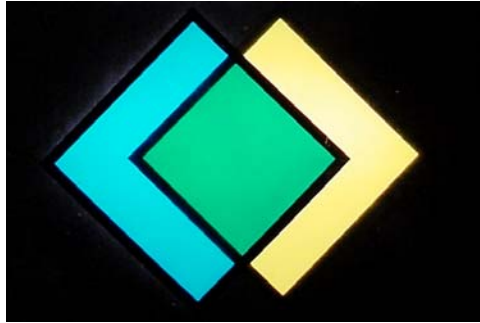


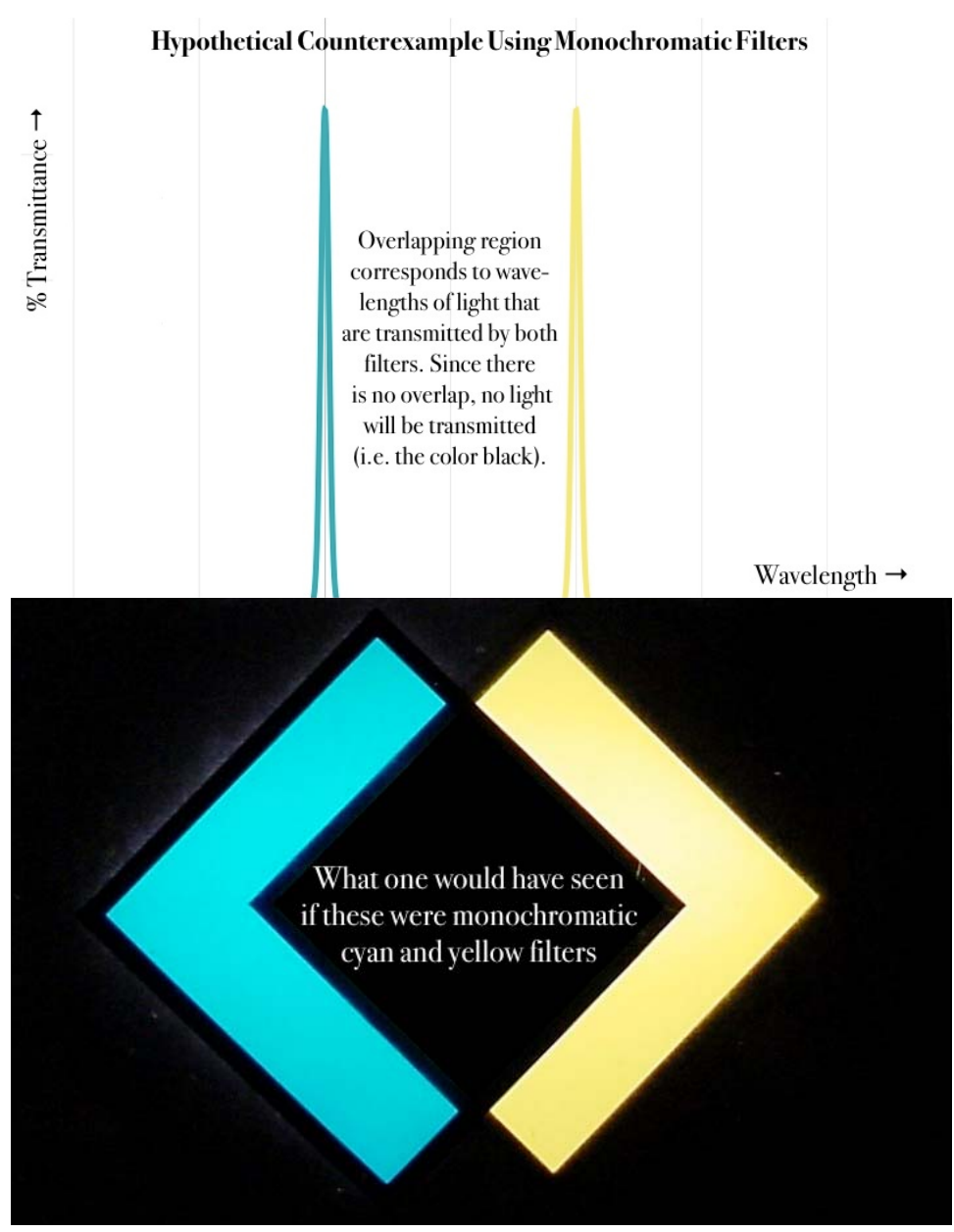
Answer #360

The answer is (c): there was not enough information given to determine the color of the overlapping region! Choice (d) is the classic case of "right answer but wrong reason" -- and in physics, it is the reason that is most important.

