



LIDETA SUB CITY ADMINISTRATION EDUCATION OFFICE
GRADE 12 PHYSICS MODEL EXAMINATIONS
2016E.C/ 2024G.C

NUMBER OF QUESTIONS: 50 TIME ALLOWED: - 2 HOURS

GENERAL DIRECTIONS

THIS BOOKLET CONTAINS PHYSICS EXAMINATION. IN THIS EXAMINATION, THERE ARE A TOTAL OF 50 MULTIPLE CHOICE QUESTIONS. CAREFULLY SELECT THE BEST ANSWER AND BLACKEN ONLY THE LETTER OF YOUR CHOICE ON THE SEPARATE ANSWER SHEET PROVIDED. FOLLOW THE INSTRUCTIONS 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 UNTIL YOU ARE TOLD TO DO SO.

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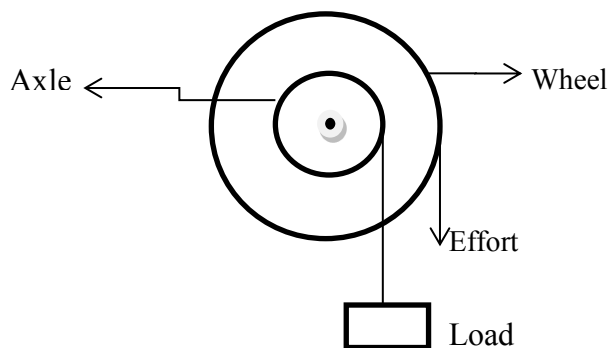
You may refer to the information given below when you work on some of the questions.

Constant	Symbol	Value
Acceleration due to gravity	g	10m/s^2
Electrostatic constant	k	$9 \times 10^9 \text{ N.m}^2\text{C}^{-2}$
Permittivity of vacuum	ϵ_0	$8.85 \times 10^{-12} \text{ F/m}$
Charge of an electron	e	$1.6 \times 10^{-19} \text{ Coulomb}$
Universal Gravitational Constant	G	$6.67 \times 10^{-11} \text{ Nm}^2/\text{kg}^2$
Density of water	ρ	1000 kg/m^3
Electron mass		$9.11 \times 10^{-31} \text{ Kg}$
Elementary (Unit)Charge		$1.602 \times 10^{-19} \text{ C}$
$\sin 30^\circ = \cos 60^\circ = 0.5$		
$\sin 37^\circ = \cos 53^\circ = 0.6$		
$\sin 45^\circ = \cos 45^\circ = 0.707$		
$\sin 53^\circ = \cos 37^\circ = 0.8$		
$\sin 60^\circ = \cos 30^\circ = 0.87$		

DIRECTION: 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.

- A train is moving with a velocity of 56 m/sec due east. A person inside the train walks towards the rear of the train with velocity of 4 m/sec. What is the person's speed relative to the ground?
A. 52 m/sec B. 60 m/sec C. 30 m/sec D. 120 m/sec
- Which of the following groups contains all vector quantities?
A. Temperature, momentum, density C. torque, weight, velocity
B. Weight, acceleration, pressure D. speed, energy, displacement

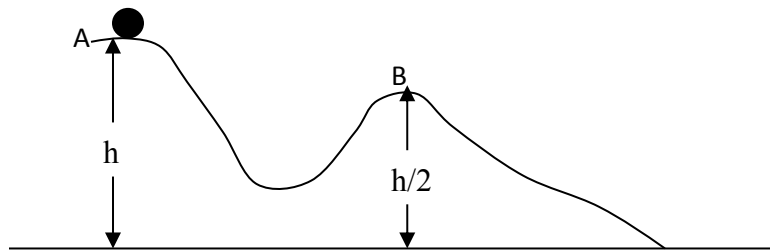
3. Which of the following statements is correct about transverse and longitudinal waves?
- The particles of the medium vibrate parallel to the direction wave propagation in transverse wave, but perpendicular in longitudinal wave.
 - The particles of the medium vibrate parallel to the direction wave propagation in longitudinal wave, but perpendicular in transverse wave.
 - The particles of the medium vibrate parallel to the direction wave propagation in both longitudinal and transverse wave.
 - The particles of the medium vibrate perpendicular to the direction wave propagation in both longitudinal and transverse wave.
4. A spring with a spring constant of 600 N/m is stretched by 40 cm in 4 seconds. What is the power applied to stretch the spring?
- 12 W
 - 6 W
 - 120 W
 - 24 W
5. Which of the following is the application of Pascal's law?
- Siphon to remove fluids
 - Sucking of liquid into mouse by straw
 - hydraulic brake in cars
 - working of submarines
6. A 35cm diameter wheel is attached to a 7cm diameter axle, as shown in the figure below



