Physics senior one marking guide 2023-2023 Kayonza District

1. a) The word science is derived from the Latin word '**scientia**' which means knowledge attained through study and practice. or

Science refers to a systematic study that uses observation and experimentation to describe and explain natural phenomena. **(1mark)**

b. **Physics** is a natural science that is concerned with the study of matter and natural forces **(1mark)**

c) **Prefixes** are words that used or fixed before the SI units. **(1mark**)

2. a) Weight **(1mark)**

b) Weight **(1mark)**

c) Mass **(1mark)**

3)a. **Quantity** may be defined as any observable property or process in nature with which a number may be associated.

b. **Fundamental quantity** are those quantities that are not defined in terms of other quantities. (**0.5 for each**)

c. Quantities which are defined in terms of the fundamental quantities via a system of equations are called **Derived quantities**.

4.a.i)12Gigametre=12x10^9m=12000000000m ii) $13\mu g = 13x10^{-6}kg$ iii)92.4Khz=92400hz (**0.5 mark for each)**

b. Write out the following numbers in full with the correct number of zeros: (**0.5mark for each)**

8.69× 10^4kg =86900kg

9.1× $10^{-3}kg$ =0.0091kg

c. A sea vessel carries 2 megatons of cargo. What is this mass in kg? =2x$10^6 tons = 2x10^9$ kg (**1mark)**

d. Write the following numbers in powers of 10 notations: (**0.5mark for each)**

(i) 328.65=3.2865x10^2

(ii) 0.0068=6.8x10^{-2}

5. Vernier caliper, micrometer screw gauge (**1mark**)

6.$\rho = \frac{m}{v}$ ⇒ $V = \frac{m}{\rho}$=2× $10^{-2}m^3$ (**2marks)**

7. (a) Speed describes how fast something is moving; it is scalar quantity while velocity describe how fast something is moving in specific direction; it is a vector quantity. (2marks)

b. Acceleration: $a = \frac{\Delta v}{\Delta t} = V = \frac{50-20}{0.5} = 60km/h^2$ (2marks)

8. i. Matter is anything that takes up space and can be weighed or anything that has mass and occupies space.

ii. An element is a substance which cannot be split into a simpler substance. (1 mark for each)

Or Matter that made up of same kind of particles

iii. a **compound** is matter that made up of different kinds of particles.

9. **Intensive property**; it is a characteristic of matter that does not depend on the amount of matter being measured. They are the same even if it is for one gram or a 1000 kg of the substance. e.g. colour, odour, density, conductivity, hardness while **Extensive property**; is any characteristic of matter that depends on the amount of matter being measured e.g. mass, weight, volume and length. **(2marks for difference and 1mark on examples)**

10. a. Mechanical advantage$= \frac{Load}{Effort} = \frac{300N}{60N} = 5$ **(2marks**)

b) Efficiency=$\frac{M.A}{V.R} = \frac{5}{8}X100\%$ (1mark)

=62.5% (1mark)

11) a. Firewood, electricity, sun, biogas,gas (2mark)

b) Work done against gravity in lifting an object becomes potential energy of the object-earth system or $\Delta GP_E = mgh$ (1mark)

c) Photovoltaic cells or soral pannel 1mark()

12.a)

Weight	Mass
Is constant regardless of the area (0.5 mark)	Change with altitude and location. (0.5 mark)
Is a scalar quantity (0.5 mark)	Change with altitude and location. (0.5 mark)
Quantity of matter in an object.	Is a vector quantity
Is measured in kg	Is force of gravity acting on an object.
Is measured using a beam balance	Is measured in Newton

b) The acceleration due to gravity on the Moon is less than that of on the earth. (1mark)

c) W=mxg=80kgx10N/kg=800N (1mark)

13) a. Force is something which tries or tends to change an object's state of rest (static effect) or that of uniform motion (dynamic static) in straight line. It is also defined as a push or pull on a body. Whenever there is an interaction between two objects, there is a force upon each of the objects. ()1mark)

b) friction force, gravitational force, Spring F0rce, Nuclear Forces, Electrical forces, Magnetic forces (2mark)

c)- Newton's first law of motion states that: "**A body continues in its state of rest or uniform motion in a straight line unless compelled by some external force to act otherwise**". (2marks)

- Newton's second law of motion. It states that; "**The acceleration (a) of an object is directly proportional to net (resultant) force(F) acting on it and inversely proportional to its mass; and the acceleration takes place in the direction of the resultant force**". (2marks)

- Newton's third law of motion states that **whenever a body exerts a force on another body, the other body exerts an equal but opposite force on the first body**. This is sometimes stated as, to every **action** there is an equal and **opposite reaction**. (2marks)