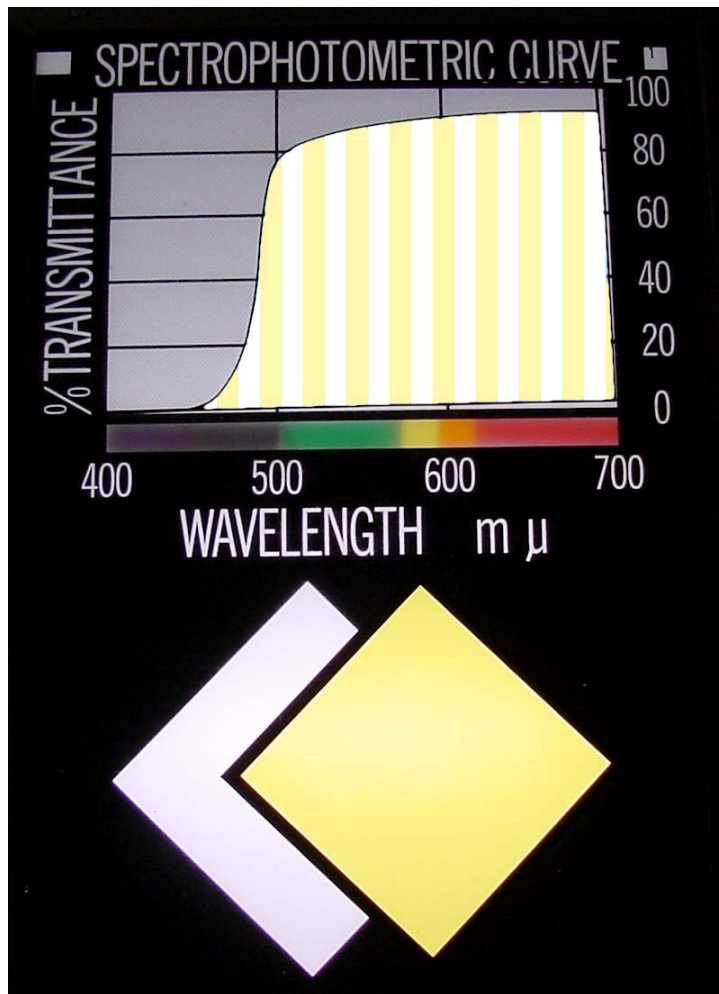


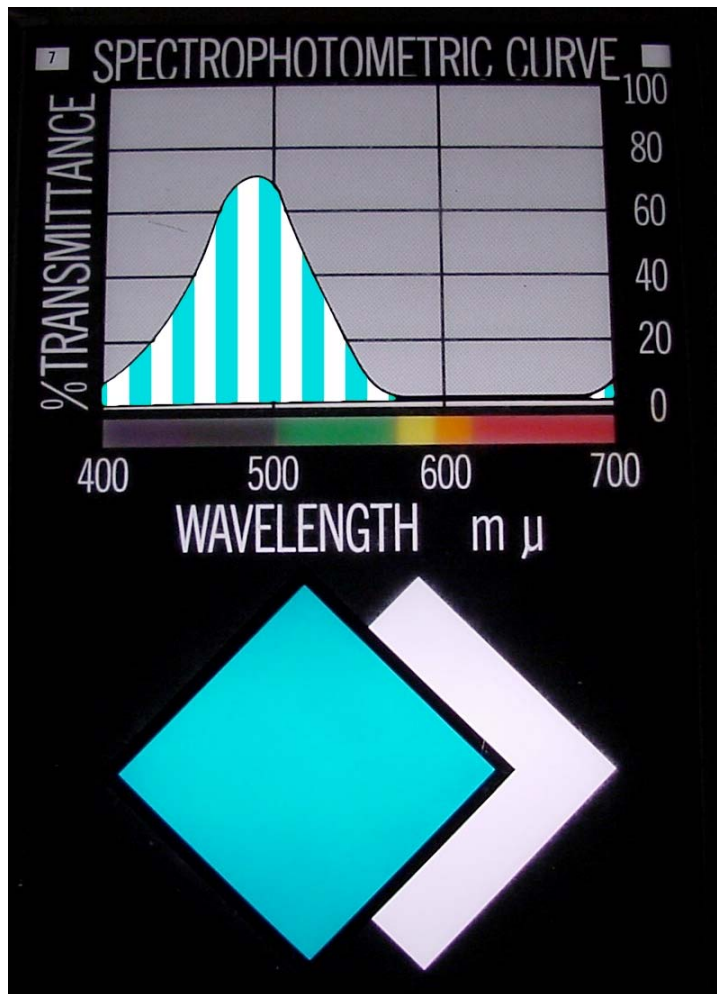
It is often customary to think of negative color mixing as governed by the "rules" one learns in class: magenta + green = white, cyan + red = white, etc. However, underlying these all lies a tacit assumption that often goes unspoken: these "rules" are not applicable for monochromatic light!

