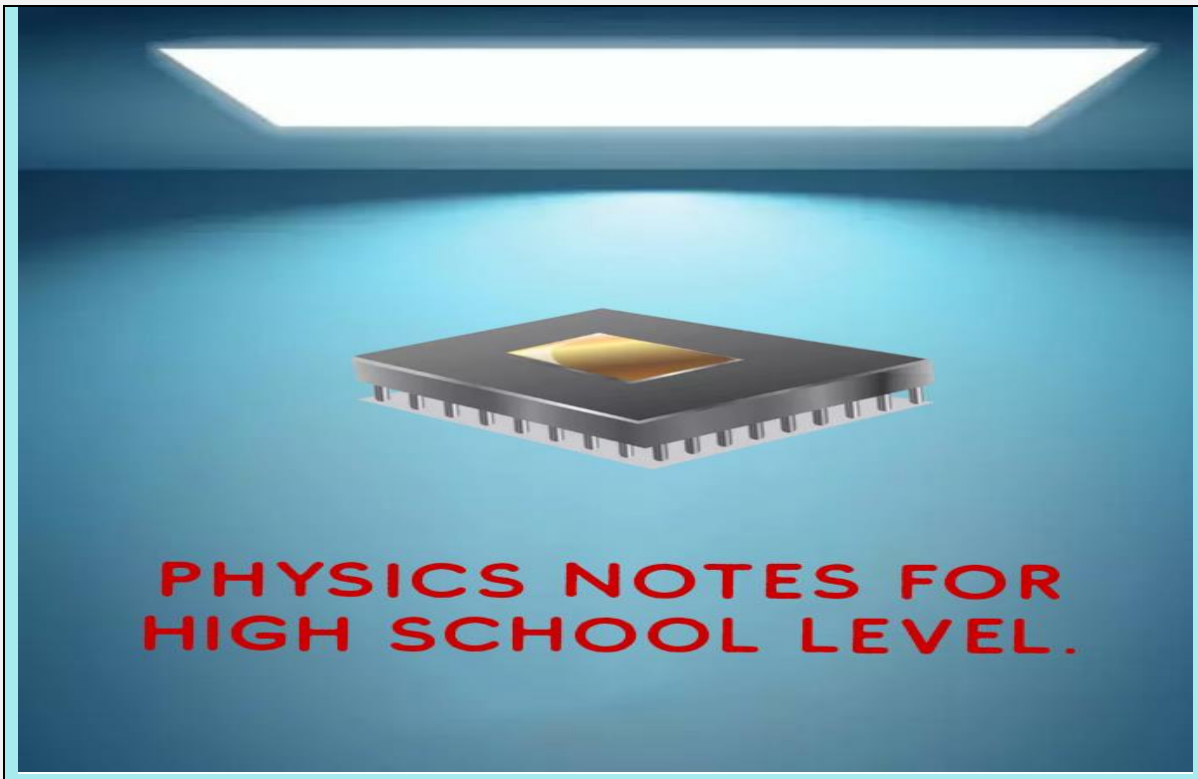
PHYSICS FORM ONE

QUICK REVISION SERIES

YEAR 2021/2022



Mr. Osimbo Godfrey

PHYSICS FORM 1 NOTES

STUDENTS'NAME……..…….

ADM No……

INTRODUCTION TO PHYSICS

1. Define physics

(1 mrks)

Physics is one of the sciences that deals with the study of matter and its relation to energy.

2. State five examples of phenomena explained in physics;

(5 mrks)

- Eclipse
- Lighting
- Rainbow
- Mirage
- Waves and tides
- Electric Charges

3. State and explain the six Branches of Physics and give Example for each; (12 mrks)

I. Mechanics:- The study of motion of bodies under the influence of forces.
Example;
- Linear motion
- Circular motion
- Oscillatory motions

II. Electricity and Magnetism:-
Study that deals with the relationship between electric currents and magnetic fields and their extensive applications in the working of electric appliances.

