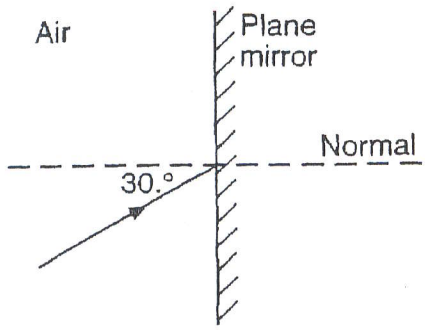
Take Home -
Reflection and Refraction

Name_____

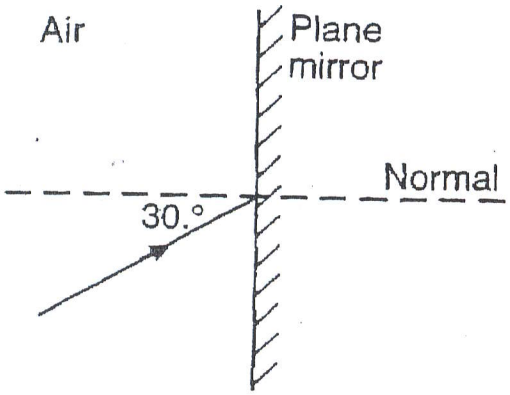
1) A ray of monochromatic light traveling in air is incident on a plane mirror at an angle of 30.°, as shown in the diagram below.



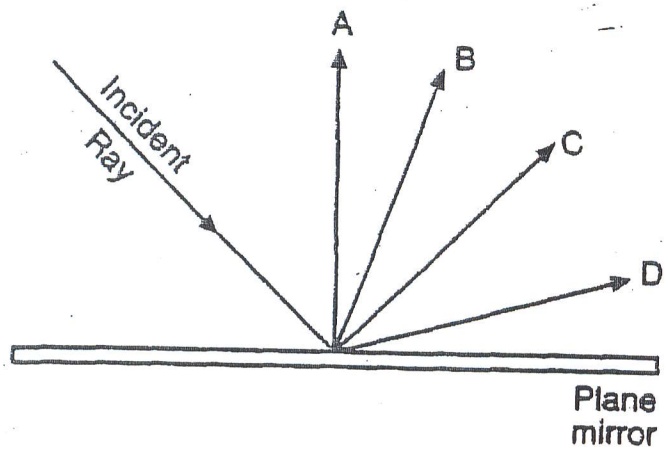
The angle of reflection for the light ray is

1) 15°
2) 30.°
3) 60.°
4) 90.°

2) On the diagram sketch the reflected ray and draw where the angle of reflection is- (Use ruler and protractor to construct) [2 credits]



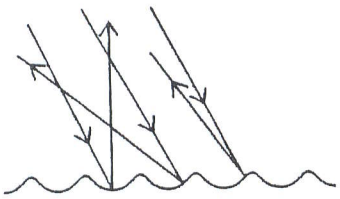
2) A light ray is incident on a plane mirror as shown in the diagram below.



Which ray best represents the reflected ray?

1) A
2) B
3) C
4) D

3) The diagram below shows parallel rays of light incident on an irregular surface.

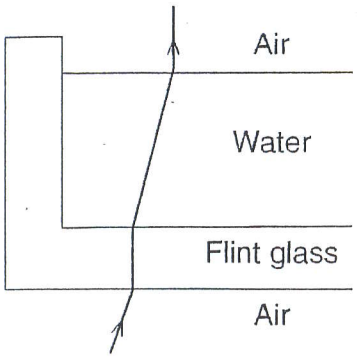


Which phenomenon of light is illustrated by the diagram?

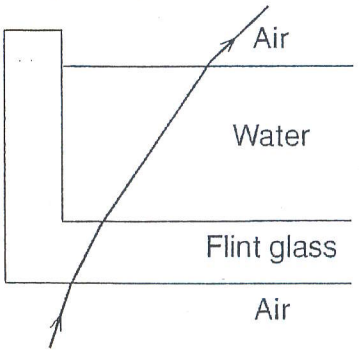
1) diffraction
2) refraction
3) regular reflection
4) diffuse reflection

4. Which diagram best represents the path taken by a ray of monochromatic light as it passes from air through the materials shown?

