

## **GROUPE SCOLAIRE MARIE REINE RWAZA**



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### **SENIOR ONE PHYSICS**

#### **UNIT 1. Laboratory safety rules and measurement of physical quantities**

1. What is science?
2. Differentiate between natural and social sciences
3. Name any four branches of natural sciences
4. Define the term physics
5. Mention any four career opportunities of a physicist
6. What is a scientific investigation?
7. Discuss the meaning of the following terms:
  - a. Prediction
  - b. Data analysis
  - c. Interpretation of results
  - d. Decision making
8. Define the term area
9. A cylinder has a diameter of 4.2 cm. how many times would a thread of 132 cm be wound around the cylinder?
10. The diameter of a cylindrical pencil is 9 mm. calculate the cross-section area in square centimeters.
11. How many micrometers are there in 4 cm?
12. A solid cube of aluminium has sides 10 cm long.
  - a. Calculate its volume
  - b. What mass in kilogram of aluminium has a volume of  $100 \text{ cm}^3$ ? Take density of aluminium as  $2700 \text{ kg/m}^3$ .
13. Describe how you would determine the volume of an irregular object such as a small stone

14. Describe five contributions of physics to the development of Rwanda as a nation
15. a) State any two importances of Physics.  
b) Give 5 safety rules in the physics laboratory.
16. Distinguish between fundamental physical quantity and derived quantity and give one example for each
17. Explain why it is important to observe laboratory rules and regulations
18. An aquarium measuring 1m by 1.2m by 0.7m is filled with water of density  $1000\text{kg/m}^3$ . Calculate the mass of water contained in the aquarium.
19. Find the volume containing 430g of platinum knowing that the density of platinum is  $21.5\text{ g/cm}^3$ . Express this volume in its S.I unit.
20. Explain how you would measure the external diameter of a measuring cylinder.
21. A beaker of radius 5cm contains water to a height of 12cm.
22. a) what is the volume of the water in the beaker?  
b) when a stone is completely immersed in the beaker, water rises to a height of 20 cm. What is the volume of the stone?
23. a) Define the word "mass" and state its S.I unit  
b) State two types of balance and one advantage and disadvantage for each type mentioned.
24. convert each of the following in their S.I unit.  
a) 23980 t  
b) 0.0000046 Mm  
c) 40.705 mg
25. The density of methylated spirit is  $800\text{g/cm}^3$  and that of ice is  $920\text{g/cm}^3$ . Will ice floats on this liquid or it will sink? Explain.
26. Define the following terms:
  - a. Physics
  - b. Density
  - c. Volume
  - d. Speed
27. Describe five contributions of physics to the development of Rwanda as a nation
28. a) State any two importances of Physics.  
  
b) Give 5 safety rules in the physics laboratory.
29. Distinguish between fundamental physical quantity and derived quantity and give one example for each
30. Explain why it is important to observe laboratory rules and regulations
31. Give three safety measures to be followed in case of fire outbreak in your school.
32. A page of a book measures 15 cm by 22 cm. calculate its area in square millimeters?

33. State career opportunities that physics opens for you.
34. Explain why physics is a science

### **Unit 2. Qualitative analysis of linear motion**

1. Define the term acceleration
2. A bus changes its speed from 18m/s to rest in 10s. calculate the :
  - a. Deceleration of the bus
  - b. Displacement of the bus
3. Define the the following terms:
  - a. Distance
  - b. Displacement
  - c. Velocity
  - d. Acceleration
  - e. Speed
4. A car increases its speed steadily from 8m/s to 30 m/s in 10s. how far does it travels?
5. a racing cyclist starts from the rest and accelerates uniformly to a speed of 20m/s in 4s.
  - a. what is the acceleration of the cyclist?
  - b. What is the distance covered in the 4s?

