

Jordan Physics Digital Material Development

Chapter 9 (+)
Chapter 10

- Oscillatory motion as a pattern of motion
- Simple harmonic motion in simple pendulum
- Relation of simple harmonic motion to uniform circular motion
- Wave Motion
- Characteristics of mechanical waves (reflection and refraction)
- Properties of waves "Interference"
- Standing waves
- Interference of light Waves
- Diffraction of waves
- Diffraction of light waves
- Polarization of light
- Polarization of light by reflection

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Wave motion

Question ?

Click the sign ✓ or X in front of each of the following sentences:

- The waves emanating from the electric heater are mechanical waves. ✓ X
- The waves carrying the voice from a sender mobile phone to a receiving mobile phone are electromagnetic waves. ✓ X
- The waves generated by musical instruments are mechanical waves. ✓ X
- X-rays need a material medium in order to propagate. ✓ X

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Question (True or False)

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Properties of waves "interference"

Questions - Exercise 2

Two waves interfere; the first is represented by the function $y_1 = 8\sin\left(\frac{5\pi}{2}t\right)$, and the other by the function $y_2 = 60\sin\left(\frac{3\pi}{2}t + \pi\right)$. Both waves were generated at the same time. Where the displacement measured in cm:

Answer the following questions:

- 1- The phase difference between the two waves after the passage of 2 seconds
- 2- The phase difference between the two waves after the passage of 4 seconds
- 3- The displacement of the resultant wave 1 second after its generation is
- 4- The displacement of the resultant wave 2 second after its generation is

1- The interference Type your answer

The answer is :

the phase angle of the first wave = $\frac{5\pi}{2}t = \frac{5\pi}{2} \times 2 = 5\pi$

the phase angle of the second wave = $\frac{3\pi}{2}t + \pi = \frac{3\pi}{2} \times 2 + \pi = 4\pi$

the phase difference = $5\pi - 4\pi = \pi$

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Question (Problem Solving)

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- Reflection and absorption of light
- Transmission of light
- Reflection of light
- Angle of minimum deviation in a prism and dispersion of light
- Refraction at spherical boundaries between two transparent media
- Lenses
- How a lens works as a prism
- Characteristics of images formed for an object in lenses
- Lens maker's equation
- Measurement of the focal length of a convex lens
- Measurement of the focal length of a concave lens
- Application of optical properties of matter

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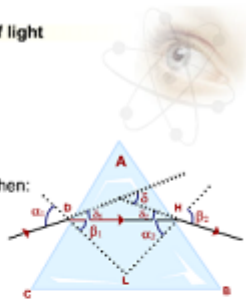
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Angle of minimum deviation in a prism and dispersion of light

Questions - Exercise 1

Click the correct answer :

- 1) The angle of minimum deviation (δ) can be obtained when:
- a) $\alpha_1 > \alpha_2$
 - b) $\alpha_1 < \alpha_2$
 - c) $\alpha_1 = \alpha_2$



2) A triangular prism having an apex angle 90° , a beam of light incident on one of its sides resulting in an angle of minimum deviation of 30° . Hence, the index of refraction of the material of that prism is:

- a) 1.23
- b) 0.87
- c) 1.21

3) A thin triangular prism has an apex angle 10° and an index of refraction 1.6. Hence, the angle of minimum deviation is:

- a) 2°
- b) 3°
- c) 6°

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Question (Selection)

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Measurement of the focal length of a concave lens

Procedure:

- Place the light convex lens of known focal length, so that it forms a real image of the object.
- Measure the distance between the object and the screen to find the focal length of the convex lens.
- Put the concave lens between the convex lens and the screen. Then measure the distance between the convex lens and the screen when a sharp image is formed.
- Move the screen up and down between the convex lens and the concave lens until a sharp image is formed.
- Apply the relation $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$ to find the focal length of the concave lens.

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Measurement of the focal length of a concave lens.

Apparatus: Experiment

- 1-Convex lens
- 2-Concave lens
- 3-Object
- 4-Meter rule
- 5-Screen
- 6-White paper

The focal length of the concave lens is _____

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Explanation: How to do experiment in a real lab.

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Measurement of the focal length of a concave lens

The lab report:

Student's name: _____ Section: _____
 School: _____ Date: _____

Purpose of the experiment:

Data:

Trial number	u	v	f
1			
2			
3			
4			

Calculations:

Results: \bar{f} (average of the focal length of the lens) = $\frac{(f_1+f_2+\dots+f_n)}{\text{number of trials (n)}}$

Error in measuring focal length = $\Delta f = \frac{\sum |(f_n - \bar{f})|}{n} \Rightarrow f = \bar{f} \pm \Delta f$

Questions on the experiment:
 1. If you did not have a convex lens at your disposal, how can you find the focal length of the concave lens?

