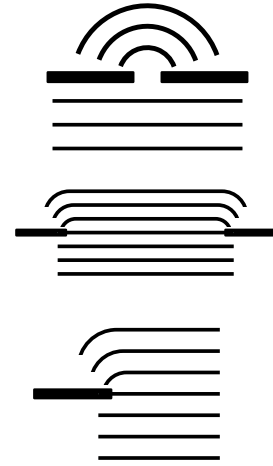


VIDEO SUMMARIES: WAVES

DIFFRACTION

What you need to know:

- $v = f\lambda$
 $v =$ Velocity (ms^{-1})
 $f =$ Frequency – Hertz (Hz)
 $\lambda =$ Wavelength (m)
- Diffraction is the bending of waves as they pass obstacles in their path
- Waves diffract when the wave length (λ) is similar to the gap size



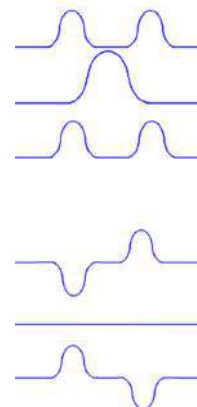
FREE tutorial videos at www.learncoach.co.nz

 learn
COACH

SUPERPOSITION

What you need to know:

- Superposition is when two or more waves overlap and the result is the sum of the individual waves
- Phase refers to the position of the wave
- Constructive interference is where waves overlap in phase producing a bigger wave
- Destructive interference is where waves overlap out of phase cancelling each other out



FREE tutorial videos at www.learncoach.co.nz

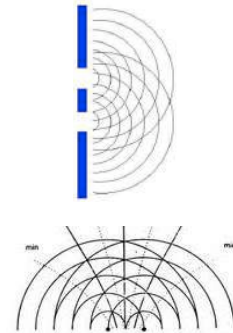
 learn
COACH

VIDEO SUMMARIES: WAVES

INTERFERENCE

What you need to know:

1. A source of light can **diffract** through two slits causing an **interference pattern**
2. The waves that have passed through the slits overlap to produce lines of constructive interference (antinodal lines) and destructive interference (nodal lines)
3. This is shown by areas of high intensity (constructive interference) and low intensity (destructive interference)



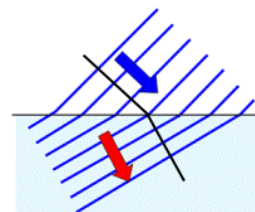
FREE tutorial videos at www.learncoach.co.nz

 learn
COACH

WAVE REFRACTION – PART 1

What you need to know:

1. Refraction: the bending of a wave as it passes from one medium to another
2. When a wave moves from a less to a more dense medium it bends TOWARDS the normal
3. When a wave enters a more dense medium v – decreases, λ – decreases, f – constant.
4. n is the refractive index and measures the optical density of a material



FREE tutorial videos at www.learncoach.co.nz

 learn
COACH

VIDEO SUMMARIES: WAVES

WAVE REFRACTION – PART 2

What you need to know:

1. Reflected waves: The angle of incidence equals the angle of reflection ($\theta_i = \theta_r$)
2. Shallow water is like high n
Deep water is like low n
3. Remember three S's: Shallow, Short, Slow
4. Ratio: $\frac{n_1}{n_2} = \frac{v_2}{v_1} = \frac{\lambda_2}{\lambda_1}$

FREE tutorial videos at www.learncoach.co.nz



RAY REFRACTION – PART 1

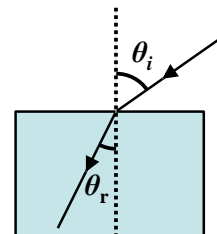
What you need to know:

1. Waves refract when passing from one medium to another
 - They bend towards the normal when entering a MORE DENSE material
 - They bend away from the normal when entering a LESS DENSE material.

$$2. \quad n_1 \sin \theta_1 = n_2 \sin \theta_2$$

n_1 = Refractive Index 1
 θ_1 = Angle of incidence
 n_2 = Refractive Index 2
 θ_2 = Angle of Refraction

3. θ_i and θ_r are measured against the normal



FREE tutorial videos at www.learncoach.co.nz



VIDEO SUMMARIES: WAVES

RAY REFRACTION – PART 2

What you need to know:

1. Total internal reflection acts like a perfect mirror where, the angle of incidence equals the angle of reflection ($\theta_i = \theta_{ref}$)
2. Total internal reflection occurs when:
 - The angle of incidence is greater than the critical angle ($\theta_i > \theta_c$)
 - Light is aiming to travel from a more dense to a less dense medium
3. When calculating the critical angle, the refracted ray (θ_r) is ALWAYS 90° when light is aiming to travel from a more dense to a less dense medium