What force must be applied to the rim of the wheel to lift a load of 1000N attached to the axle? (Neglect friction)

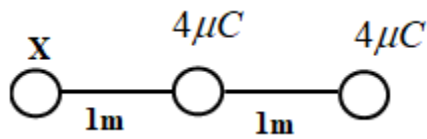
- 5000N
- 200N
- 400N
- 100N

7. A given mass of gas has a temperature of 37°C and volume ' V '. Keeping the pressure constant, the volume is increased to $4V$ by varying the temperature. What is the final temperature of the gas?
- A. 967°C B. 37°C C. 74°C D. 148°C
8. When a person jumps off a boat onto a dock, the boat moves backward this is because of _____.
- A. Newton's first law of motion.
B. Newton's second law of motion.
C. Newton's third law of motion.
D. Newton's law of universal gravitation."
9. A bead slides on a frictionless wire shown below. If it starts from rest at A, what is its speed at B?



- A. 0
B. $\sqrt{2gh}$
C. $\sqrt{gh}$
D. $\sqrt{3gh}$

10. The intensity of sound at a point 25m away is 100W/m^2 . At what distance from the source will the intensity be 25W/m^2 ?
- A. 12.5m B. 25m C. 5m D. 50m
11. In a projectile motion the horizontal velocity is constant. The best reason for this constant velocity motion is_____.
- A. The acceleration of the body is zero
B. the air resistance is zero.
C. The velocity is zero.
D. The net horizontal force is zero.
12. A bicycle wheel turns at a constant angular velocity 20rad/sec . The radius of the wheel is 30cm. What is the distance travelled by the bicycle in 30 minutes?
- A. 10.8km B. 0.18km C. 1080km D. 18km
13. Three-point charges are placed as shown in the figure below. The net force on the unknown charge ' X ' due to the two $4\mu\text{C}$ charges is $18 \times 10^{-3}\text{ N}$. What is the unknown charge X ?



- A. $9 \times 10^{-6} \text{C}$ B. $0.5 \times 10^{-6} \text{C}$ C. $0.2 \times 10^{-6} \text{C}$ D. $0.4 \times 10^{-6} \text{C}$

14. Which one of the following statements is **NOT** true about electric field lines?

- A. Electric field lines do not cross each other.
- B. Electric field lines are crowded whenever the field is strong.
- C. Electric field lines originate from positive charges and sink at negative charges.
- D. Electric field lines form closed loops.

15. The potential difference across a resistor can be measured by connecting _____.

- A. a voltmeter in series to it.
- B. a voltmeter in parallel to it.
- C. an ammeter in series to it.
- D. an ammeter parallel to it.

16. A 1.5KW electric fire is accidentally left on overnight for 8hr. The cost of a unit of electric energy is 0.273 birr per kWh. How much money has been wasted?

- A. 12 birr B. 3.28 birr C. 4.5 birr D. 12.4 birr

17. You want to design a solenoid to produce the strongest possible magnetic field. Which of the following strategies would be **MOST** effective?

- A. Use a very short solenoid with many turns of wire and high current.
- B. Use a long solenoid with many turns of wire and a low current.
- C. Use a short solenoid with few turns of wire and a high current.
- D. Use a long solenoid with many turns of wire and a low current.

