**SOUTHERN PROVINCE**

**NYANZA DISTRICT**

**TERM TWO**

**SENIOR TWO**

**PHYSICS COMPREHENSIVE ASSESSMENT (100Marks)**

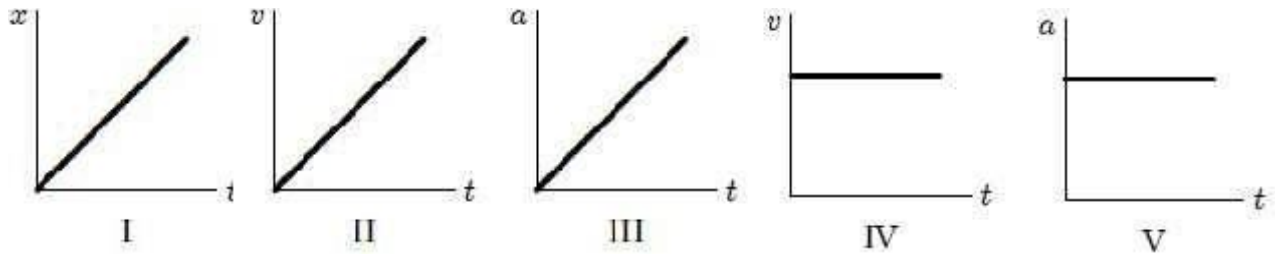
**Instructions**

**This paper is composed by two sections A and B:**

**Do all questions from section A and three questions of your choice from section B**

**SECTION A(70marks)**

**Q1.A)** Consider the following five graphs (note the axes carefully).Which of these represents motion at constant speed? **(1mark)**




a) IV only

b) IV and V only

c) I, II, and III only

d) I and II only

e) I and IV only

**B)**A boat moves forward when water is pushed back. The basic physical law applicable here is? **(1mark)**

a) Law of floatation

b) Newton's second law of motion

c) Pascal's principle

d) Newton's 3rd law of motion

**C)** Why do hot air balloons float? **(1 mark)**

a. The cold air outside the balloon forces the balloon up
b. Hot air balloons contain helium
c. Hot air in the balloon is less denser than cold air outside, making the balloon lighter than air
d. Hot air is more denser than cold air

**D)** Two identical beakers are both halves filled with a liquid. Beaker A contains water and Beaker B contains a liquid that is denser than water, which of the following is false?

a) The pressure at the bottom of Beaker B is greater than that at the bottom of Beaker A.

b) The pressure within each fluid is exerted equally in all direction.

c) The mass of fluid in Beaker B is greater than the mass of fluid in Beaker A

d) The volume of fluid in Beaker B is equal to the volume of fluid in Beaker A **(1mark)**

**Q2.** Name the physical quantities measured by the following measuring instruments. **(4marks)**

(a) A beam balance

(b) A measuring tape

(c) A wattmeter

(d) A dynamometer

(e) A speedometer

Q3. Respond by true or false for each the following statement.

(a) Friction force is a force that acts in an opposite direction of movement. **(1mark)**
(b) The type of friction force occurs when solid surfaces slide over each other is known as rolling friction**.** **(1mark)**
(c) The type of friction which occurs as an object is not moving is static friction. **(1mark)**
(d) Friction force is as a friend as it reduces the efficiency of using machines. **(1mark)**

Q4. A train increases its speed steadily from 10 m/s to 20 m/s in 2seconds. Find:

a) The average speed of the train during this time inm/s.**(2marks)**

b) The distance the train travels while increasing its speed. **(2marks)**

Q5. a) Differentiate between a vector quantity and a scalar quantity and give two examples of each quantity. **(2marks)**

b) What is meant by anon-uniform velocity? **(1mark)**

c) A car moving with a velocity of 10 m/s accelerates uniformly at the rate of 3 $m/s^2$ to reach 34*m/s.* Find the time taken. **(3marks)**

Q6. (a) State Archimedes 'principle. **(2marks)**

(b)A piece of a metal is weighed

i. In air

ii. Fully submerged in water

iii. Fully submerged in a salt solution

The results obtained, but not in correct order, were 6 N, 5 N and 8N. Which reading was obtained for b(i), b(ii) and b(iii)? **(3marks)**

Q7.(a)Which instrument would you use to measure atmospheric pressure? (1**mark)**

b) With aid of a diagram show and explain that air of atmosphere exerts force. **(2marks)**

c)Calculates the pressure exerted by water at 10 m below the surface of the water in a lake. $g = 10N / kg$ and density1000kg/$m^3$. **(3marks)**

**Q8.** a) State the law o f floatation. **(2marks)**

b) A ship may travel from the sea into a river. Explain why the ship will sink deeper in the river than in the sea. **(2marks)**

