Refraction Problems ANSWERS

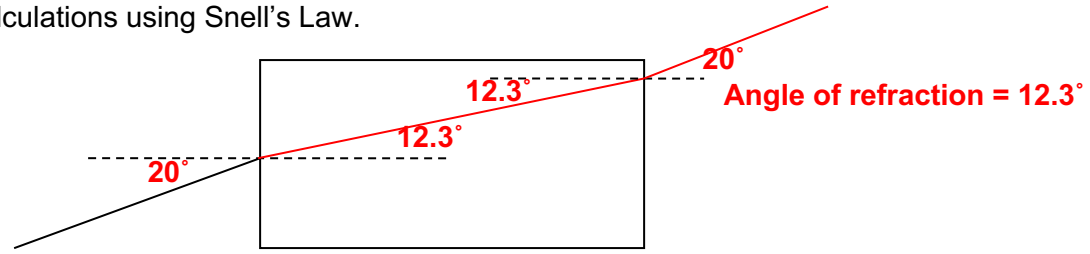
1) Complete the chart below. Make you calculations on another page.

Medium 1	Medium 2	Index of refraction (n_1)	Index of refraction (n_2)	Angle of incidence (Θ_1)	Angle of refraction (Θ_2)
Air	Diamond	**1.00**	2.42	30º	**11.9°**
Air	Zircon	**1.00**	1.90	30º	**15.3°**
Diamond	Air	2.42	**1.00**	**4.1°**	10º
Water	Diamond	1.33	2.42	**18°**	10º

2) If the angle of incidence (from crown glass, n=1.52) is 30°, find the angle of refraction in diamond (n=2.42).

$(1.52)\sin 30° / 2.42 = \sin\theta_2$ **$\theta_2 = 18.3°$**

3) a) Draw a ray diagram to show the path of ray of light as it passes from air (n=1.00) into a block of flint glass (n=1.61). Be sure to sketch the normal and show your measured angles and calculations using Snell's Law.



b) What would happen to the angle of refraction if the block was made of ice (n=1.30)?

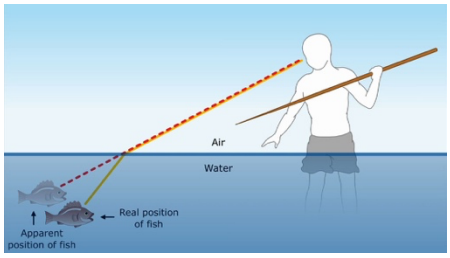
14.5˚

c) What will happen to the path of light when it passes back into the air? **20˚**

4) Complete the chart below

Medium 1	Medium 2	Index of refraction (n_1)	Index of refraction (n_2)	Critical Angle (Θ_1)
Diamond	Air	2.42	1.00	**24.4°**
Water	Air	1.33	1.00	**48.8°**
Glass	Water	**1.52**	1.33	61.4º

5) You want to scoop a fish out of water. Where should you aim relative to the fish to capture it? Explain using a diagram. **Above the actual location of the fish**



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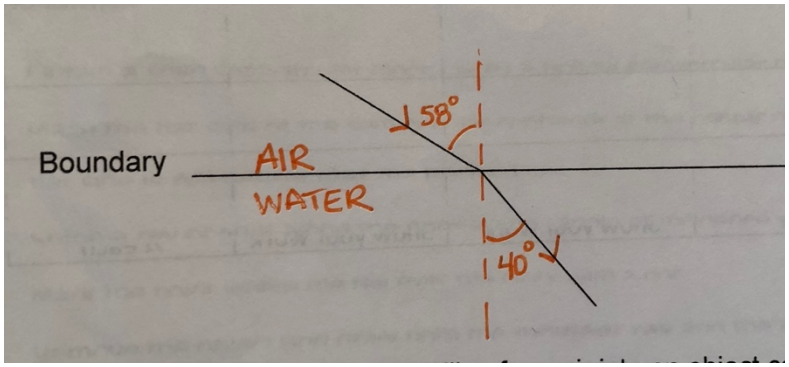
6) In the diagram below, light is crossing a boundary from air to water (n = 1.33). Draw the **normal line**, indicate the **direction** of the rays & **label** each medium as air or water.



7) A diagram below shows a ray travelling from air into an object composed of 3 different media. Complete the diagram by continuing the ray until it leaves the object.