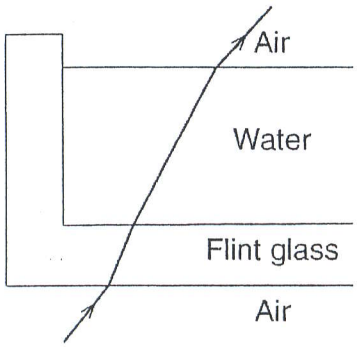
1)



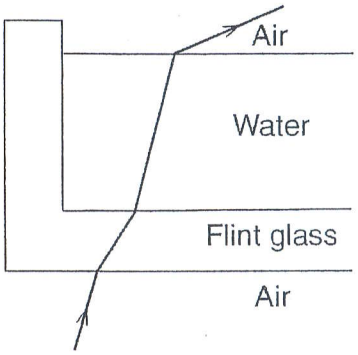
3)



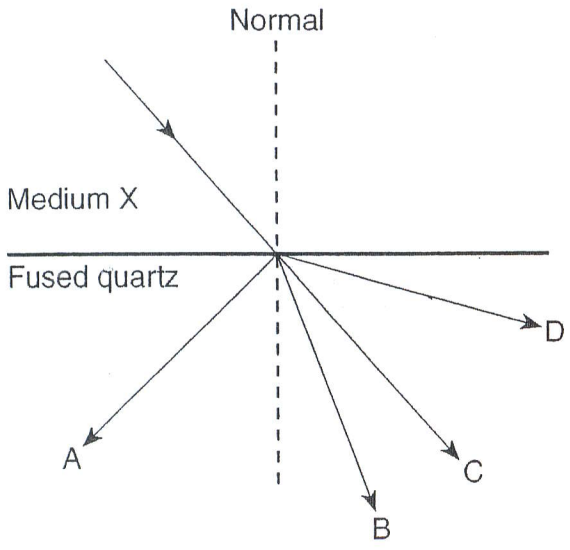
2)



4)



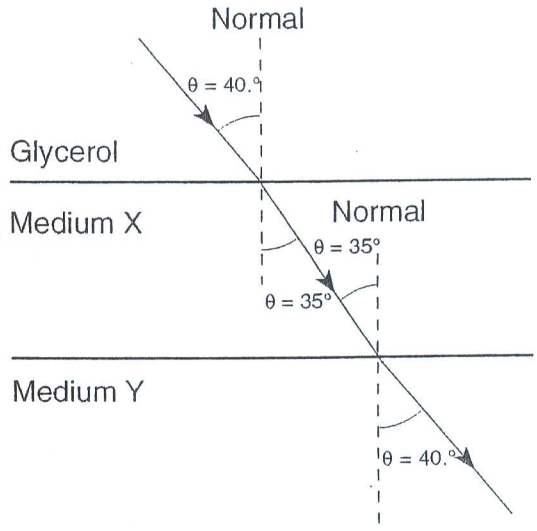
5. The diagram below represents a ray of monochromatic light ($f = 5.09 \times 10^{14}$ Hz) passing from medium X ($n = 1.46$) into fused quartz.



Which path will the refracted ray follow in the quartz?

1) A
2) B
3) C
4) D

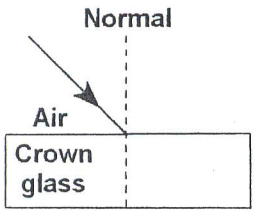
6. A beam of monochromatic light ($f = 5.09 \times 10^{14}$ hertz) passes through parallel sections of glycerol, medium X, and medium Y as shown in the diagram below.



What could medium X and medium Y be?

1) X could be flint glass and Y could be corn oil.
2) X could be corn oil and Y could be flint glass.
3) X could be water and Y could be glycerol.
4) X could be glycerol and Y could be water.

7. The diagram below shows a light ray in air incident on a crown glass block.



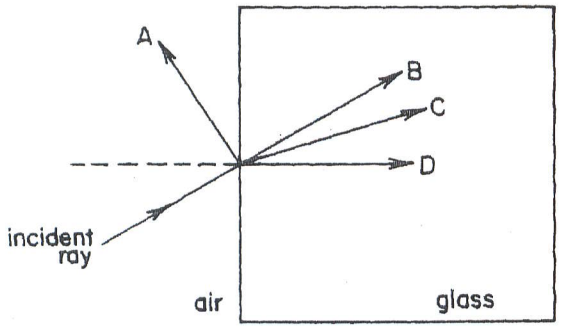
As the light ray enters the crown glass block, it will

1) slow down and bend toward the normal
2) slow down and bend away from the normal
3) speed up and bend toward the normal
4) speed up and bend away from the normal

8. A pencil appears to be bent at a point where it enters the water in a beaker. This phenomenon is called

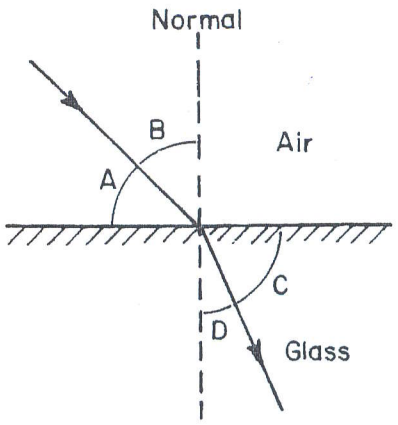
1) refraction
2) reflection
3) dispersion
4) rarefaction

9. In the diagram below a light ray passes obliquely from air into a glass block. Which path represents the refracted ray of light?



