/s C. 500m/s D. 700m/s
16. A cylinder has a radius of 0.10 m. Its moment of inertia, about the cylinder's axis on which it is mounted, is 0.020 kg m^2 . A string is wound around the cylinder and pulled with a force of 1 N. What is the angular acceleration of the cylinder?
- A. 2.5 rad/s^2 B. 5.0 rad/s^2 C. 10 rad/s^2 D. 20 rad/s^2
17. What is the Mechanical energy of a bird of mass 200g flying at 12m/s at a height of 50m above the ground? A. 14.4 J. B. 100.0 J. C. 114.4 J. D. 85.6J.
18. Two satellites are revolving around the earth. Satellite B is two times as far from the earth's center as satellite A. If the period of revolution of A is T, what is the period of revolution of B?
- A. 2T B) $2\sqrt{2} T$ C) 4T D) $\sqrt[3]{4} T$
19. The bulk modulus is a proportionality constant that relates the pressure acting on an object to
- A. The fractional change in volume C. the fractional change in length
B. Young's modulus D. the spring constant
20. A particle move in the circular path of radius 2m with a radial acceleration of 8m/s^2 . The angular speed of the particle is
- A. 4 rad/s B. 6 rad/s C. 9 rad/s D. 3 rad/s
21. Which one of the following acceleration versus time graphs is correct for an object moving in a straight line at a constant velocity of 20 m/s?



22. Which of the following set of physical quantities represents fundamental quantities?
- A. Time, velocity, mass, length C. force, acceleration, length, momentum
B. temperature, length, time, mass D. Energy, length, time, mass

30. The pressure at the surface of an ocean is one atmosphere (10^5 N/m^2). At what depth in the ocean is the absolute pressure twice atmospheric pressure? ($\rho_{\text{H}_2\text{O}} = 1000 \text{ kg/m}^3$)
- A. 20m B. 10m C. 100m D. 15m
31. Suppose the object A is Three times as dense as object B, for equal volume of object A and B. How do the masses compared?
- A. $M_A = M_B$ B. $M_A = \frac{1}{3}M_B$ C. $M_A = 3M_B$ D. $M_A = \frac{1}{9}M_B$
32. Which of the following describe s Pascal's principle?
- A. In a given liquid, the greater the depth the greater is the pressure.
- B. A body immersed in the liquid is pushed up by a force equal to the weight of water it displaced
- C. Pressure at the same depth in a given liquid is the same everywhere.
- D. Pressure change in an enclosed liquid is transmitted to every part equally.
33. Which of the following is not true about projectile motion?
- A. The horizontal component of the velocity is changes throughout the projectile motion.
- B. The flight of a golf ball is an example of projectile motion.
- C. In projectile motion the time to cover both horizontal and vertical displacement is the same.
- D. Projectile refers to an object that is in flight with acceleration due to gravity.
34. The heat capacity of an object is:
- A. The amount of heat energy that raises its temperature by 1°C
- B. The amount of heat energy that changes its state without changing its temperature
- C. The amount of heat energy per kilogram that raises its temperature by 1°C
- D. The ratio of its specific heat to that of water
35. If you are four times closer to an explosion than your friend, the sound intensity you detect as compared to that of your friend is
- A. 4 times greater. C. 18 times greater
- B. 2 times greater. D. 16 times greater
36. Two identical capacitors, each with capacitance C, are connected in parallel and the combination is connected in series to a third identical capacitor. The equivalent capacitance of this arrangement is:
- A. C B. $\frac{2}{3}C$ C. $\frac{3}{2}C$ D. 3C

37. To store a total of 0.040 J of energy in the two identical capacitors shown, each should have capacitance of:



- A. 0.1 μF B. 0.5 μF C. 1 μF D. 2 μF
38. For a body to be in equilibrium under the combined action of several forces:
- A. All of the forces form pairs of equal and opposite forces
 - B. Any two of these forces must be balanced by a third force
 - C. The sum of the torques about any point must equal zero
 - D. the lines of action of all the forces must pass through the center of gravity of the body
39. Four 20Ω resistors are connected in series and the combination is connected to a 20 V source
The potential difference across any one of the resistors is:
- A. 4V B. 5V C. 20V D. 80V
40. A bat flying in cave emits sound wave and receives its echo 2 second later. How far is the cave wave? (Take speed of sound as 340m/s)
- A. 680m B. 100m C. 170m D. 340m
41. By what factor must the separation between two charges be changed in order to double the electric force between them?
- A. $\frac{1}{4}$ B. 4 C. $\frac{1}{\sqrt{4}}$ D. $\sqrt{2}$
42. What are the inputs when the output of a NAND gate is 0?
- A. 1 and 1 B. 1 and 0 C. 0 and 0 D. 0 and 1
43. Which of the following is TRUE about a p- type semiconductor?
- A. It has large number of electrons than holes.
 - B. It is an acceptor doped semiconductor material.
 - C. It has large number protons than electrons
 - D. It is intrinsic semiconductor material.

44. The moment of inertia depends on:
- A. Axis of rotation of the body.
 - B. Mass of the body.
 - C. A and B.
 - D. None of the above
45. Which of the following is true about gravitational and electrostatic force?
- A. Gravitational force can be attractive or repulsive whereas electrostatic force is always attractive.
 - B. Gravitational force always repulsive whereas electrostatic force can be attractive or repulsive.
 - C. Gravitational force always attractive whereas electrostatic force can be attractive or repulsive.
 - D. Gravitational force always repulsive whereas electrostatic force always attractive.
46. The plane of a rectangular coil, 5 cm by 8 cm, is perpendicular to the direction of a magnetic field $\vec{B}$. If the coil has 80 turns and a total resistance of $8\ \Omega$, at what rate must the magnitude of $\vec{B}$ change to induce a current of 0.10 A in the coil?
- A. 2.5 T/sec
 - B) 5 T/sec
 - C) 0.4 T/sec
 - D) 4 T/sec
47. Which of the following statement are **correct** about application of physics?
- A. Radar used for Balancing our body motion
 - B. Technology is not important for developing the physics knowledge.
 - C. Engineers can design knew technology without knowledge of physics(science)
 - D. The knowledge of physics important for design and development technology.
48. What is the importance of infrared detection device?
- A. It helps to treat the cancer without damaging the healthy tissue.
 - B. Used to form magnetic Resonance image of the body part and used for diagnosis.
 - C. For detect hidden object and targeting it.
 - D. It is to see broken bone inside the body by creating a shadow gram.
49. Which of the following is **true** about Kepler's law?
- A. Kepler's third law is referred to as the law of equal areas.
 - B. Kepler's second law states that the ratio of the square of period to the cube of the distance is always constant
 - C. Kepler's first law referred as the law of ellipses
 - D. Kepler's third law referred to as the law of equal area.

50. Solid resist all types of stress and compression because:

- A. The atoms are able to move freely.
- B. The atoms are not fixed distance apart.
- C. The atoms are not able to move freely
- D. The atoms would not be forced in to one another.

ANSWER SHEET (2016)

Physics-Grade 12

Name-----Sec-----R.No-----

Nº	Answer	Nº	Answer	Nº	Answer	Nº	Answer	Nº	Answer
1		11		21		31		41	
2		12		22		32		42	
3		13		23		33		43	
4		14		24		34		44	
5		15		25		35		45	
6		16		26		36		46	
7		17		27		37		47	
8		18		28		38		48	
9		19		29		39		49	
10		20		30		40		50	

