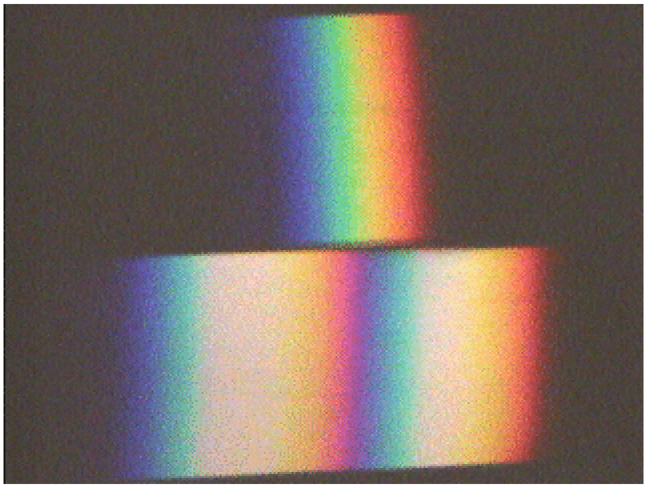
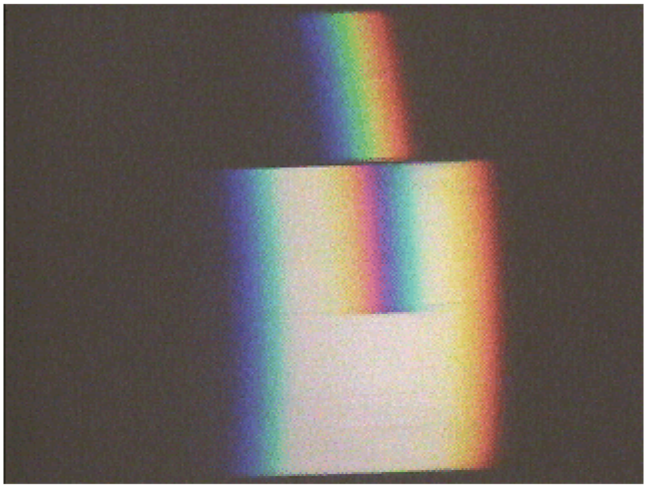
Answer #13

The answer is (b); the spectrum obtained from the "negative" slit will have colors complementary to those of a standard white light spectrum, as seen in the photograph below. The photograph contains the standard white light spectrum on top and the "negative spectrum" on the bottom.



As you go from right to left (increasing angle of dispersion) for the standard spectrum the colors decrease in wavelength - red, yellow, green, cyan, and blue. The "complementary" spectrum consists of the complementary colors - cyan (white minus red), blue (white minus yellow), magenta (white minus green), red (white minus cyan), and yellow (white minus blue).

The slit defines a narrow band of light that would then be dispersed by the prism before being focused onto the screen. In the case of the "negative" slit, spectral colors corresponding to those of the classic white light spectrum are removed from the white light continuum of the "no slit" case by the existence of the baffle where the slit would normally be. Three "spectra" are shown in the photograph below, corresponding to the three baffles pictured in the third figure of Question #13: from top to bottom: the white light spectrum, the "negative" spectrum, and the "spectrum" of the open baffle.



From the difference between the center and the lower spectra, the effect of the "negative" slit is apparent. Aberration in the optical system causes curvature of the spectra in this case, but does not affect the result.

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