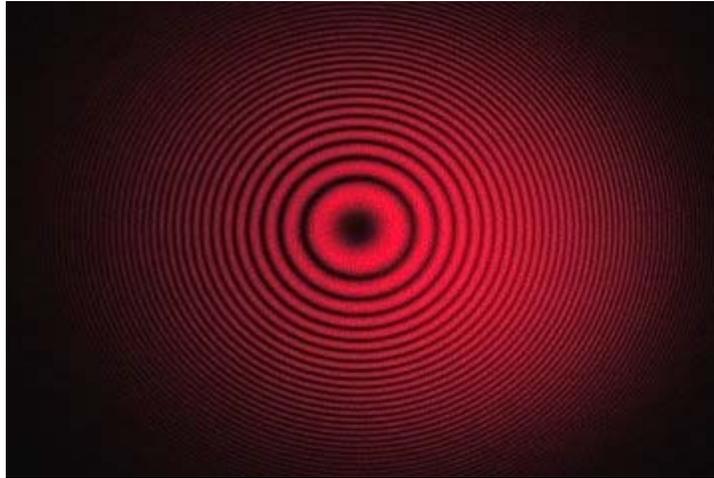
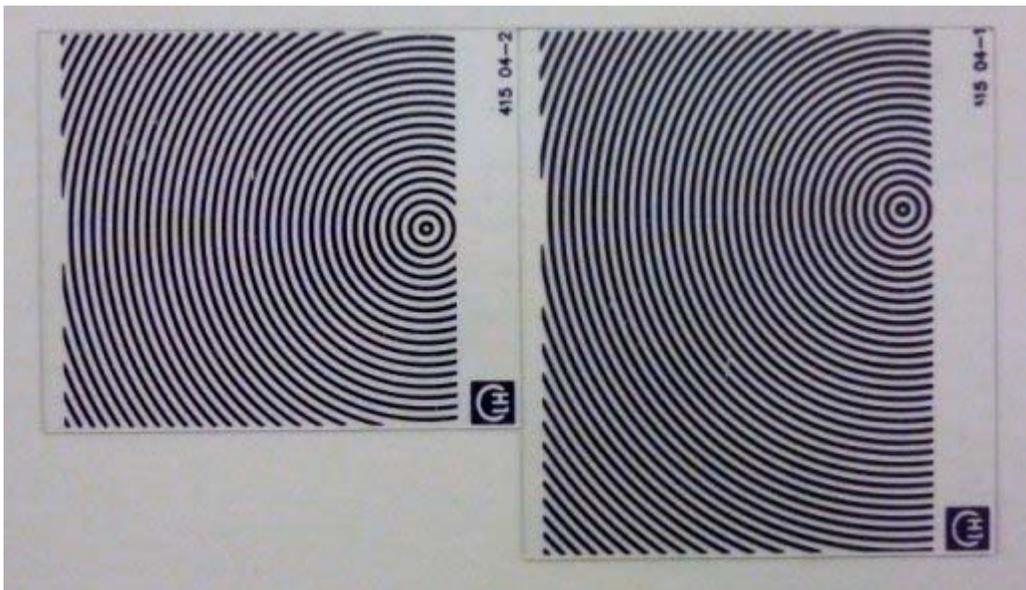


Answer #293

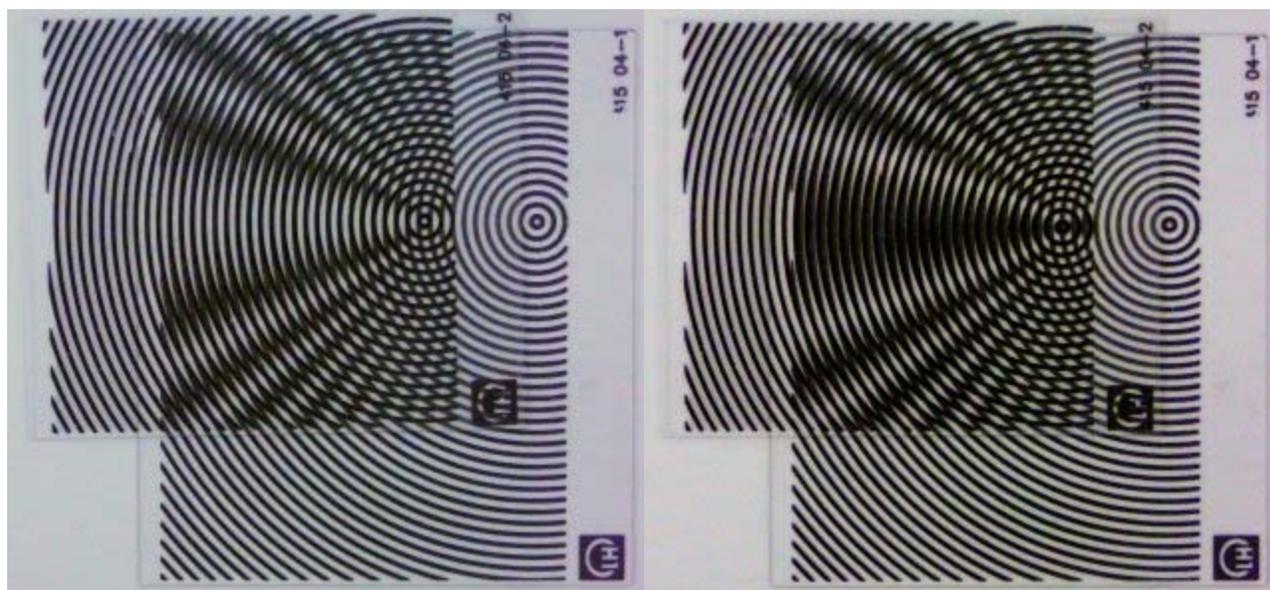
The answer is either (f): either (d) or (e): the spot where the two beams overlap will have a series of bright and dark circles with either a bright spot or a dark spot in the center, dependent on whether the two central rays are in or out of phase. In this case it is a dark spot, which is a result of the light reflected from the front and rear surfaces of the lens along the optic axis of the system being out of phase. This is seen in the photograph below, and in an mpeg video by clicking your mouse on the photograph.



To see why this is so, we will use a model of the laser light employing two concentric circle Moire patterns, seen in the photograph below.



The laser light reflects off the front and the back surfaces of the lens, creating two diverging beams, as seen in the photograph.



The beams progress along the horizontal line defined by the two sources (the center dots of the Moiré pattern) spreading out at different rates, because the distance from any point along the axis optic to the two sources is different. Thus they form a series of concentric dark and light circles, each slightly narrower, as seen in the model and in the actual photograph at the top of this page. The phase between the two sources depends on the thickness of the lens as well any phase changes that occur when the light reflects off the front (external) and rear (internal) surfaces of the lens. If the two sources happen to be in phase, the center will be a bright spot, as seen at the left above. If the two sources happen to be out of phase, the situation will be as seen at the right, which happens to be the case for our actual experiment.

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