### **Unit 3. Forces**

1. State the parallelogram law
2. State three types of contact and non-contact forces
3. Name the instrument used to measure the weight of the body
4. Calculate the weight of the following:
  - a. 300 g mass of water
  - b. 700 kg mass of sand
  - c. 0.5 mg mass of wood
5. A metal bob of mass 20 g is suspended using a light thread. Calculate the tension developed in the thread. Take  $g=10 \text{ N/kg}$
6. State four differences between mass and weight
7. What is frictional forces?
8. Moon's gravitational pull is  $\frac{1}{6}$  of the Earth's gravitational pull. Calculate the weight of a body whose mass is 40 kg on:
  - a. The Moon's surface
  - b. The Earth's surface

#### **Unit 4. Newton's laws of motion**

1. Give the explanations of the following:  
A gun recoils when it is fired
2. State Newton's first, second and third laws of motion
3. A communication satellite of mass 300kg orbits( go round) the Earth at the height 35 000 m. Given that mass of Earth =  $5.97 \times 10^{24}$  kg, radius of the Earth =  $6.4 \times 10^6$  and  $G = 6.67 \times 10^{-11} \text{Nm}^2/\text{kg}^2$ , find :
  - a. How far the satellite is from the center of the Earth?
  - b. The Earth's force of attraction onto the satellite
4. Determine the Earth's force of gravitational attraction between the Earth and the satellite of mass 1500 kg orbiting the Earth at the distance 40 000 kg above the surface of the Earth .
5. What is the gravitational force between :
  - a. The sun and the Earth
  - b. Earth and the Moon.
6. State Newton's Universal law of gravitation

#### **Unit 5. Center of gravity**

1. What is stability?
2. Define the term center of gravity
3. Differentiate the term center of gravity

#### **Unit 6. Work, power and energy**

1. An horizontal pulling force of 60N is applied through a spring to a block on a frictionless table, causing the block to move by a distance of 3m in the direction of the force. Find the work done by the force.
2. Explain why in trying to push a rigid wall, a person is said to be doing no work
3. Define the term work and state its SI unit.
4. A garden tractor drags a plow with a force 500N a distance of 2 metres in 20 seconds. How much work is done?
5. A machine is able to do 30 joules of work in 6.0 seconds. What is the power developed by the machine?
6. Students A lifts a 50N box from the floor to a height of 0.40 metres in 2 seconds. Student B lifts 40N box from the floor to a height of 0.5 m in 1.0 second. Which student has more power than the other one?
7. Define the term energy
8. State and explain six forms of energy
9. Differentiate between :
  - a. Potential and kinetic energy
  - b. Gravitational potential energy and elastic potential energy

10. A brick of mass 0.5 kg is lifted through a distance of 100m to the top of a building.  
Calculate the potential energy attained by the brick.
11. Define the term power and state its SI unit
12. A motor raised a block of mass 72kg through a vertical distance of 2.5 m in 28 s.  
calculate:
  - a. Work done on the block
  - b. Useful power supplied by the motor
13. A stone falls vertically through a distance of 20m. if the mass of the stone is 3.0 kg,
  - a. Sketch the graph of work done by the gravity against distance
  - b. Find the power of the gravitational pull.
14. A car is doing work at the rate of 8 000 w. calculate the thrust of the wheels on the ground if the car moves on the ground If the car moves with a constant velocity of 30m/s.
15. a.state the law of conservation of energy  
b.Differentiate between renewable and non-renewable sources of energy. Give two examples of each.

### **Unit 7. Simple machines**

1. A machine requires 6 000 j of energy to lift a mass of 55kg through a vertical distance of 8m. calculate its efficiency.
2. A machine of efficiency 75% lifts a mass of 90 kg through a vertical distance of 3m . find the work required to operate the machine.
3. define the following terms as applied to levers:
  - a. Mechanical advantage
  - b. velocity ratio
4. An effort of 50N is applied to drive a screw whose handle moves through a circle of radius 14cm. the pitch of the screw thread is 2mm. calculate the :
  - a. Velocity ratio of the screw.
  - b. Load raised if the efficiency is 30%
5. A block and tackle pulley system has a velocity ratio of 4. If the efficiency is 75%, find the :
  - a. Mechanical advantage.
  - b. Load that can be lifted with an effort of 500N.
  - c. Work done if the load is lifted through the vertical distance of 4.0m
  - d. Average rate of working if the work is done in 2 minutes.
6. Define the following terms:
  - a. Power of a machine
  - b. Mechanical advantage
  - c. Efficiency
  - d. Velocity ratio

