MINEDUC
GASABO DISTRICT
LEVEL: SENIOR ONE (S1)
SUBJECT: PHYSICS
Duration: 3hours

PHYSICS MARKING GUIDE 2nd TERM EXAMINATION S1

1. a) True **(1mark)**
b) True **(1mark)**
c) False **(1mark)**
d) False **(1mark)**
e) True **(1mark)**

2.

a. **Given** **asked**
AB = 150 m distance=?
BC = 200 m

Solution and formula

Distance; AC=150m + 200m = 350m **(2marks)**

b. **Given** **asked**
AB = 150 m displacement=?
BC = 200 m

Solution and formula

Displacement AC=$\sqrt{AB^2 + BC^2}$ **(1mark)**
Displacement AC=$\sqrt{150^2 + 200^2} = 250m$ **(1mark)**

3.

a) Viscosity **(1mark)**
b) Inertia **(1mark)**
c) Friction **(1mark)**
d) Efficiency **(1mark)**

4.

a.

i. **Heat:** is a form of energy that is transferred from the hot body to a cold body SI Unit Joule(J) **while (1mark)**
ii. **Temperature**: is a degree of hotness and coldness of the body SI Unit Kelvin(o_K) **(1mark)**

b. To express the room temperature of 27ºC in Kelvin, you need to add 273.15 to the Celsius temperature:27ºC + 273.15 = 300.15 Kelvin (K)
So, the room temperature of 27ºC is 300.15 Kelvin **(1mark)**

c. $C=\frac{5}{9}(F-32)=\frac{5}{9}(-40-32)=$ -40°C **(1mark)**

5. **Give** **asked**

$\rho = 13.6\, g/cm^3$ $v = \frac{m}{\rho}$ **(1mark)**

$m = 200g$

Solution and formula

$$\text{v} = \frac{m}{\rho} = \frac{200g}{13.6\, g/cm^3} = 14.7cm^3 (\textbf{1mark})$$

6.

a) Given **asked**

M=60kg power:?

Steps=35

$h_{one\ step}$=$10cm$

T=4S

$g = 10\, m/s^2$

Solution and formula

f = mg = 60kg × $10\, N/kg$=600N **(0.5marks)**

$h_{total} = 10cm \times 35 = 350cm = 3.5m$ **(0.5marks)**

W=$F \times d = 600 \times 3.5 = 2100J$ **(1mark)**

P=$\frac{W}{T} = \frac{2100J}{4S} = 525Watt$ **(1mark)**

b) Given **asked**

M=30kg w=?

S=6m P.E=?

.$g = 10\, N/Kg$

Solution and formula

i) W=$F \times S = 30Kg \times 6m \times 10\, N/kg = 1800J$ **(2marks)**

ii) $P.E = mgh = 30kg \times 6m \times 10\, N/kg$=1800j **(1mark)**

iii) The work done against gravity is stored as P.E in the body **(1 mark)**

7.

a. Newton's second law of motion "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."

F α$\frac{m(\Delta s)}{t}$. **(1mark)**

b. Given **asked**

M=50kg W=?

$g = 10\,N/kg$

Solution and formula

$w = mg = 50kg \times 10\,N/kg = 500N$ **(1Mark)**

c. Given asked

$M_{satelite}$=300kg $r_{satellite} fr\ earth$=

H=35000m F=?

M_{earth}=$5.97 \times 10^{24} kg$

$r_{earth} = 6.4 \times 10^{6} m$

$G = 6.67 \times 10^{-11} N\,m^2/Kg^2$

Solution and formula

i. $r_{satellite}\ from\ the\ earth = 35000m + 6400000m =$ 6435000m **(1mark)**

ii. $F = G\frac{m_{earth} m_{satellite}}{r_{satellite}{}^2} =$ **(1mark)**

$F = \frac{300kg \times 5.97 \times 10^{24} kg \times 6.67 \times 10^{-11} m}{(6.435 \times 10^6)^2}$=288.48m **(1mark)**

8.

a) Applying the principle of moments

750x = 250(2 – x) **(0.5marks)**

750x = 500 – 250x **(0.5marks)**

1 000x = 500 **(0.5marks)**

x = 0.5 m from the end with 750 N. **(0.5marks)**

b)

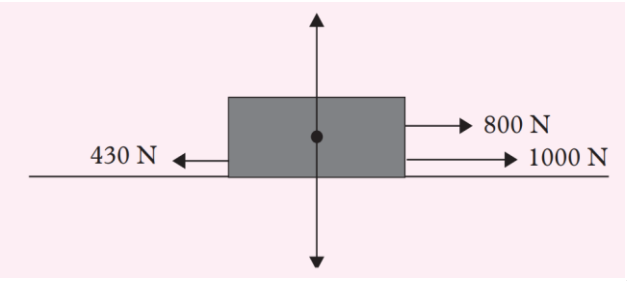
iii. velocity ratio=$\frac{effort\ distance}{load\ distance} = \frac{1.5}{0.5}$=3 **(1mark)**

iv. $M.A = \frac{750N}{250N} = 3$ (**1mark)**

v. Efficiency$\frac{M.A}{V.R} \times 100\% = 100\%$ **(1mark)**

c) We have assumed that there is no friction and that the crowbar is weightless **(1mark)**