FREE tutorial videos at www.learncoach.co.nz

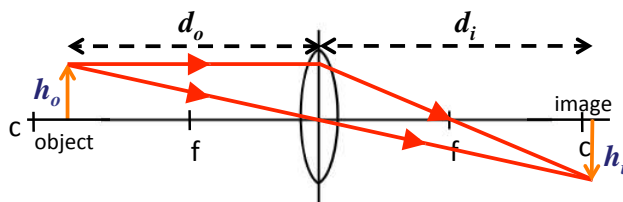


INTRODUCTION TO RAY DIAGRAMS

What you need to know:

$$m = \frac{d_i}{d_o} = \frac{h_i}{h_o} \quad \frac{1}{f} = \frac{1}{d_i} + \frac{1}{d_o}$$

f is the focal length
 f is half the centre of curvature (c)
 d_i is the distance **from the lens** to the image
 d_o is the distance **from the lens** to the object
 h_i is the height of the image
 h_o is the height of the object
 m is the magnification



FREE tutorial videos at www.learncoach.co.nz

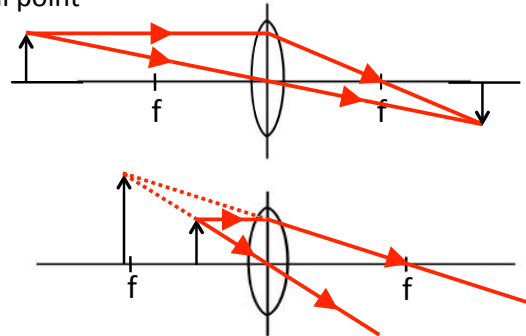


VIDEO SUMMARIES: WAVES

CONVEX LENS DIAGRAMS

What you need to know:

- To Draw
 1. Straight through centre
 2. In parallel, then through the focal point
 3. Dot back if necessary
- Properties/Characteristics:
 - Enlarged vs. Diminished
 - Upright vs. Inverted
 - Real vs. Virtual
- If object is outside f :
(real, inverted, diminished/enlarged)
- If object is inside f :
(virtual, enlarged, upright)



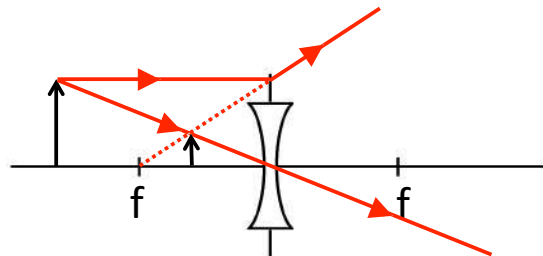
FREE tutorial videos at www.learncoach.co.nz



CONCAVE LENS DIAGRAMS

What you need to know:

- To Draw:
 1. Straight through centre
 2. In parallel, then out from the focal point (dot out)
 3. Dot back if necessary
- The image is:
 - Enlarged vs. Diminished
 - Upright vs. Inverted
 - Real vs. Virtual



FREE tutorial videos at www.learncoach.co.nz

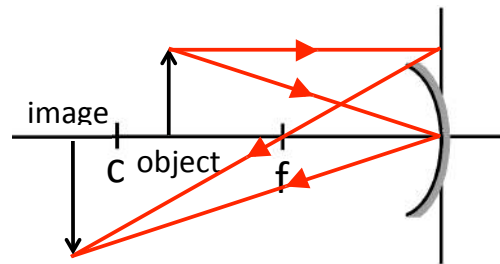


VIDEO SUMMARIES: WAVES

CONCAVE MIRROR DIAGRAMS

What you need to know:

- To Draw:
 1. Into centre, out on same angle
 2. In parallel, back through focal point
 3. Dot back to get image
- If object is outside f :
(real, inverted, diminished/enlarged)
- If object is inside f :
(virtual, enlarged, upright)



FREE tutorial videos at www.learncoach.co.nz

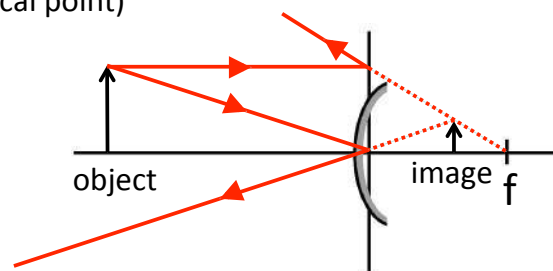
 learn
COACH

CONVEX MIRROR DIAGRAMS

What you need to know:

- To Draw:
 1. Into centre, out on same angle
 2. In parallel, out (dot back from focal point)
 3. Dot back outgoing rays
- Image is always:

~~Enlarged~~ vs. ~~Diminished~~
~~Upright~~ vs. ~~Inverted~~
~~Real~~ vs. ~~Virtual~~



FREE tutorial videos at www.learncoach.co.nz

 learn
COACH