7. A crane just lift 9 940N when an effort of 116N is applied. The efficiency of the crane is 70% find its :
  - a. mechanical advantage
  - b. Velocity ratio

### **Unit 8.Kinetic theory and states of matter**

1. Explain why the density of a gas is much less than that of a solid or a liquid.
2. Explain why tyres burst when left outside during a hot whether.
3. Describe the difference between solid, liquids, and gases in terms of the arrangement of the molecules throught the bulk of the material.

### **Unit 9. Heat and temperature**

1. According to the kinetic theory, what is temperature?
2. Differentiate between heat and temperature. State their SI units.
3. Convert each of the following into the Kelvin scale.
  - a.  $34^{\circ}\text{C}$
  - b.  $-371^{\circ}\text{C}$
  - c.  $17^{\circ}\text{C}$
4. State any two properties of a thermometric liquid
5. Name four temperature scales and state their fixed points
6. What is a thermometer? Name two types of thermometers.
7. State four characteristics of a good thermometric substance.
8. State one advantage of an alcohol-in-glass thermometer as compared to a mercury-in-glass thermometer.

### **Unit 10. Magnetism**

1. Explain the meaning of the following terms:
  - a. A magnet
  - b. A magnetic substance/ material
  - c. a non-magnetic material
  - d. A ferromagnetic material
2. State two properties of a magnet
3. State the basic law of magnetism
4. Name any four types of magnets according to their shape

## Unit 11. Magnetism and current electricity

1. Name two types of charges
2. a. When do we say that a body is negatively charged?  
b. what is meant by “ Charging by contact” ?
3. Define the term electric circuit
4. a. Draw a diagram for a simple circuit  
b. What is an open circuit?
5. Calculate the amount of charge that passes through a point in a circuit in 3 seconds, if the current in the circuit is 0.5 A
6. A car battery circulates charge round a circuit for 5 minutes. If the current is held at 15 A, what quantity of charge passes through the wire?
7. A charge of 40 coulombs flows through a point on a conducting wire in 15s. Calculate the current flowing in the conductor.
8. Define the term potential difference and state its SI unit
9. a. Name the instrument used to measure voltage  
b. Define volt
10. The voltage and current through a device in a circuit are 2V and 0.02A respectively. Calculate the resistance of the device.
11. States Ohm’s law
12. A p.d of 12V is required to drive a current of 1.5 A to flow through a filament. Find the resistance of the filament.
13. A resistor of value  $20\ \Omega$  allows a current of 0.3 A to pass through. Calculate the Voltage across the resistor.
14. How much electric energy in joules does a 150 watts lamp convert to heat and light energy in:  
a. 15 seconds  
b. 5 seconds  
c. 1 minute
15. a. A washing machine is marked 240V, 3KW. What does this mean?  
b. Calculate the electrical energy consumed by this machine in 1 hour.

16. How much current flows through a bulb rated 150 W when a potential difference of 240V is supplied to the bulb when operating normally?

17. what do you understand by the term “ Heating effect” ?

18. state four household appliances that convert electrical energy into heat energy.

19. a current of 1.3 A flows in a circuit for 9 minutes. How much charge passes through a given point in the circuit?

## **Unit 12. Rectilinear propagation of light**

1. What is light?

2. a. What do scientists mean by the phrase rectilinear propagation of light?

b. Suggest a simple experiment to illustrate this property of light?

3. Explain the meaning of the following terms:

a. A non-luminous objects

b. An opaque object

c. A ray and a beam of light

d. a Shadow

4. with a simple labeled diagram, distinguish between the terms umbra and penumbra

5. a. What is meant by reflection of light?

b. State the laws of reflection