9.a



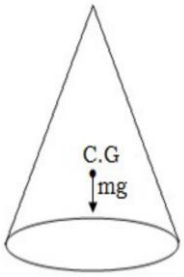
/2marks

b) Force exerted by the oxen = 800 N + 1000 N **(0.5marks)**
Force exerted by friction = -430 N **(0.5marks)**
The total force on the crate = 800 + 1000 – 430 N = 1370 N**(1mark)**
The resultant force on the crate = 1370 N

c). Since the force is positive its direction is forward. **(1mark)**

10. Stable equilibrium

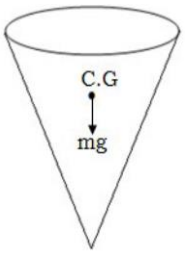
The object is in stable equilibrium if it returns to its original position after being slightly displaced. For instance, a cone is placed on its base.



(1mark)

Unstable equilibrium

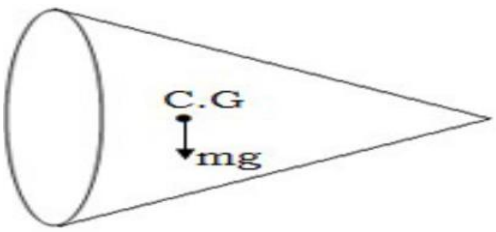
An object is in unstable equilibrium if it moves further away from its original position after being lightly displaced. For instance, a cone is placed on its tip.



(1mark)

Neutral equilibrium

An object is in neutral equilibrium if it remains where it is after being lightly displaced. For instance, a cone lying on its side.



(1mark)

11.

a. From liquid to a solid: **Freezing** or **Solidification (1mark)**
b. From gas to solid: **Deposition (1mark)**
c. From solid to liquid: **Melting** or **Fusion (1mark)**
d. From a liquid to a gas: **Vaporization** or **Boiling** (if it occurs at the boiling point) or Evaporation (if it occurs below the boiling point) (**1mark)**

12.

a)

i. **Potential energy:** is energy processed by the body due to position (**1mark)**
ii. **Kinetic energy:** is energy processed by the body due to its motion (**1mark)**

b)

i. **Gravitational potential energy:** is the energy stored in an object due to its position relative to a reference point within a gravitational field. (**1mark)**
ii. **Elastic potential energy:** is the energy stored in an object due to its deformation under the influence of a force, such as stretching or compressing a spring or an elastic material (**1mark)**

C) PE=mgh=(0.5kg)×(10N/kg)×(100m)=500J (**2mark)**

13.

a) Science: is a systematic study that uses observations and experimentation to describe and explain natural phenomena. **(1mark)**

b) Is essential for maintaining eye safety and preventing injuries that could result in temporary or permanent damage to vision. **(2marks)**

c) Wash your hands with soap and water for at least 20 seconds after handling biological specimens, chemicals, or lab substances to remove any potential contaminants. **(1mark)**

14. Keep fire extinguishers or other appropriate fire suppression equipment readily available in case of emergencies **(1mark)**

15.

a. Pulley of fig1

i. V.R=2 **(1mark)**

ii. M.A=$\frac{200}{150} = 1.33$ **(1mark)**

iii. $\eta = \frac{M.A}{V.R} \times 100\% = 66.5\%$ **(1mark)**

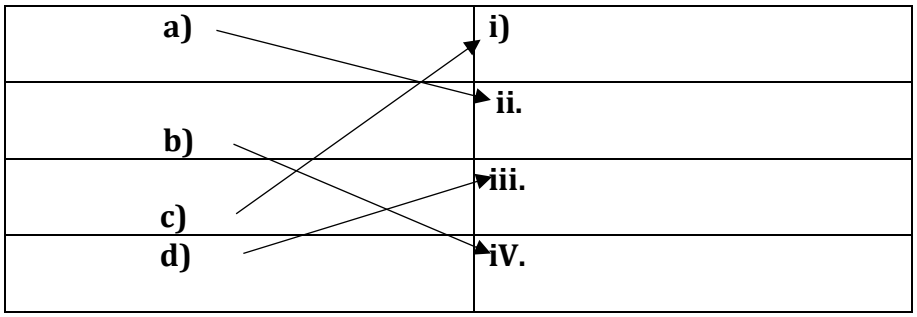
b. pulley of fig 2

i. V.R=6 **(1mark)**

ii. M.A=$\frac{210}{60} = 3.5$ **(1mark)**

iii. $\eta = \frac{M.A}{V.R} \times 100\% = \frac{3.5}{6} \times 100\% = 58.3\%$ **(1mark)**

16. (4marks)



Section B (Attempt only three questions /30marks)

17.

a) Universal Law of Gravitation.