Example;

-Electric motors
- Magnetic Relay
- Telephone receivers
- Generators

III. Thermodynamics:-
Study of the transformation of heat to and from other forms of energy.
Example;
- Thermal expansion
- Heat transfer

IV. Geometrical optics:-
Study of the behaviour of light as it traverses various media.
Example;
- Telescope
- Microscope

V. Waves:- Study of the propagation of energy through space/media.
Example;
- Reflection of light
- Refraction of sound.

VI. Atomic physics:-
Study of the behavior of particles involving nucleus and accompanying energy changes.
Example;
- Radioactivity
- Nuclear fusion & fission

4. State and explain the Relationship between physics and other subjects: (5mrks)

✓ **Physics and technology:**
Medicine; - X-rays, body scanners and lasers used in diagnosis and treatment of diseases.

- High precision equipment used in research involved in such disease like Ebola, Corona Virus and HIV/AIDs requires physics principles.

Information Technology;-Satellite and microwaves discs which relays information over extremely long distances within shorter time uses physics principles

Entertainment industry;- Refinement of sound and colour mixing techniques to create special effects in stage presentations.

Defense industry; - Wars can be fought using laser-guided bombs of extremely high precision.

✓ **Physics and Mathematics:**
Many concepts in physics are expressed mathematically i.e. calculation of masses, charges on electrons etc.

✓ **Physics and Chemistry:**
Explanation of forces within atoms and atomic structures are studied in both chemistry and physics.

✓ **Physics and Biology:**
Knowledge of thin lenses are required in making microscope which assist in studying cells. Also knowledge of levers helps explain locomotion in biology.

✓ **Physics and home science:**
The design and manufacturing kitchen equipment, tailor machines etc. needs physics principles.

✓ **Physics and History:**
Carbon dating an application of radioactivity, serves as crucial tool to archeologist in studying fossil ages and patterns of life. Also, Vasco co dagama used magnetic properties of lodestone to determine direction.

✓ **Physics and Geography:**
Heat transfer by convection, leading to convectional rainfall are concepts of physics. Also, thermometer, windsock, wind vane hygrometer etc. requires physics skills in their operations and reading of scales.

✓ **Physics and Religion:**
Rotation of Earth from West to East; the sun always rises from East shows the orderliness of creation. Also, anomalous expansion of water and its application on aquatic life shows some of the wonders of creations.

5. State five career opportunities in physics (5marks)
   I. Bachelor of science (Civil engineering)
   II. Bachelor of science (Mechanical engineering)
   III. Bachelor of science (Technology engineering)
   IV. Bachelor of science (Production engineering)
   V. Bachelor of science (computer science)
   VI. Bachelor of science (textile engineering),

VII. Diploma in civil engineering, etc.

Note: Bachelor Degree, Master degree and PhD are the qualifications obtained in the University Institution While Diploma and Certificate qualifications are obtained in College Institution.

6. Define the term Laboratory (1 marks)

Room designed and equipped for conducting of experiments and practical work in the course of the studying science.

7. State five basic Laboratory Rules (5 marks)

- Proper dressing must be put on. Shirts and blouses must be tucked in and long hair tied up.
- Location of electricity switches, fire extinguishing equipment, first aid kit, gas supply and water supply system must be noted.
- There should be no eating or drinking in the laboratory
- When handling electrical apparatus, hands must be dry. Do not splash water where electrical sockets are located.
- Never plug in foreign objects into electrical sockets.
- All apparatus must be cleaned and returned to the correct location of storage after use.

8. State five items contained in the First Aid kit (5mrks)

i. Fire extinguisher
ii. Bandage
iii. Scissors
iv. Scalpel
v. Cotton wool.

9. State the Courses and First Aid measure to be taken of the following (10 marks)

i. **Cut** – Result from poor handling of glass apparatus or cutting materials like scalpels – In case of a cut, apply direct compression the wound and dress the wound as medical assistance is sought.

ii. **Electric shock** –Result from touching exposed wire or using faulty electrical appliances –Put off the current at the main switch. Use non conducting object, such as the dry wooden rod to remove the victim away from the conductor.

iii. **Eye Damage** – Result from dangerous chemical or bits of solids gets into the eye. –In case of irritating chemicals lands into your eye, it should be washed off immediately with a lot of cold water.

iv. **Burns** – Result from naked flame or splashes of concentrated acid and bases. –In case of acid and base, run cold water over the affected part immediately for around 20 minutes as you seek for further treatment.

v. **Poisoning** – Result from inhaling poisonous fumes or actual swallowing of poisonous chemical. Assistance should be sought immediately, like taking the victim in an open field in case of inhaling poisonous gas/fumes.