18. If we have two inputs A (0011) and B (0101). Which one of the following is **NOT** true?

- A. If we use AND gate the output is 0001
- B. If we use OR gate the output is 0111
- C. If we use NAND gate the output is 1000
- D. If we use NOR gate the output is 1000

19. An object is 30cm in front of a converging lens of focal length 100cm. The image is
- real and the same size as the object.
 - virtual and larger than the object.
 - real and larger than the object.
 - virtual and smaller than the object.
20. Which one of the following is not true?
- Refraction → changing of wave length and speed.
 - Critical angle → when total internal reflection occurs.
 - Power of lens → directly proportional to focal length
 - Diffraction → change of direction around obstacle
21. If the unit of mass is x, the unit of length is y, and the unit of time is z , what is the unit of force?
- $\frac{x \cdot y^2}{z}$
 - $\frac{x \cdot y}{z^2}$
 - xyz
 - $\frac{x \cdot y}{z}$
22. In which of the following cases the magnitude of $\vec{A} + \vec{B}$ could be equal to the magnitude of $\vec{A} - \vec{B}$? When the vector _____.
- point in the same direction
 - are perpendicular to each other
 - point in the opposite direction
 - have any angle between them
23. A car moving at 100km/h is 80km behind another car moving at 60km/h in the same direction. How far does the first car travel before it overtakes the second car?
- 80km
 - 120km
 - 160km
 - 200km
24. Which of the following statements is/are correct?
- If speed of a body is varying, its velocity must be varying and it must have non-zero acceleration.
 - If velocity of a body is varying, its speed must be varying.
 - A body moving with varying velocity may have constant speed.
 - A body moving with varying speed may have constant velocity, if its direction of motion remains constant.
- only 4 is correct
 - 1 and 2 are correct
 - 3 and 4 are correct
 - 1 and 3 are correct

25. A 2kg object is subjected to a force $\vec{F} = (6\hat{i} + 8\hat{j})$ N. If the object starts from rest, what will its velocity be after 5 seconds?

- A. 5m/s B. 15m/s C. 20m/s D. 25m/s

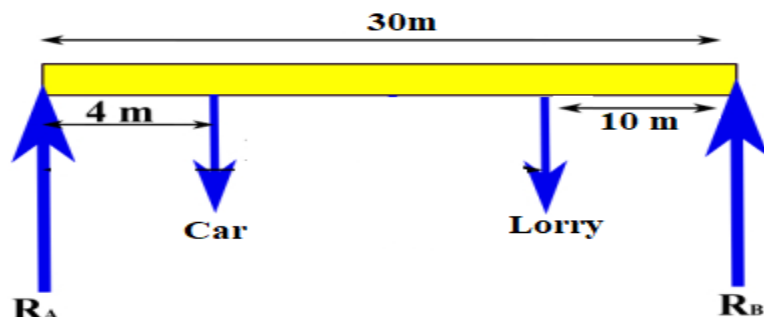
26. A body at rest may have _____.

- A. energy B. momentum C. speed D. velocity

27. Which of the following statements is NOT correct about moment of inertia?

- A. It depends on the axis of rotation.
 B. It depends on the distribution of mass.
 C. Its value will be high as more mass is farther from the axis of rotation.
 D. Its value will be high as more mass is closer to the axis of rotation.

28. A uniform bridge AB 30m long and weighing 2×10^5 N rests on supports at A and B. Find the forces on support B (R_B) when a car of weight 10^4 N is 4m from A and a lorry of weight 10^5 N is 10m from B.



- A. 6.8×10^4 N C. 1.68×10^5 N
 B. 3.4×10^4 N D. 1.74×10^5 N

29. A load causes a wire to stretch by the amount y . If the same load is applied to another wire of the same material but twice as long and with twice the diameter, the second wire will stretch by the amount _____.

