KEY

First Name:_____ Last Name:_____

L06 – Formative Quiz – Refraction

Use the following information to answer Q1 and Q2.

▼ **Table 13.4** Absolute Refractive Indexes
(for Sodium Yellow Light, λ = 589 nm)

Medium	Index of Refraction
vacuum	1.0000
air	1.0003
ice	1.31
water	1.33
ethanol	1.37
glycerin	1.47
quartz glass	1.47
crown glass	1.52
light flint glass	1.58
Lucite (plexiglass)	1.52
ruby	1.54
zircon	1.92
diamond	2.42

Q1: Light travels fastest in which of the following mediums?

a) Ruby $n = 1.54$
b) Ice $n = 1.31$ ⟶ lowest index, fastest speed
c) Light Flint Glass $n = 1.58$
d) Glycerin $n = 1.47$

Q2: Light of wavelength 588nm in air is incident on ethanol at an angle of 38°. Upon entering the ethanol, what is the new wavelength, to the nearest nanometer?

$n = 1.37$

*(Record your **three-digit** answer in the numerical response boxes below.)*

4	2	9	

$\lambda_i = 588\,nm$
$n_i = 1.00$
$\theta_i = 38°$
$v_i = 3.0 \times 10^8\,m/s$

$\lambda_f = ?$
$n_f = 1.37$

$$\frac{n_2}{n_1} = \frac{\lambda_1}{\lambda_2}$$

$$\frac{1.37}{1.00} = \frac{588}{\lambda_2}$$

$$\lambda_2 = 429.197\,nm$$

KEY

Use the following information to answer Q3.

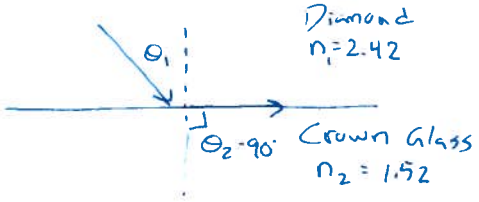
▼ **Table 13.4** Absolute Refractive Indexes (for Sodium Yellow Light, λ = 589 nm)

Medium	Index of Refraction
vacuum	1.0000
air	1.0003
ice	1.31
water	1.33
ethanol	1.37
glycerin	1.47
quartz glass	1.47
crown glass	1.52
light flint glass	1.58
Lucite (plexiglass)	1.52
ruby	1.54
zircon	1.92
diamond	2.42

Q3: What is the critical angle necessary for total internal reflection at a crown glass and diamond interface? High index → Low index $n = 1.52$ $n = 2.42$

*(Record your **three-digit** answer in the numerical response boxes below.)*

3	8	.	9



$$\frac{\sin\theta_1}{\sin\theta_2} = \frac{n_2}{n_1}$$

$$\frac{\sin\theta_1}{\sin 90} = \frac{1.52}{2.42}$$

$$\sin\theta_1 = 0.628099\ldots$$

$$\theta_1 = 38.91°$$

MARKING:

Beginning	0
Progressing	1
Competent	2
Exemplary	3