MEASUREMENT (I)

10. State the seven basic physical quantities with their SI units.
(14 marks)

Basic physical Quantities	SI unit
1. Length	metre
2. Mass	Kilogram
3. Time	Second
4. Electric Current	Ampere
5. Thermodynamic Temperature	Kelvin
6. Luminous Intensity	Candela
7. Amount of substance	Mole

11. Distinguish between basic physical (fundamental) quantity and derived quantity and give example for each.(2marks)
-Basic physical quantity cannot be obtained from any other physical quantities while the derived quantity are obtained by multiplication and division of basic physical quantities.
Example of physical quantities:
- Mass
Example of derived quantities:
- Area

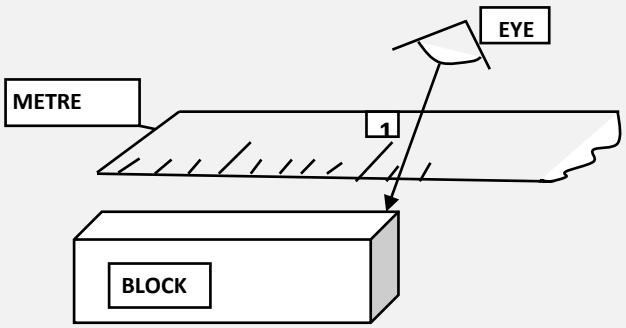
12. Define length and state its SI unit
(2mrks)
-Length is distance between two points.
-Its SI unit is metre.

13. State the instruments used to measure length (3mrks)
-Metre rule and half-metre rule
-Tape measures
-Engineers' calipers

14. Describe the procedure that should always be followed when using metre rule (3mrks)

-Place the metre rule in contact with the object
-Place the end of the object against the zero mark on the scale
-Position your eye perpendicularly above the scale for accurate reading or to avoid error due to parallax

15. A form one student carried out an experiment and made the observation shown below. State the reasons why she will not give accurate result.
(3mrks)



-The rule is not in contact with object

-The object is not aligned to the zero mark on the scale

-The position of the eye is not perpendicular to the scale.

16. Determine the readings indicated by the arrows on the following metre rule; (3mrks)

A **B** **C**

A = 0.5cm B = 2.45cm C = 3.6cm

17. Describe an experiment to measure the circumference of a cylinder using a thread and metre rule. (7mrks)

-Closely wrap the thread 4 times around the cylinder as shown above.

- Mark the beginning and the end of the turns

-Remove the thread and measure the length between the ink marks and call it as a_1

- Repeat three times and record the readings as a_2 and a_3 respectively to ensure accuracy.

-Then find the average a = $\frac{a1+a2+a3}{3}$

- Circumference = $\frac{a}{4}$

18. A form one blue carried out an experiment to estimate the height of a tree in the school compound. He recorded the following:

-length of the rod = 1m

-length of the shadow of the rod = 150cm

-length of shadow of the tree = 540cm

a) Determine the height of the tree he estimated (3mrks)

$\frac{height\ of\ tree}{height\ of\ rod} = \frac{length\ of\ shadow\ of\ tree}{length\ of\ shadow\ of\ rod}$;

$\frac{height\ of\ tree}{100} = \frac{540}{150}$;

$Height\ of\ tree = 3.6 \times 100$

$= 360$ cm.

b) State one condition which necessary for the above experiment. (1mark)

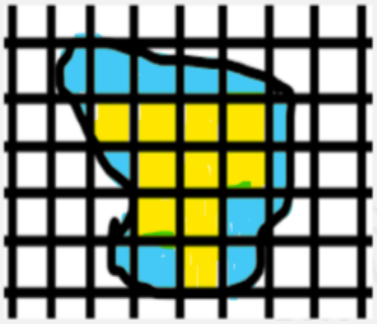
-The length of the shadow of the tree and that of the rod must be measured same period of time for accuracy.