14) The center of gravity of a tall person is high and makes him to be unstable; hence he is therefore likely to fall down. Or the center of gravity of a tall person is high. A slight force would exert turning force out of the body of a tall person and hence fall down. (1mark)

15a) Stable equilibrium, unstable equilibrium and neutral(static) equilibrium. (3marks)

b) Increase the support base, lower center of gravity. (3marks)

SECTION B

16.a) Distance is a scalar quantity describing the length of the path between two points along which the particle has travelled while displacement is a vector quantity; defined as moved in specified direction or the change from its initial position to its final position (2marks)

b) i. Displacement is zero, distance=8km 2marks()

ii)Average speed V=$\frac{\Delta S}{\Delta T} = \frac{8Km}{2h} = 4km/h$ (3marks)

c) **A renewable energy source** is a resource we can access infinitely; it's one that constantly replenishes itself without human involvement. Renewable energy sources come from natural elements such as wind, water, the sun and even plant matter. There will always be wind blowing, sun shining and water flowing, regardless of how much of each resource we use to produce energy. (1.5marks)

Nonrenewable energy sources, on the other hand, are only available in fixed amounts. In most cases, this refers to fossil fuels such as natural gas, oil, and coal. While these resources did originate from organic matter, they take hundreds of thousands of years to create and require a hyper-pressurized environment to become the oil, coal and gas we can use for fuel. Once burned, they are gone forever. (1.5marks)

17.a) Potential energy may be defined as the energy possessed by an objects or bodies due to their position or state of strain or the position of their parts. (0.5mark)

Potential energy is energy deriving from position. Potential energy is referred to as stored energy because it can be looked at as energy which will be used when time comes for it to be used while kinetic energy is the form of energy possessed by moving bodies. Kinetic energy of a body is dependent upon both the body's mass and speed.(0.5mark)

b) i) Potential energy-kinetic energy-sound energy-heating energy (1mark)

ii) potential energy: PE=mgh=0.1x10x3=3J (2marks)

iii) Loss of potential energy=gain in kinetic energy when h=0 (2marks)

loss of potential energy:$\Delta PE = mgh - mg \times 0 = 3J$

C) Work transferred W=Fd=5000x300=1500KJ (2marks)

d) The power of a person P=$\frac{Wd}{t} = \frac{600x10x0.15}{2} = 450W$ (2marks)

18. a.The **Centre of gravity** of a body is the point from which the whole weight of the body appears to act. (1mark)

The Centre of gravity of an object is constant i.e. at the one location when a body in a place with uniform while

Centre of mass of an object on the other hand is the point where all the mass of the object is concentrated. (1mark)

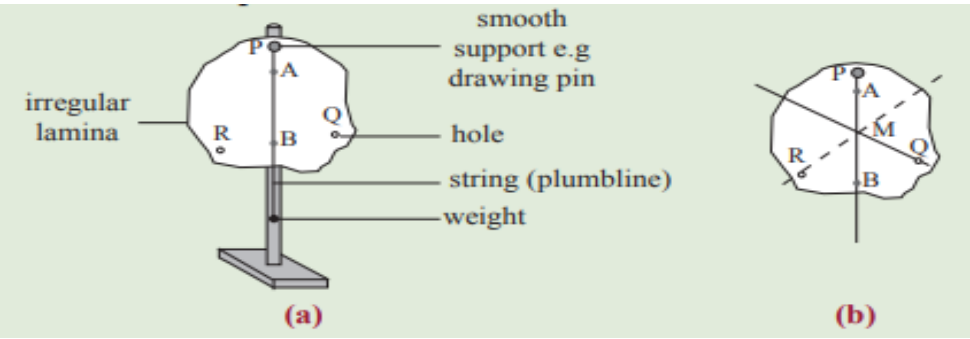
b) Steps followed for determining the Centre of gravity of irregular lamina (3.5marks)

1. Make three holes P, Q and R on an irregularly shaped lamina as close as possible to the edges and far away from each other.

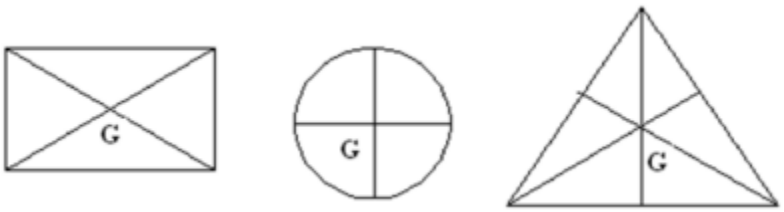
2. Suspend the lamina on the clamp using the drawing pin through each hole at a time.

3. Suspend a plumb line (a thin thread with a small weight at one end) from the point of support, P And draw the line of the plumb line on the lamina by marking two points A and B far apart and joining them.

