2022A8 REFRACTION, REFLECTION

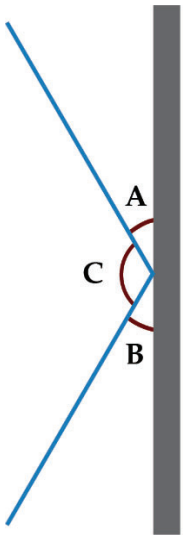
ANSWERS

Level 1:

The completed table is below. While the speed of light through diamonds is very slow compared to the speed of light in a vacuum, remember how fast that speed still is! Light can still travel through 41.6 million miles of diamond in a single minute!

SPEEDS OF LIGHT	
MATERIAL	**FRACTION OF THE "TRUE" SPEED OF LIGHT**
Vacuum	$3*10^8$ meters / second (m/s) * This is the highest the speed of light possible aka the "true" speed of light
Air	$(3 * 10^8 \text{ m/s}) * 0.999 = 2.997 * 10^8$ m/s
Water	$(3 * 10^8 \text{ m/s}) * 0.75 = 2.26 * 10^8$ m/s
Windows	$(3 * 10^8 \text{ m/s}) * 0.66 = 1.97 * 10^8$ m/s
Diamond	$(3 * 10^8 \text{ m/s}) * 0.41 = 1.24 * 10^8$ m/s

Level 2: As a reminder, here is the diagram:



We know that angle A equals 30°. One of the laws of reflection is that angle A and B are equal. Therefore, angle B is also 30°. The surface is flat as well, so we know that

$$A + B + C = 180°$$

Let's do some quick replacements with what we know.

$$30° + 30° + C = 180°$$

Great! Now, we can work through this to solve for C.

$$60° + C = 180°$$

$$C = 180° - 60°$$

$$C = 120°$$

Fiber optic cables, which heavily utilize reflection and refraction allow us to communicate with projects like this one in milliseconds!