19. Define area and state its SI unit. (2marks)

-Quantity that expresses the extent of a given surface on a plane.

- SI unit is square metre.

20. Estimate the area of the irregular shape below, given that the grid is made of small squares of side 2cm. (3marks)



Area = No. of complete squares plus half the No. of incomplete squares.

$A = 10 + \frac{1}{2}(15) = 10 + 7.5 = 17.5$ sq. units

If 1 sq. unit = 2 × 2 = 4 sq. units

∴ s17.5 sq. units = 17.5 × 4

Area of the shape = 70 sq. unit

21. A sheet of paper measures 25 cm by 15 cm. Calculate its area in mm^2 (3marks)

$A = 25 \times 15 = 375\ cm^2 = \frac{375}{100}\ mm^2$

$= 3.75\ mm^2$

22. Define volume and state its SI unit (2marks)

-Volume is the space occupied by a substance.

-SI unit is cubic metres.

23. State the instruments used to measure:

I. volume of liquids in the laboratory (3marks)

-Volumetric flask

-measuring cylinder

-beaker

-Pipette

-burette

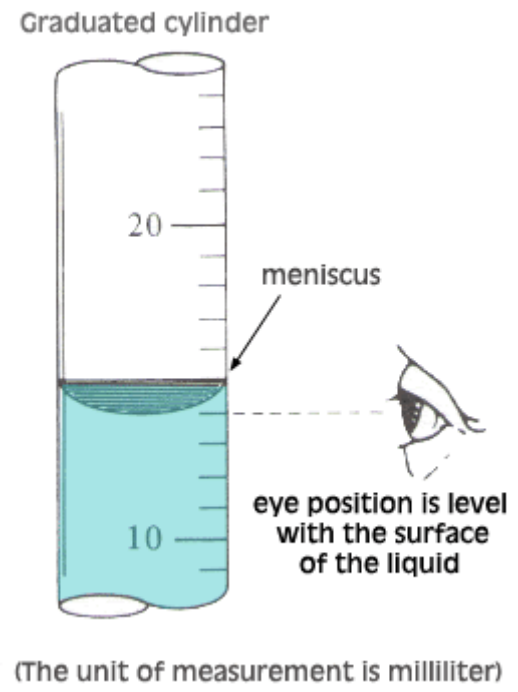
-syrange

II. fixed volume of liquids (2marks)

-Pipette

-Volumetric flask

24. State the volume of the liquid in the measuring cylinder as shown in the diagram below. Leave your answer in SI unit. (3marks)



Volume => Reading on the scale

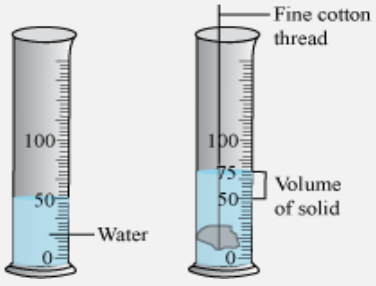
V = 14 milliliters

$= \frac{14}{1000000} = 1.4 \times 10^{-6}\ m^3$

$= 0.0000014\ m^3$

25. Describe an experiment to determine the volume of an irregularly-shaped solid (stone) using:

a. Measuring cylinder and state the conditions necessary for the experiment. (6marks)



Procedure:

-Partly fill a measuring cylinder with water. Note the volume V_1 of the water.

-Tie a stone that can fit into the measuring cylinder with a thread and lower it gently into the cylinder until it is wholly submerged.

-Record the new volume of the liquid plus stone V_2.

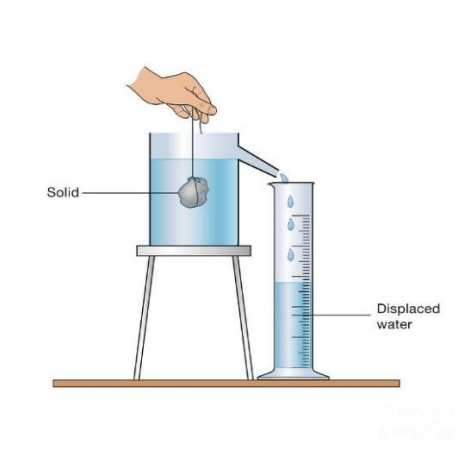
- The volume of stone = $V_2 - V_1$

Conditions:

-solid does not react with the water (liquid used)

-solid must fit inside the cylinder

26. Eureka can (6marks)



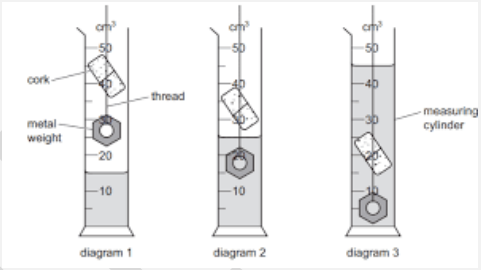
Procedure:

-Fill the eureka can with water until it flows out of the spout. Place a measuring cylinder under the spout of the can.

-Tie the solid with a thread and lower the stone gently into the can until it is completely submerged.

-The volume of water collected in the cylinder equals to the volume of the stone.

27. Describe an experiment to determine the volume of a cork using a sinker, a thread, measuring cylinder and water only. (10marks)



Procedure:

-Partly fill the measuring cylinder with water record the initial water level and call it V_1

-Lower the sinker, tied with thread gently into the cylinder.

-Measure the volume V_2 of the sinker.

-Remove the sinker wipe it dry and tie it to the cork.

- Add water into the cylinder up to the initial level V_1.

-lower the sinker and cork tied together into the cylinder.

- Measure the new reading V_3

-The volume of the cork

$= V_3 - (V_2 - V_1)$.

28. A wire of radius 3.0 mm and length 200m is melted into a sphere. Calculate the radius of the sphere in metres. (3marks)

-Volume of wire (cylinder) = volume of sphere

Vol. of cylinder

$= \pi r^2 h = \frac{22}{7} \times (0.003)^2 \times 200$

Vol. of sphere

$= \frac{4}{3}\pi R^3 = \frac{4}{3} \times \frac{22}{7} \times R^3$

$\pi r^2 h = \frac{4}{3}\pi R^3$

$\frac{22}{7} \times (0.003)^2 \times 200 = \frac{4}{3} \times \frac{22}{7} \times R^3$

$R^3 = 0.00135$

$R = \sqrt[3]{0.00135}$

$R = 0.1105$ m.

29. The initial reading water in burette was 10.2 cm^3, what would be the new reading if 4.7 cm^3 of water was used in titration? (2marks)

New reading = Initial reading + Vol. used

$= 10.2 + 4.7 = 14.9\ cm^3$

30. Define mass and state its SI unit (2marks)

-Quantity of a substance

-SI unit is Kilogram

31. State three instruments used in measuring mass (3marks)

-Beam balance

-Top pan balance

-Lever balance

32. Define density and state its SI unit (2marks)

-Mass per unit volume

- SI unit is Kilogram per Cubic metres.

33. Density of water is 1g/cm^3. Express this density in kg/m^3. (2marks)

Density = $\frac{Mass}{Volume}$

Density of water

$= \frac{Mass\ of\ water}{Volume\ of\ water} = \frac{1g}{1\ cm^3}$

$1\ cm^3 = \frac{1}{1000000\ m^3}$

Also $1\ g = \frac{1}{1000}\ kg$

Density of water $= \frac{1}{1000}\ kg \div \frac{1}{1000000\ m^3}$

$= \frac{1}{1000}\ kg \times \frac{1000000\ m^3}{1}$

$= 1000 kg/m^3$

34. A glass block of mass 187.5g is 5.0cm long, 2.0 cm thick and 7.5 cm high. Calculate the density of the glass in its SI unit. (2marks)

- Density = $\frac{Mass}{Volume}$

Mass = 187.5g

Volume = $5 \times 2 \times 7.5\ cm^3$

Density = $\frac{187.5}{5 \times 2 \times 7.5}$

$= 2.5 g/cm^3$

$= 2.5 \times 1000$

$= 2500 kg/m^3$

35. Discus how you can find the density of a liquid using clean dry beaker, balance, measuring cylinder and a burette. (6 marks)

-Find the mass m_1 of the clean dry beaker using a balance.