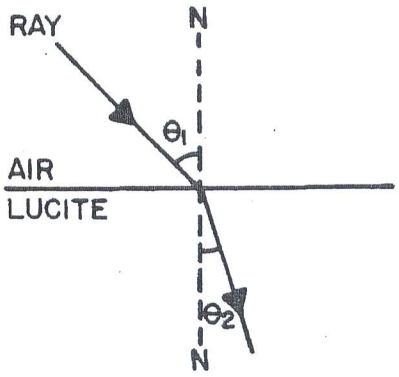
1) *A*
2) *B*
3) *C*
4) *D*

10. The diagram below shows a ray of light being refracted as it passes from air into glass. Which letter represents the angle of refraction for the light ray?



1) *A*
2) *B*
3) *C*
4) *D*

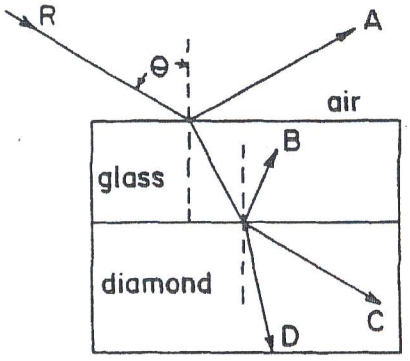
11. Base your answer to the following question on the diagram below which represents a ray of yellow light ($l = 5.9 \times 10^{-7}$ meter in air) passing from air into Lucite. Angle θ_1 is 45°.



Lucite is replaced by medium X, which makes θ_2 smaller for the same θ_1 in air. Compared to the speed of the yellow light in Lucite, the speed of the yellow light in medium X is

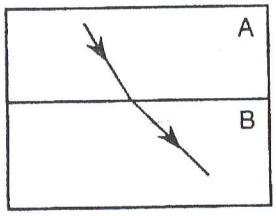
1) less
2) greater
3) the same

12. The ray *R* of monochromatic yellow light shown in the diagram is incident upon a glass surface at an angle of θ. Which resulting ray is *not* possible?



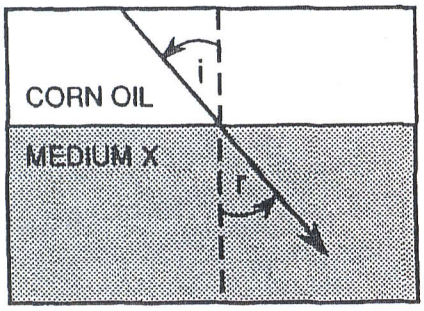
1) *A*
2) *B*
3) *C*
4) *D*

13. The diagram at the right represents the path of periodic waves passing from medium *A* into medium *B*. As the waves enter medium *B*, their speed



1) decreases
2) increases
3) remains the same

14.

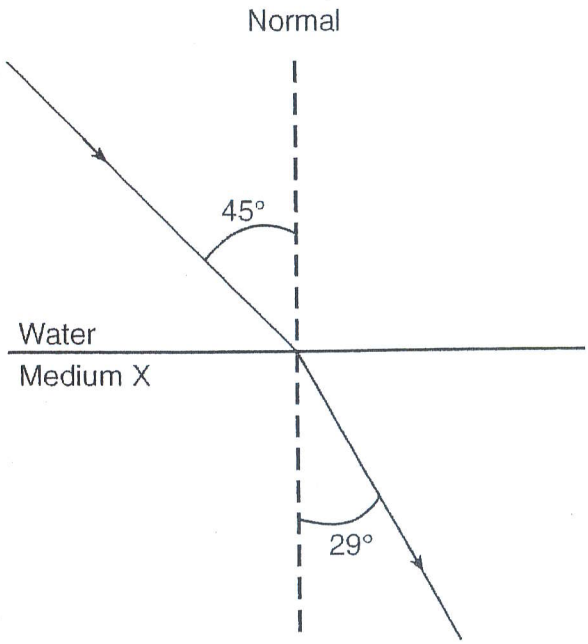


In this diagram, if i = r medium *X* could be

1) water
2) diamond
3) glycerol
4) alcohol

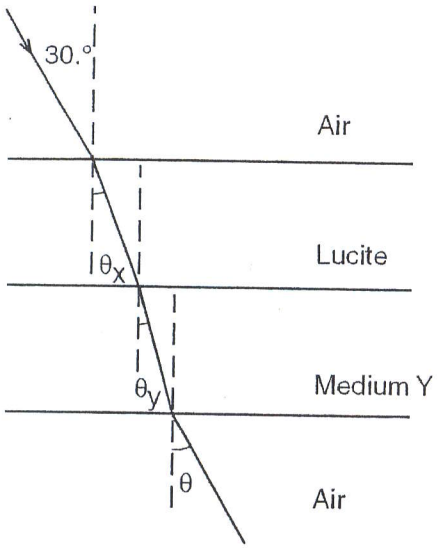
15. Base your answer to the following question on the information and diagram below.