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Report form of experiment in real lab (Student can print this out)

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Transmission of light

- www.Physicsclassroom.com
- http://www.glenbrook.k12.il.us/gbssci/phys/Class/light/u12l2c.html

Activities

Acrobat Reader - [Ch9_e_9.pdf]

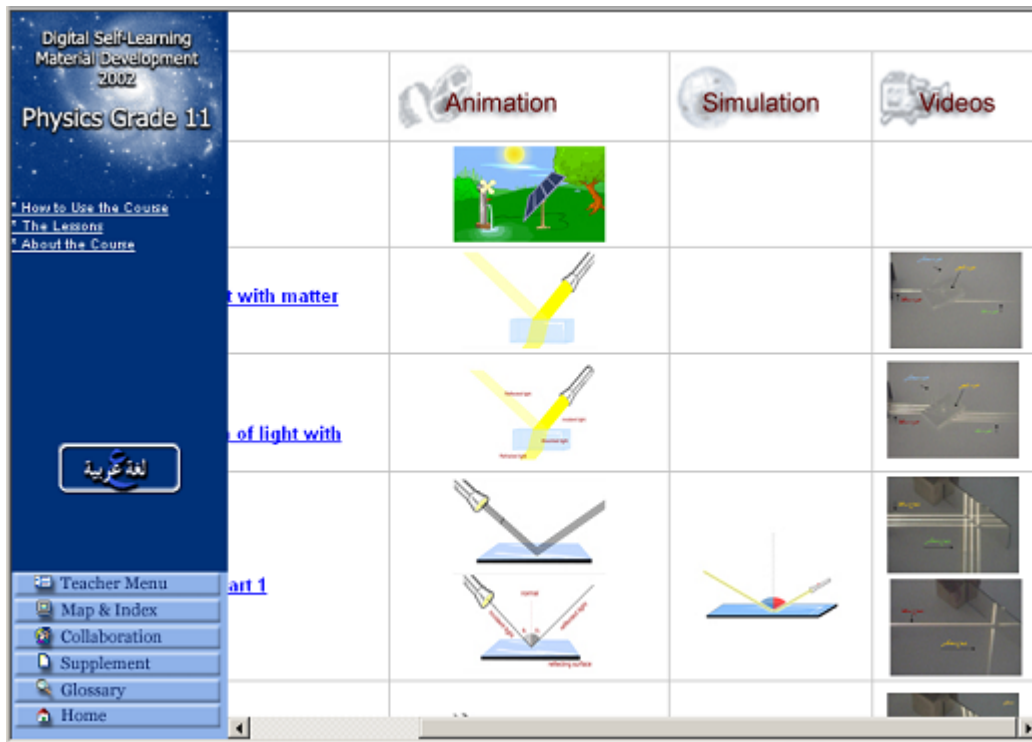
Chapter nine
 Optical properties of a matter

Q.1: A concave lens made of a material with an index of refraction 1.3. Does the lens remain a concave lens when placing it in a liquid with an index of refraction 1.4?

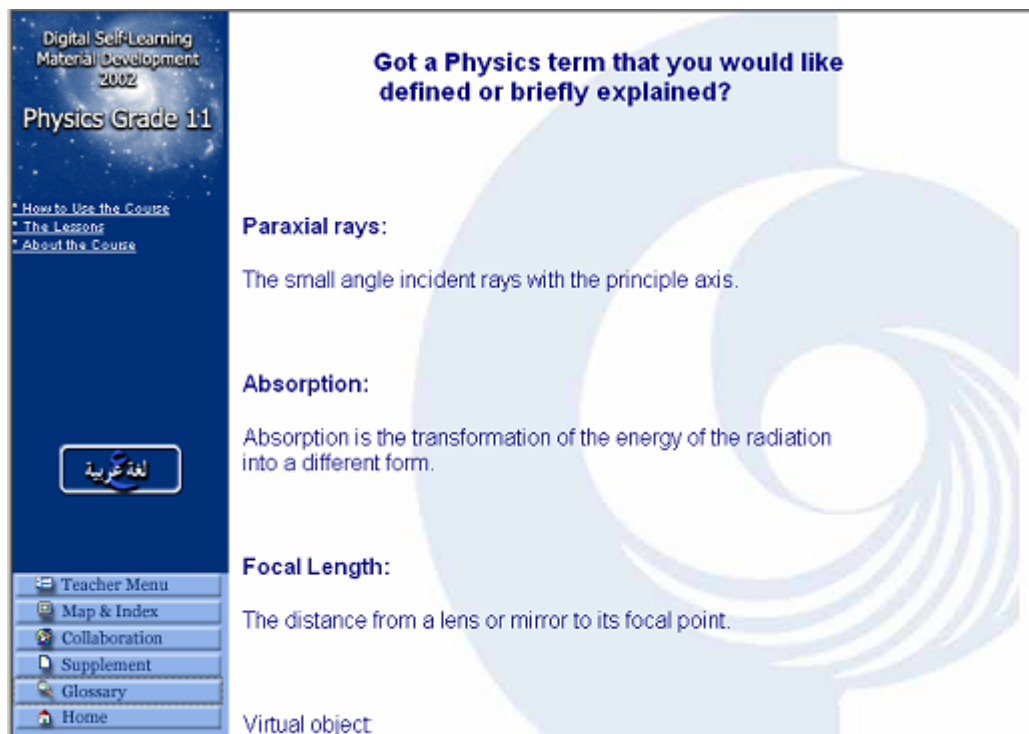
Q.2: A plane convex lens placed in the air with a focal length 18 cm and made of glass with an index of refraction 1.6. Calculate the radius of the convex surface for the lens.

Q.3: A lens with a power of (3 Δ) in water and a power of (2 Δ) in another media with an index of refraction 1.5.

Advanced Activity (Student can print this out)



Menu of Simulation, Animation, Movie for Data Show (Projector)



Glossary