-Measure a known volume V of the liquid using either a measuring cylinder or a burette.

-Transfer the liquid into the beaker.

- Find the mass m_2 of the beaker with the liquid.

-Mass of the liquid = $m_2 - m_1$

- Density of the liquid = $\frac{m2 - m1}{V}$

36. A rectangular tank measures 12.5m long, 10.0m and 2.0m high. Calculate the mass of water in the tank when it is full.(Density of water is 1000kg/m^3, assume the measurements are internal)(3mrks)

-Volume of water in tank

= 12.5 ×10 ×2

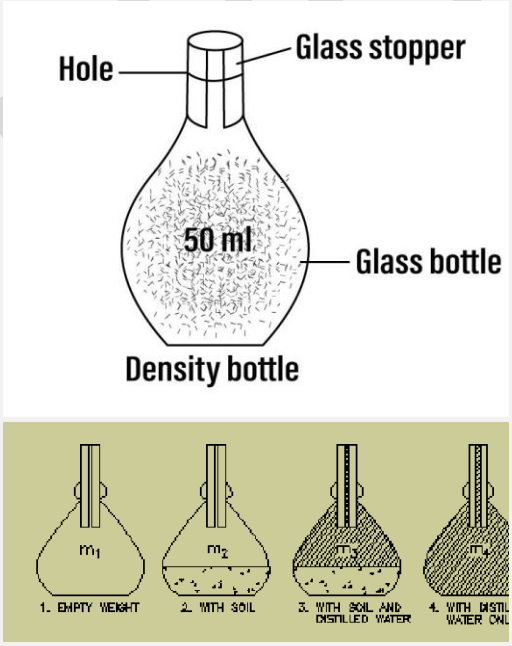
= 250 m^3

- Mass = Density ×Volume

= 1000 × 250

= 250 000 kg.

37. Discus how you can determine density of a liquid using density bottle and beam balance. (6mrks)



- Measure the mass $m_1$of the clean dry empty density bottle with the stopper.

- Fill the bottle with liquid and replace the stopper.

- Dry the bottle on the outside after the excess liquid have overflown through the hole in the stopper.

-Measure the mass m_2 of the bottle plus the stopper and liquid.

- Remember the capacity of the bottle is V, then density of the liquid = $\frac{m2 - m1}{V}$

38. State three precautions required in the measurement of density using density bottle. (3mrks)

-The bottle is held by the neck when wiping it dry.

- The outside of the bottle must be wiped carefully.

-It must be ensured that there are no air bubbles when the bottle is filled with the liquid.

39. Discus how you can measure the density of lead shot (solid) using a density bottle, water, lead shot and beam balance.

(10 mrks)

-Measure the mass m_1 of a clean dry empty density bottle.

- Fill the bottle partly with lead shot and measure the mass m_2 of the bottle with its contents.

-Fill up the bottle with water to the neck and measure its mass m_3.

- Empty the bottle and rinse it.

- Fill the bottle with water replace the stopper. Wipe the outside dry and measure the mass m_4 of the bottle filled up with water.

-the density of the lead shot

-Mass of water = ($m_4 - m_1$) g

-Volume of water = $(m_4 - m_1)$ cm^3

(Since density of water = $1gcm^3$).

-Mass of lead shot = $(m_2 - m_1)$ g

-Mass of lead shot + water = $(m_3 - m_2)$ g

-Volume of water = $(m_3 - m_2)$ cm^3

- Volume of lead shot

$= (m_4 - m_2) - (m_3 - m_2)$ cm^3

$$\text{Density} = \frac{m2 - m1}{(m4 - m1) - (m3 - m2)}$$

40. Precautions to be taken the experiment above (2mrks)

- Solid does not react with water

-Solid should not be soluble

41. The mass of empty bottle is 20.0g.Its mass when filled with water is 40.0g and 50.0 g when filled with liquid x. Calculate the :

i) Mass of water = 40 – 20
= 0.02kg

ii) Volume of water = $\frac{0.02}{1000}$
(since density of water =1000 kg/m^3)