A ray of monochromatic light of frequency 5.09×10^{14} hertz is traveling from water into medium *X*. The angle of incidence in water is 45° and the angle of refraction in medium *X* is 29°, as shown.



Calculate the absolute index of refraction of medium *X*. [Show all work including the equation and substitution with units.]

16. Base your answer to the following question on the diagram below, which represents a light ray traveling from air to Lucite to medium *Y* and back into air.



Light travels *slowest* in

1) air, only
2) Lucite, only
3) medium *Y*, only
4) air, Lucite, and medium *Y*

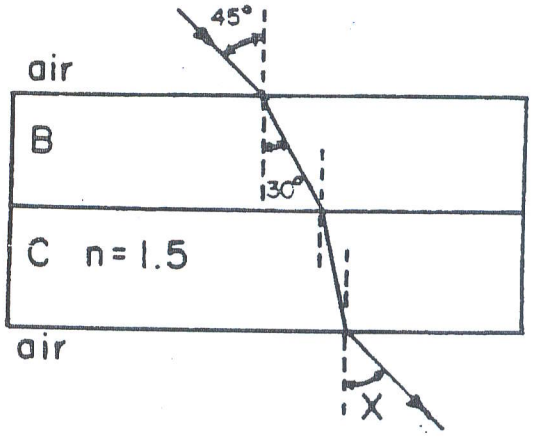
17. In a certain material, a beam of monochromatic light ($f = 5.09 \times 10^{14}$ hertz) has a speed of 2.25×10^8 meters per second. The material could be

1) crown glass
2) flint glass
3) glycerol
4) water

18. A beam of monochromatic light travels through flint glass, crown glass, Lucite, and water. The speed of the light beam is slowest in

1) flint glass
2) crown glass
3) Lucite
4) water

19. Base your answer to the following question on the diagram below which represents a ray of light moving from air through substance *B*, through substance *C*, and back into air. The surfaces of substances *B* and *C* are parallel.



Compared to the wavelength of the light in air, the wavelength of the light in substance *C* is

1) shorter
2) longer
3) the same

20. What is the speed of a ray of light ($f = 5.09 \times 10^{14}$ hertz) traveling through a block of sodium chloride?

1) 1.54×10^8 m/s
2) 1.95×10^8 m/s
3) 3.00×10^8 m/s
4) 4.62×10^8 m/s

21. The speed of light in a material is 2.50×10^8 meters per second. What is the absolute index of refraction of the material?

1) 1.20
2) 2.50
3) 7.50
4) 0.833

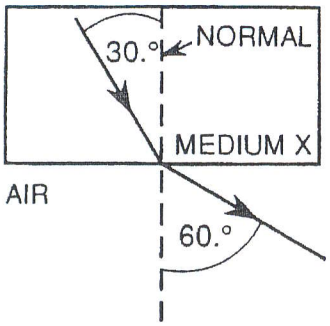
22. The speed of light ($f = 5.09 \times 10^{14}$ Hz) in a transparent material is 0.75 times its speed in air. The absolute index of refraction of the material is approximately

1) 0.75
2) 1.3
3) 2.3
4) 4.0

23. A monochromatic ray of light ($f = 5.09 \times 10^{14}$ hertz) traveling in air is incident upon medium A at an angle of 45°. If the angle of refraction is 29°, medium A could be

1) water
2) fused quartz
3) Lucite
4) flint glass

24. The diagram below shows a ray of light passing from medium *X* into air.



What is the absolute index of refraction of medium *X*?

1) 0.500
2) 2.00
3) 1.73
4) 0.577

25. A ray of light ($\lambda = 5.9 \times 10^{-7}$ meter) traveling in air is incident on an interface with medium X at an angle of 30°. The angle of refraction for the light ray in medium X is 12.°. Medium X could be

1) alcohol
2) corn oil
3) diamond
4) flint glass

26. A beam of monochromatic light ($\lambda = 5.9 \times 10^{-7}$ meter) crosses a boundary from air into Lucite at an angle of incidence of 45°. The angle of refraction is approximately

1) 63°
2) 56°
3) 37°
4) 28°

Answer Sheet

Name _____

1) _____

2) Do on diagram

2) _____

3) _____

4) _____

5) _____

6) _____

7) _____

8) _____

9) _____

10) _____

11) _____

12) _____

13) _____

14) _____

15) _____

16) _____

17) _____

18) _____

19) _____

20) _____

21) _____

22) _____

23) _____

24) _____

25) _____

26) _____