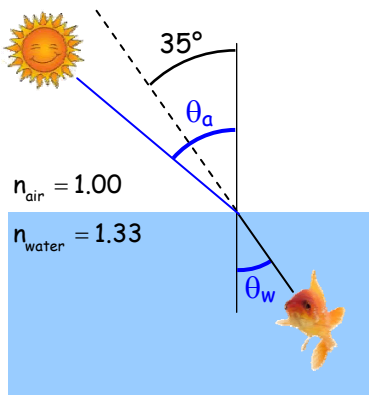Name _____ Key _____

Quiz 6

1)[6] A fish sees the sun 35° from vertical. What is the actual position (angle from the vertical) of the sun in the sky? Draw the ray from the fish to the sun and the sun in its actual position.

$35°$

θ_a

$n_{air} = 1.00$

$n_{water} = 1.33$

θ_w

The fish sees the refracted ray from the sun

$$n_{water} \sin\theta_{water} = n_{air} \sin\theta_{air}$$

$$\sin\theta_{air} = \frac{n_{water}}{n_{air}} \sin\theta_{water} = \frac{1.33}{1} \sin(35) = 0.763$$

$$\theta_{air} = 49.7°$$

So the sun is actually 49.7° down from the vertical.

2)[2] What is the critical angle for the fish and is it in the air or the water?

The critical angle is in the water

$$n_{water} \sin\theta_{critical} = n_{air} \sin(90°)$$

$$\theta_{critical} = \sin^{-1}\left(\frac{n_{air}}{n_{water}}\right) = \sin^{-1}\left(\frac{1}{1.33}\right) = 48.7°$$

3)[2] QB is sitting 1 m in front of a plane mirror. Where does she see her image and is it real or virtual?

    a) 1 m in front of the mirror, real
    b) 0.5 m in front of the mirror, real
    c) 1 m behind the mirror, virtual
    d) 0.5 m behind the mirror, virtual

1 m

WAIT A MINUTE.
I THINK LASSIE'S
TRYING TO TELL US
SOMETHING.