Vol. of water = $0.00002m^3$

iii) Volume of bottle
-Vol. of bottle = vol. of water = $0.00002m^3$

iv) Mass of liquid = 50-20
= 0.03 kg

v) Volume of liquid
-Vol. of liquid = vol. of bottle = $0.00002m^3$

vi) Density of liquid

$$= \frac{0.03kg}{0.00002m3}$$

$= 1500$ kg/m^3

42. 100 cm^3 of fresh water of density 1000kg/m^3 is mixed with 100 cm^3 of sea water of density 1030 cm^3. Calculate the density of the mixture. (3mrks)

-Density $_{mxt}$ = $\frac{Mass\ of\ mixture}{Volume\ of\ mixture}$

-Mass of mixture =

mass of fresh water + mass of sea water

$$= \left(\frac{100}{1000000} \times 1000\right) + \left(\frac{100}{1000000} \times 1030\right)$$

=0.1 + 0.103

=0.203kg

Vol.$_{mxt}$ = vol. of fresh + vol. of sea

Volume of mixture = $\frac{100+100}{1000000} = 0.00002m^3$

Density of mixture= $\frac{0.203}{0.00002} = 1050kg/m^3$

43. State an instrument used in the measurement of time (1mrks)

-Stop watch

44. Define time and state its SI unit (2mrks)

-Time is a measure of duration of an event. Its SI unit is Second.

FORCE

45. Define force and state its SI unit (4mrks)

-Push or a pull.

-SI unit is Newton

46. State 4 effects of force on objects: (3mrks)

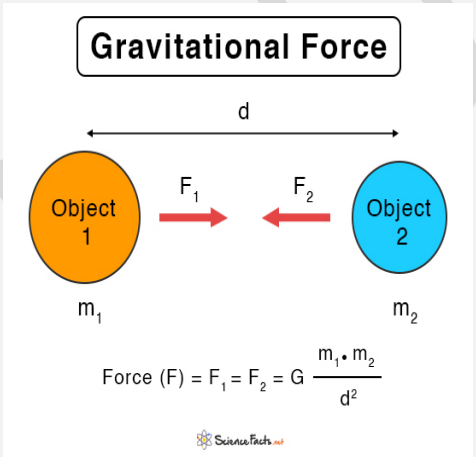
-Make stationary objects start moving
-Slow down moving object
-Change direction of moving object
-Change shape (distort shape) of object

47. State two characteristics of force (2mrks)

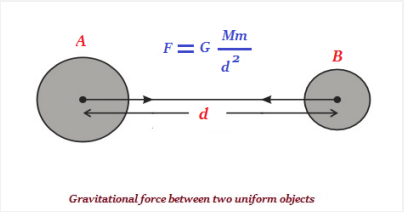
-Vector quantity
-Represented by a line with an arrow showing direction in which it acts ⟶

48. State the types of forces and briefly describe each. (12mrks)

-Gravitational force:
Force of attraction between two bodies of given masses and acts towards the centre of the bodies.



a) Define gravitational force of Earth and state its unit of measurement (2mrks)
-The force of attraction which pulls objects towards centre of Earth.
-Measured in Newton



Gravitational force between two uniform objects

Note:

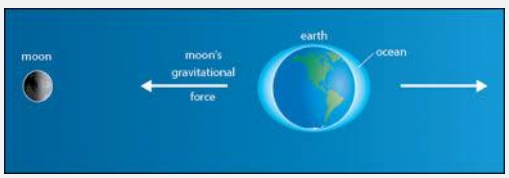
-For any object falling down or thrown upward, the gravitational force is taken to be an acceleration for the free fall and deceleration/retardation for upward motions. The unit of gravitational pull here changes to metres per second.

-On the Earth surface, the Gravitational force is the force of attraction between the body and the Earth.

- Each planet (heavenly) has its own gravitational force.

-Gravitational force of Earth is approximately 9.89N which is taken to be 10N (Rounded off) while that of the moon is 1.67N or a sixth of that of the Earth.

-Pull of gravity on an object towards the centre of Earth is called Weight of the object.

