**FORM 2 PHYSICS TERM ONE 2023**

**MARKING SCHEME**

1. Differentiate fundamental quantities from derived quantities and give an example of each.(4mks)

**Fundamental quantities are quantities that cannot be obtained from physical quantities e.g. Length, mass, time etc. while derived quantities are quantities that are obtained by either division or multiplication of basic physical quantities e.g. Area, Volume, density etc.**

1. State what the following branches of physics deals with:(6mks)
   * 1. **Mechanics This branch deals majorly with motions under the influence of forces**

**ii) Electricity and magnetism this branch looks at the interaction between electric fields and magnetic fields and the applications of such interactions.**

**(iii) Thermodynamics This branch looks at how heat as a form of energy is transformed to/from other forms of energy.**

1. a) Define volume and give its SI units.(2mks)

**Volume refers to the amount of space occupied by matter. The SI unit of volume is the cubic meter (**.**)**

b) The mass of an empty density bottle is 20g. When the bottle is full of paraffin it weighs 60g and when full of water weighs 70g. Calculate the density of paraffin in SI units.(4mks)

***Mass of paraffin =60 – 20 = 40g***

***Mass of water 70 – 20 = 50g***

***Volume of water = = = 50*.**

***Volume of water = volume of paraffin = 50 cm 3***

***Density of paraffin == = = 0.8g/cm3 = 800kg/*.**

1. a) Define force (1mk)

**Force refers to a push or a pull that result from interaction of bodies.**

1. The diagram below shows drop of liquids X and Y carefully put on a clean flat glass slab

**Glass slab**

**X**

**Y**

**Explain** the shapes of the drops (2mks)

**X – Adhesive force between the glass and liquid x molecules are stronger than cohesive forces. liquid Y rolls into small droplets because its cohesive forces are stronger than adhesive forces.**

1. State **three** differences between mass and weight. (3mks)

|  |  |
| --- | --- |
| **Mass** | **weight** |
| **The quantity of matter in an object body** | **Gravitational pull on an object** |
| **The SI unit kg (kilogram)** | **SI unit is the newton** |
| **Constant everywhere** | **Varies from place to place** |
| **A scalar quantity** | **A vector quantity** |
| **Measured using a beam** | **Measured using a spring balance** |

1. a) Two samples of bromine vapor are allowed to diffuse separately under different conditions, one in a vacuum and the other in air. State with reasons the conditions in which bromine will diffuse faster (2mks

**Bromine diffuses faster in a vacuum because there is no air molecules which will collide with bromine gas particles as it move along.**

b) In an experiment to demonstrate Brownian motion, smoke was placed in air cell and observed under a microscope. Smoke particles were observed to move randomly in the cell.

1. Explain the observation(2mks)

**The random motion is due to constant collision of smoke molecules with air particles which are in random motion.**

1. What would be the most likely observation if the temperature in the smoke cell was raised?(1mk)

**Random motion will be more vigorous due to increase in energy content of smoke and air particles**

1. Give a reason why gases are more compressible than liquids (2mks)

**Gas particles are widely spread , they also have weak cohesive forces**.

1. a) Distinguish between **heat** and **temperature (2mks)**

**Temperature is the degree of hotness or coldness of a body while Heat is a form of energy that flows from hot to cold object.**

b) In a ball and ring experiment, the ball goes through the rings at room temperature. When it is heated it does not go through the ring, but when left on the ring for some time, it goes through. Explain this observation (2mks)

**When the ball is heated it expands and that is why it does not go through the ring.**

**When it is left for some time it cools and contracts. At the same time the temperature of the ring increases and it expands so that the ball goes through.**

c) State the reason why electricity transmission cables are left sagging between the posts.(1mk)

**To allow room for contraction when it is cold**

1. Give a reason why a concrete beam reinforced with steel does not crack when subjected to changes in temperature.(1mk)

**They have the same linear expansion rate.**

1. i) Explain why in cold weather the metal blade of a knife feels colder that the wooden handle. (2mks)

**Thermal conductivity of metal is greater than wood. Metal conducts heat away from the hand faster than wood, which is a poor conductor.**

1. The Figure below shows a copper rod of uniform thickness being heated. The ends of the rod are dipped In water and mercury with wax at the bottom.

**Copper rod**

**Water**

**Wax**

**Mercury**

**Wax**

**Asbestos shields**

1. State the use of asbestos shields.(1mk)

**To prevent heat from reaching the wax by radiation**

1. State two observations made in this experiment. (2mk)

**-all the wax at the bottom of mercury falls.**

**-Wax at the bottom of water remains.**

1. What conclusion can be made from the experiment above.(1mk)

**Copper and mercury are good heat conductors.**

1. a) Define pressure and state its SI units(2mks)

**Force acting normally per unit area. SI unit is newton per square meter**

1. What is the reason why a trailer carrying heavy loads has many wheels?(2mks)

**The many wheels increase the area of contact between the lorry and the road which reduces the pressure exerted by the lorry on the road. This prevents the trailer from sinking as it moves and also minimizes road damage**

1. Name **two** factors that affect pressure in fluids. (2 marks)

**Depth/ height of fluid column**

**Density of the fluid**

d) A submarine is **40m** below sea water of density **1020 kg/m3**. If the atmospheric pressure at the place is **103,000Pa**, calculate the total pressure acting on the submarine. (4 marks) **Total pressure =** **atmospheric pressure + pressure due to column of water**

**= 𝟏𝟎𝟑 𝟎𝟎𝟎 + (𝟏𝟎𝟐𝟎 × 𝟒𝟎 × 𝟏𝟎)**

**= 𝟏𝟎𝟑 𝟎𝟎𝟎 + 𝟒𝟎𝟖 𝟎𝟎𝟎**

**= 𝟓𝟏𝟏 𝟎𝟎𝟎𝑵𝒎−𝟐**