

BETHEL PARENTS SS BUSEGA
COMPETENCE BASED CURRICULUM
ADVANCED LEVEL PHYSICS
S.5 PHYSICS 1 SET 2
2 HOURS

INSTRUCTIONS

- **Attempt All Items in this paper**

Where necessary use:

- Mathematical tables and squared paper will be provided.
- Non-programmable Silent Scientific Calculators may be used.
- Diagrams and elaborative explanations recommended where necessary.

Where Necessary Use;

Acceleration due to gravity,	g	=	9.81 m s^{-2}
Speed of light in Vacuum,	c	=	$3.0 \times 10^8 \text{ m s}^{-1}$
Speed of sound in air,	v	=	$3.40 \times 10^2 \text{ m s}^{-1}$
Electronic charge,	e	=	$1.60 \times 10^{-19} \text{ C}$
Electronic mass,	m_e	=	$9.11 \times 10^{-31} \text{ kg}$
Permeability of free space,	μ_0	=	$4\pi \times 10^{-7} \text{ H m}^{-1}$
Permittivity of free space,	ϵ_0	=	$8.85 \times 10^{-12} \text{ F m}^{-1}$
The Constant,	$\frac{1}{4\pi\epsilon_0}$	=	$9.0 \times 10^9 \text{ F}^{-1} \text{ m}$

Item 1

"Mirrors are used in different fields in the world due to their unique property and ability of reflection"
"said John "an engineer in Jairah construction Company.

However they are used due to the nature of the images formed by the plane mirrors and this might differ depending on the thickness of the mirror.

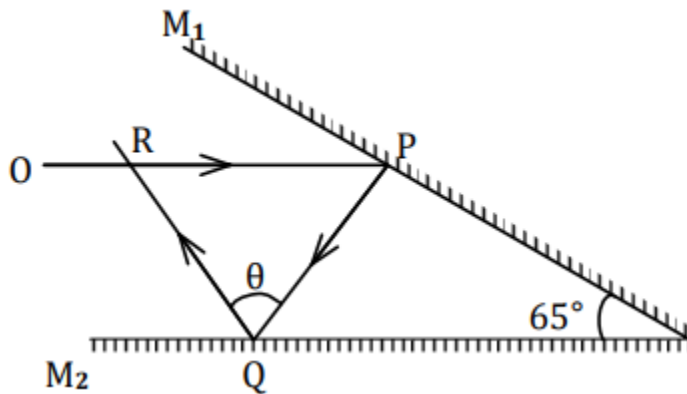
When a mirror is used, and then the mirror rotated while keeping the incident ray constant this may result into the rotation of the reflected ray through an angle he concluded saying mirrors can therefore be used by marine (sailors) in sextants and this left the rich man wondering about mirrors

Taks

As a physics student:

Help the rich man understand

- The meaning of reflection and deviation
- How multiple images can be formed by plane mirrors
- The relationship between the angle of rotation of the mirror and the angle of deflection of the reflected ray when the incident ray is kept constant.
- How the sextant can be used by sailors
- If Two plane mirrors M_1 and M_2 are inclined at 65° to each other. Incident ray OP is parallel to mirror M_2 , but ray QR is not parallel to mirror M_1



Determine the angle θ

Item 2

Rita (a dentist) is always driven by Jonah (the driver) to work at Nakasero hospital every morning. Rita always wonders of how the driver is always able to see cars coming in different directions as he is driving.

He was later explained to by the driver that he uses A special type of a mirror called convex mirror of a good focal length and advised her that however on her job as a dentist she can use a concave mirror to do her work if she has determined its focal length experimentally or using the mirror formula.

Task

As a student of physics, Help Riah,

- a) Understand the meaning of focal length
- b) Understand why Jonah uses a convex mirror for driving and she was as advised to use a concave mirror for her work
- c) Derive the expression $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$ for the mirror formula of the mirror she was advised to use.
- d) Understand an investigation of experiment she can carry out to determine the focal length of the mirror she has. If she has a mirror, retort stand, and an object pin.
- e) If the concave mirror she has forms on a screen a real image of three times the size of the object. The object and screen are then moved until the image is five times the size of the object. If the shift of the screen is 30cm.
Help Rita determine the focal length of the mirror and the distance through which the object was moved (shifted)

Item 3

Personal hygiene including washing clothes is strongly recommended but however hanging clothes on electric wires is strongly discouraged even when they are made of metals and plastics. After a long day Elisha's wanted to put on his dry shirt but he was amazed that as it got in contact with his hair sparks were produced which worried him.

His brother in secondary told him not to worry as this was just a scientific occurrence know as electrification.

As a Physics student, Help Elisha understand

- a) Why wires are made of metals inside yet covers with plastic covers
- b) How the shirt got charged or electrified when he was dressing up
- c) How insulators and conductors can become electrified or charged.
- d) How an uncharged conductor can be attracted by a charged conductor

END