**Q9**. a) What is the difference between force and pressure? **(3marks)**

b) State the principle of transmission of pressure in fluids. **(2marks)**

**Q10**.a) What is meant by the term ‘‘viscosity?’’ **(2marks)**

b) What effect does soap have on the surface tension of water? **(2marks)**

**Q11**. Identify the physical quantity whose dimensions are the following:

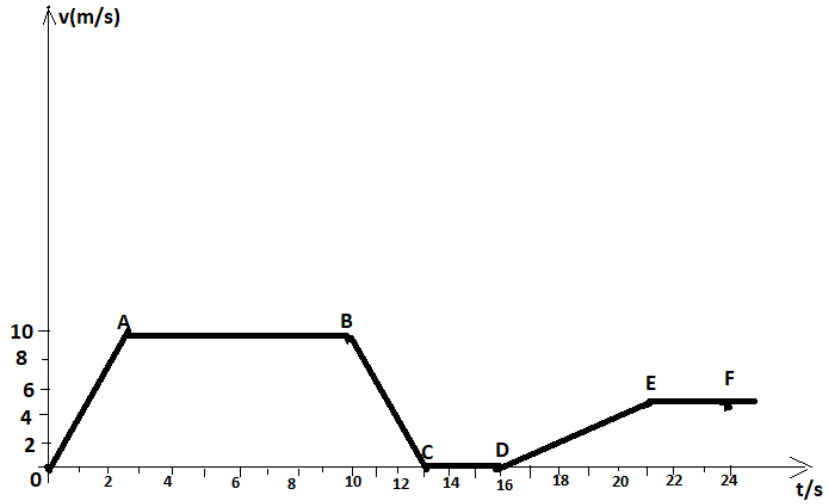
i) $[M^0LT^{-1}]$ /**1mark**

ii) $[MLT^{-2}]$ /**1mark**

b. Copy and complete the table below /**4marks**

| Numbers | Significant figures |
|---|---|
| 102.500 | |
| 0.00300 | |
| 307000 | |

**Q12.** The diagram below shows how the speed of a bus changes during a part of its journey.



Choose the correct words from the following list to describe the motion during each segment of the journey to fill in the blanks:

- Accelerating
- Decelerating
- Constant speed
- At rest

a) For segment 0-A, the bus is……, its speed changes from 0 to 10m/s in 5seconds. **/1mark**

b) For the segment A-B, the bus is moving at …….. of 10m/s for 5seconds. /**1mark**

c) For segment B-C, the bus is …….. It is slowing down from 10m/s to rest in 3seconds. **/1mak**

d) For segment C-D, the bus is …….. It has stopped. **/1mark**

e) For segment D-E, the bus is …….. It is gradually increasing in speed. /**1mark**

Q13.Match the following gas laws with the equation representing them. **(4marks)**

| | |
|---|---|
| (i)Boyle's law | (a) $P_{total}=P_1+P_2+P_3+\ldots P_n$ at constant T and V |
| (ii)Charles' law | (b) $V\alpha$ T at constant n and P |
| (iii)Dalton's law | (c) P α V at constant n and T |

Q14.A rectangular plate has a length of (21.3±0.2)cm and a width of (9.80±0.10)cm. Find the area of the plate and the uncertainty in the calculated area. **(4 marks)**

**Q15.**Match each of the following physical quantity with its meaning **(5marks)**

| Physical quantity | Meaning |
|---|---|
| 1.Power | a) The capacity for doing work |
| 2.Energy | b) Any interaction that can change the motion of an object |
| 3.Work | c)The rate at which work is done |
| 4. Potential energy | d)Energy transfer that occurs when an object is moved over a distance by a force applied in the direction of the displacement |
| 5.Force | e) Energy possessed by an object because of its position |

**SECTION B (30marks)**

**Q16.a)** What is the difference between potential energy and kinetic energy? **(2marks)**

**b)** An orange fruit of mass 0.1kg falls from its tree 3m high to the ground.

**i.** State the energy changes which occur as the orange falls to the ground. **(2marks)**

**ii.** Calculate the potential energy possessed by the orange before it falls. Take g=10N/kg. **(3marks)**

iii. Calculate the kinetic energy of the orange as it hits the ground. **(2marks)**

iv. Does the orange stop immediately after it has hit the ground? **(1mark)**

**Q17**. You are provided with the following apparatus: spring balance, an object, a beaker of known weight, water and eureka-can. Outline how you can verify Archimedes' principle. Use diagrams to make your answer clear. **(10marks)**

**Q18a)** A boy runs up the stairs. Explain how you may determine his power. **(5 marks)**

b) Which type of energy does the boy use to run up stairs? **(1mark)**

**c)** A man lifts 50kg of beans through a vertical height of 2m in 5s. Calculate

(i). the minimum force required **(1mark)**

(ii). the work done **(2mark)**

(iii). the power of the man **(1 marks)**

Q19. Explain the following:

a) An egg sinks in fresh water, but floats in a strong salt solution. **(2marks)**

b) A toy balloon filled with hydrogen rises to the ceiling, but if filled with carbon dioxide sinks to the floor. **(2marks)**

c) An iron nail sinks in water while an iron ship floats on water. **(2 marks)**

d) A balloon filled with hydrogen rises to a certain height and then stops rising further **(2marks)**

e) A ship submerges more as it sails from sea water to river water. **(2marks**

**Q20. a)**The equation of state of an ideal gas is PV = nRT, for each of these symbols state the physical quantity and SI unit. Use a table like the following one below. **(5marks)**

| Symbol | Name of Physical quantity | SI Unity |
|---|---|---|
| P | | |
| V | | |
| N | | |
| R | | |
| T | | |

**b.** A600 ml sample of nitrogen is warmed from$77^0$C to $87^0$C find its new volume if the pressure remains constant. **(3 marks)**

**c**. A container of an ideal gas has a volume of 0.10 $m^3$at a pressure of $2.0x10^5$$N/m^2$and a temperature of $27^0$C.Find the new pressure if the gas is heated at constant volume to $57^0$C

**(2marks)**

**Happy Easter day !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!**