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)**

b) Given **asked**

m_1 = 28 kg, m_2 =?

r = 1.2 m

F = 3.2×10^{-8}N,

G = 6.67×10^{-11} Nm^2/kg^2

Solution and formula

$\boldsymbol{F = G\frac{M_1M_2}{r^2}}$ **(1mark)**

$M_2 = \frac{Fr^2}{M_1G} = \frac{3.2\times10^{-8}N(1.2m)^2}{28Kg\times6.6\times10^{-11}Nm^2/kg^2} = 24.67kg$ **(3marks)**

c) Given **asked**

$m_1 = 20$ kg r =?
$m_2 = 35$ kg,
$F = 3.6 \times 10^{-9}$ N,
$G = 6.67 \times 10^{-11}$Nm2 /kg2

Solution and formula

$$r = \sqrt{\frac{GM_1M_2}{F}}\ (1\textbf{mark}) = \sqrt{\frac{6.67\times10^{-11}\times20\times35}{3.6\times10^{-9}}} = 3.6m\ \textbf{(3marks)}$$

18. (10marks)

INSTRUMENT	QUANTITY OF MEASUREMENT
1. Beam balance	**a. Mass**
2. Meter ruler	b. Length in mm, cm,m.
3. Stop watch	**c. Time**
4. Manometer	d. pressure of liquid
5. speedometer	**e. speed , velocity of a vehicle**
6. Mercury barometer	f. Atmospheric pressure
7. Vernier calipers	**g. Diameter of objects.**
8. Burette, measuring cylinder, pipette	h. Small volume
9. Lactometer	**i. Specific gravity of milk**
10. ohmmeter	j. electrical resistance

19.

a)

i) The freezing point of water: This is a significant reference point in many temperature scales. For example, on the Celsius scale, it's defined as 0°C, and on the Kelvin scale, it's 273.15 K. **(1mark)**

ii) The boiling point of water: Another crucial reference point, especially for thermodynamic studies. On the Celsius scale, it's defined as 100°C, and on the Kelvin scale, it's 373.15 K. **(1mark)**

b) (4marks) for (i or a)and (ii or b)

Solution

(a) The distance between the two fixed points is 16.0 – 1.0 = 15.0 cm.
This distance represents a temperature change of (100 – 0) = 100°C.
Let (7.5 – 1.0) cm represent a temperature x °C
15 cm represents 100°C
1 cm represents $\frac{100}{15}$°C
∴ 6.5 cm represents $x = \frac{100}{15} \times 6.5$
$= 43.3$ °C
∴ The temperature reading is 43.3 °C

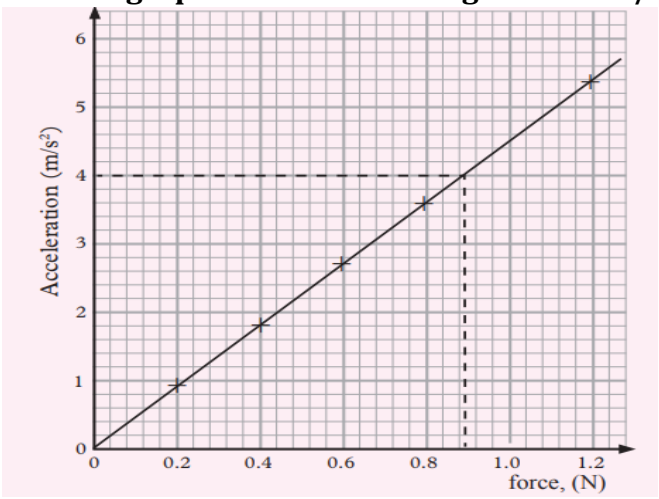
or

$\theta = \frac{x}{y} \times 100°C$
$= \frac{6.5}{15} \times 100°C$
$= 43.3°C$

(a) 100°C is represented by 15 cm
1°C represents $\frac{15}{100}$ cm
61°C is represented by $\frac{15 \times 61}{100}$ cm = 9.15
Level of mercury = 9.15 cm + 1.0 cm
= 10.15 cm

20.

a. A graph of acceleration against force/2marks



(5marks)

b. As shown in the graph, force F = 0.9 N when acceleration, a = 4.0 m/s². **(1mark)**

c. F = ma, **(1mark)** m = F /a = 0.9 N/ 4.0 m/s² = 0.225 kg **(1mark)**

21.

a. The displacement-time graph for a motorist. **(1mark)**
b. 15m **(2marks)**
c. Slope of the graph equals the speed of the motorist:

$$slope = \frac{\Delta s}{\Delta t} \ /\mathbf{1mark} = \frac{15m - 0m}{10s - 0s} = 1.5\, m/s \ \textbf{(2marks)}$$

d.

i. In the interval BC, the body is at rest because the distance is not changing. **(2marks)**

ii. In the interval CD, the motorist is moving at a constant speed towards the starting point. **(2marks)**