4. Repeat the steps with the support Q and mark the point M where the two lines intersect.



c) (4.5marks)



19)a. Efficiency=$\frac{M.A}{V.R}X100\%$ (0.5mark)

75=$\frac{M.A}{4}X100\%$ (1mark)

M.A=3 (0.5 mark)

b) M.A=$\frac{Load}{Effort}$ (1)

3=$\frac{Load}{500}$ (1mark) Load=1500 N (1mark)

C) Work=Force ×distance in the direction of force (1mark)

=1500× 4 (1mark)

=6000J (1mark)

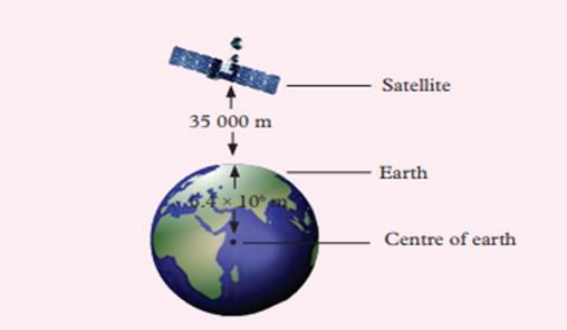
d) Rate of doing work=Power

Power $=\frac{Work\ done}{time}$

$=\frac{6000}{120}=50W$ (2marks)

20.a) The law states that any two bodies in the universe attract each other with a force that is directly proportional to the product of their masses and inversely proportional to the square of the distance between them. (2marks)

i) Distance of satellite from the center of the earth=Radius of the earth +Distance of satellite from the surface of the earth.



=35000m+6.4× 10^6m

=35000m+$64000000m$

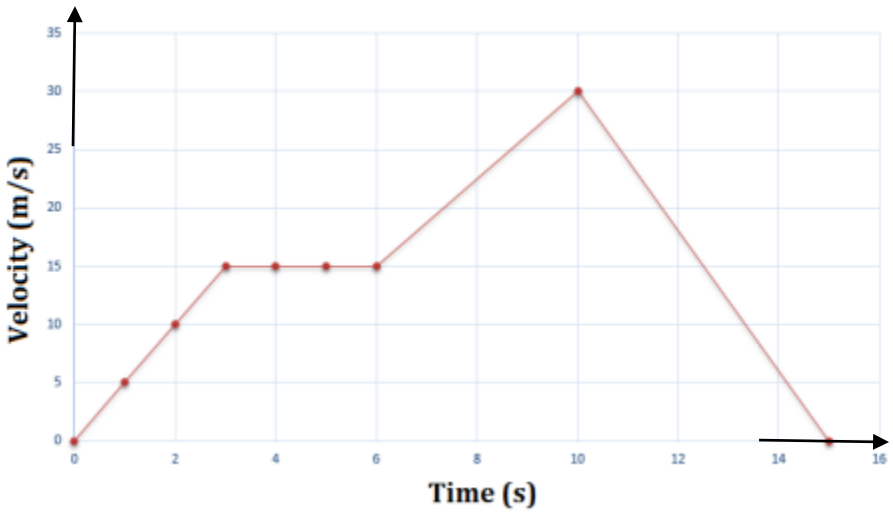
6435000m or 6.435× 10^6m (3marks)

ii) to determine force of attraction between the earth and satellite

$m_1 = 5.97 \times 10^{24}kg,\ m_2 = 300kg\ , r = 6.435 \times 10^6m, G = 6.67 \times 10^{-11}Nm^2/kg^2$

$F = \frac{Gm_1m_2}{r^2}$=$\frac{6.67\times10^{-11}\times5.97\times10^{24}\times3\times10^2}{(6.435\times10^6)^2}$=288.48N (3marks)

C) $a = \frac{F}{m} = \frac{20N}{300m/s}$=0.0667m/s^2 (2marks)



(mark for each a :4.5marks+1mark for two arrows + fit line 1mark+scales 1mark)

b) i. Acceleration: a=$\frac{\Delta V}{\Delta t} = \frac{15-0}{3} = 5m/_{s^2}$ (2marks)

ii) Acceleration is constant for 3 s (1.5 marks)

iii) Acceleration a= =$\frac{\Delta V}{\Delta t} = \frac{0-30}{15-10} = -6m/_{s^2}$ hence deceleration is 6 $m/_{s^2}$ (2marks)

iv) Distance moved during 3 s S:=$\frac{1}{2}at^2 = \frac{1}{2}5(3)^2 = 22.5m$ (2marks)

or area under the graph: A=$\frac{BXH}{2}$=$\frac{3X15}{2} = 22.5m$ (2marks)