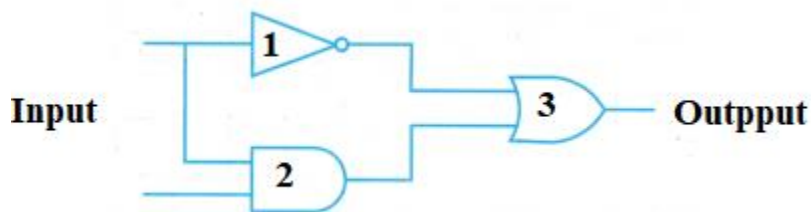
- A. y B. $2y$ C. $y/2$ D. $y/4$

30. The unit of specific heat capacity in terms of SI basic units is

- A. $\text{kg}^{-1} \text{m}^2 \text{k}^{-1}$ B. $\text{m}^2 \text{s}^{-1} \text{k}^{-1}$ C. $\text{m} \text{s}^{-1} \text{k}^{-1}$ D. $\text{m}^2 \text{s}^{-2} \text{k}^{-1}$

- B. Planet B experiences a stronger gravitational force and orbits faster.
 - C. Both planets experience the same gravitational force and orbit at the same speed.
 - D. It depends on the composition of the planets, not just their mass.
39. If a barometer were constructed using a liquid less dense than mercury, then:
- A. A tube of larger diameter would be needed
 - B. The liquid column will be unchanged for a given pressure
 - C. A longer tube may be necessary.
 - D. None of the above
40. An object will float on water if its relative density is _____. (Assume no external force is applied on the object).
- A. Less than one
 - B. Equals to one
 - C. greater than one
 - D. All of the above
41. If the diameter of a pipe through which an incompressible fluid flows is cut in half, the speed of flow will _____.
- A. also be cut in half
 - B. double
 - C. decrease by 1/4
 - D. quadruple
42. What is the force at the bottom of the pool 20.0m by 8.0m whose uniform depth is 2.0m? Take atmospheric pressure = 100 KPa .
- A. $3.0 \times 10^5\text{ N}$
 - B. $2.0 \times 10^7\text{ N}$
 - C. $4.8 \times 10^7\text{ N}$
 - D. $6.0 \times 10^7\text{ N}$
43. What is one common cause of risk associated with high-pressure systems?
- A. Low energy consumption
 - B. Slow-moving fluids
 - C. Decreased operational efficiency
 - D. Potential for explosive release of stored energy
44. A current-carrying wire creates a magnetic field around it. This relationship demonstrates that:
- A. Moving electric charges can generate a magnetic field.
 - B. Static electricity is always accompanied by a magnetic field.
 - C. Magnets can attract or repel currents flowing in wires.
 - D. Electric current is simply the flow of magnetism through a conductor.

45. Electromagnetic induction is the process by which:
- A stationary charge creates a magnetic field
 - A changing magnetic field induces an electric current
 - Electromagnets lose their magnetism over time
 - Electrons are transferred between conductors
46. A 50-turn rectangular coil of dimensions $5\text{cm} \times 10\text{cm}$ is perpendicular to a magnetic field that increases uniformly in magnitude from 0.5T to 2.5T in 0.25s . What is the resulting induced current if the coil has a resistance of 2.0Ω ?
- 1A
 - 1.5A
 - 2.5A
 - 4A
47. A diode is used in half-wave rectification of **A.C.** circuit. This is because it:
- Generates only half of the current in a circuit.
 - Allows current to flow in one direction only.
 - Reduces the current in a circuit by half.
 - Absorbs the current in the second half of the ac cycle.
48. Consider the following combination of logic gates as shown below.



- Which one is the correct name of symbols' that represents logic gates ordered **1, 2 and 3** respectively?
- OR, NOR, NAND
 - NOR, NAND, AND
 - NOR, NAND, OR
 - NOT, AND, OR
49. Which statement best describes the difference between forward bias and reverse bias?
- Forward bias allows current flow while reverse bias blocks current flow.
 - Reverse bias allows current flow while forward bias blocks current flow.
 - Both forward and reverse bias allow current flow.
 - Neither forward nor reverse bias allows current flow.
50. If a transistor, under common emitter configuration, has a gain of 200. If the base current is $10\mu\text{A}$, the approximate value of the emitter current would be:
- 2mA
 - 5mA
 - $2\mu\text{A}$
 - $5\mu\text{A}$