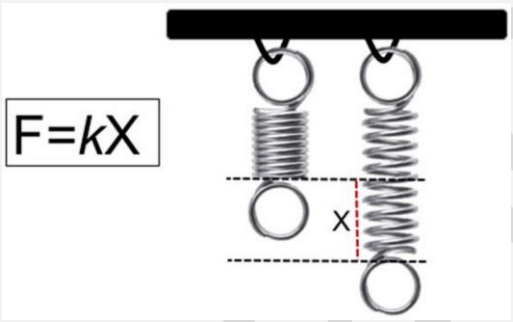


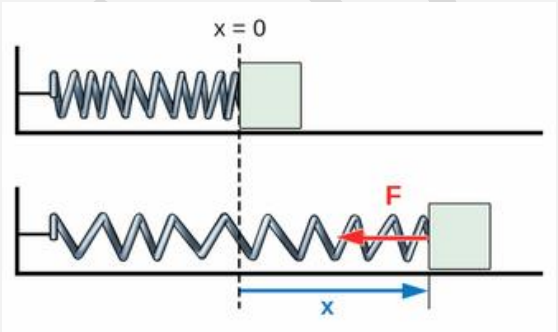
b) State the reason why the weight of an object varies from one planet to another

but its mass is constant everywhere (2mrks)
-Weight varies because planets have different gravitational force.
-Mass is constant because it is the matter in a substance which does not change.

-Tension:
Quantity of the pulling force exerted by elastic materials on an object.

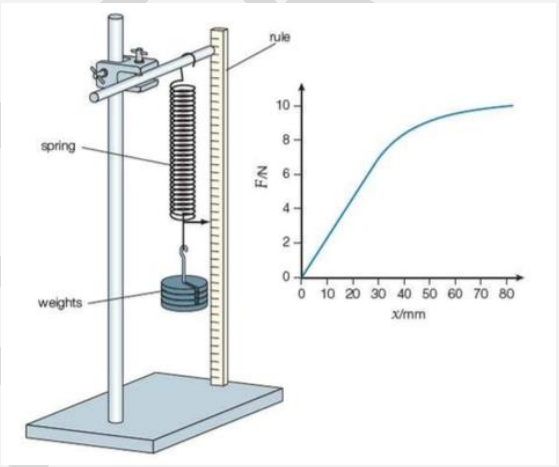
Note: Tension can be stretching force or compression force.
Applied in -springs





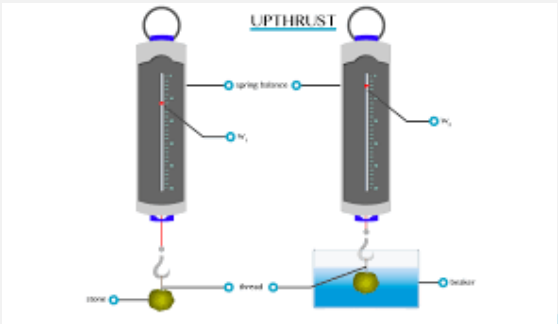
And catapult

c) Sketch a graph of Force against extension (3mrks)

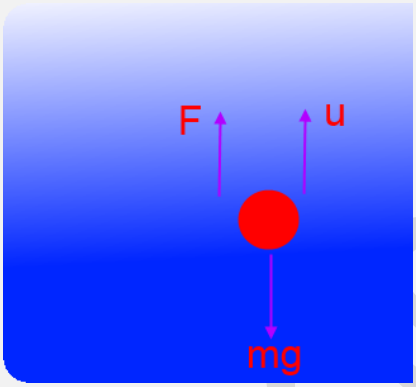


d) Define the term elastic material (3mrks)
-Materials that can be compressed or extended without breaking.

-Upthrust force:
Upward force acting on an object immersed in a fluid(liquid or gas)



a. State then forces acting on object fall or floating in liquids.
-Upthrust
-Friction



b. A body weighs 100N in air and 80N when the object is immersed in water. Calculate the upthrust acting on the body (3mrks)

-Weight in air = 100N
-Weight in water = 80N

Upthrust
= Weight in air – weight in water
= 100 – 80
=20N

-Cohesive and adhesive force:

a. Distinguish between cohesive force adhesive force (2mrks)

-Frictional force
-Magnetic force
-Centripetal force
-Surface tension
-Molecular force
-Electric force
-Nuclear force
-Electrostatics force

49.