Suppose for a moment that the cyan and yellow filters used allowed only a narrow band of light to pass through (monochromatic). The overlapping region would correspond to the color that is passed by *both* filters. However the catch is, there isn't any overlap to begin with!



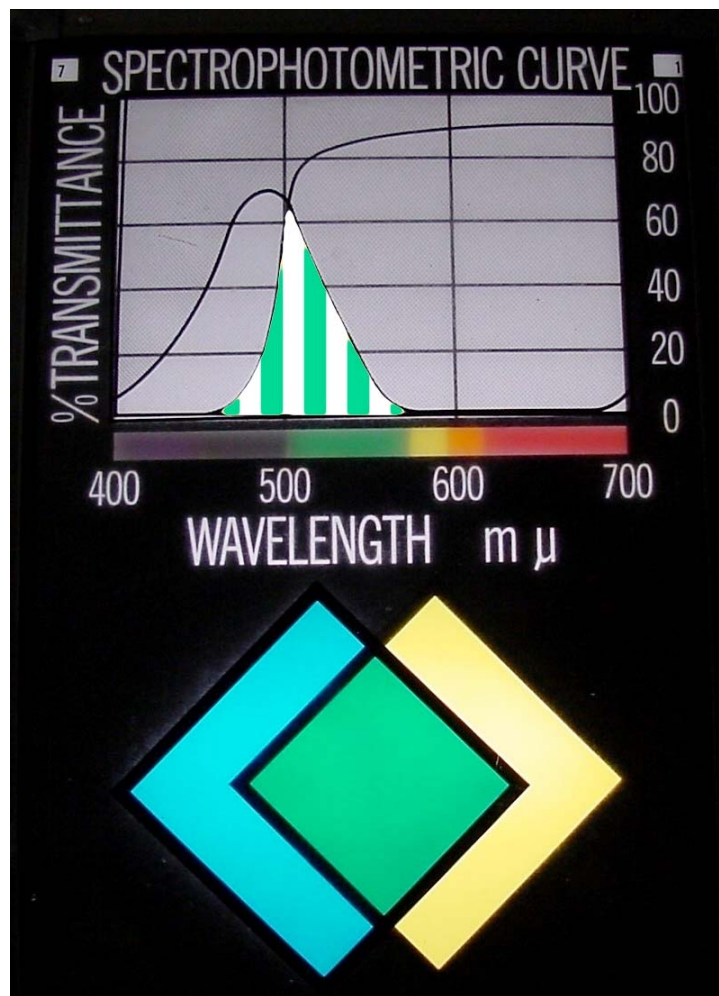
Therefore, it is absolutely necessary for one to know which wavelengths of light each filter lets through in order to answer the question. Luckily, we just happen to have such information (which was shrewdly cropped out of the question); the vertical shading is completely artificial and courtesy of Photoshop.





Notice how the filters are not monochromatic!! (In fact, if one looks closely, it is interesting to note how the cyan filter actually lets a tiny fraction of red light through!)

Since we now know we are working with broadband filters, there is a (good) possibility there will be a region of overlap of the wavelengths passed by both. And indeed there is -- a curve predominantly in the green part of the spectrum; shading again courtesy of Photoshop.



Take-home point? Negative color mixing can be tricky! Without complete knowledge of the transmittance profiles of the filter at hand, one cannot say with conviction what color will result.

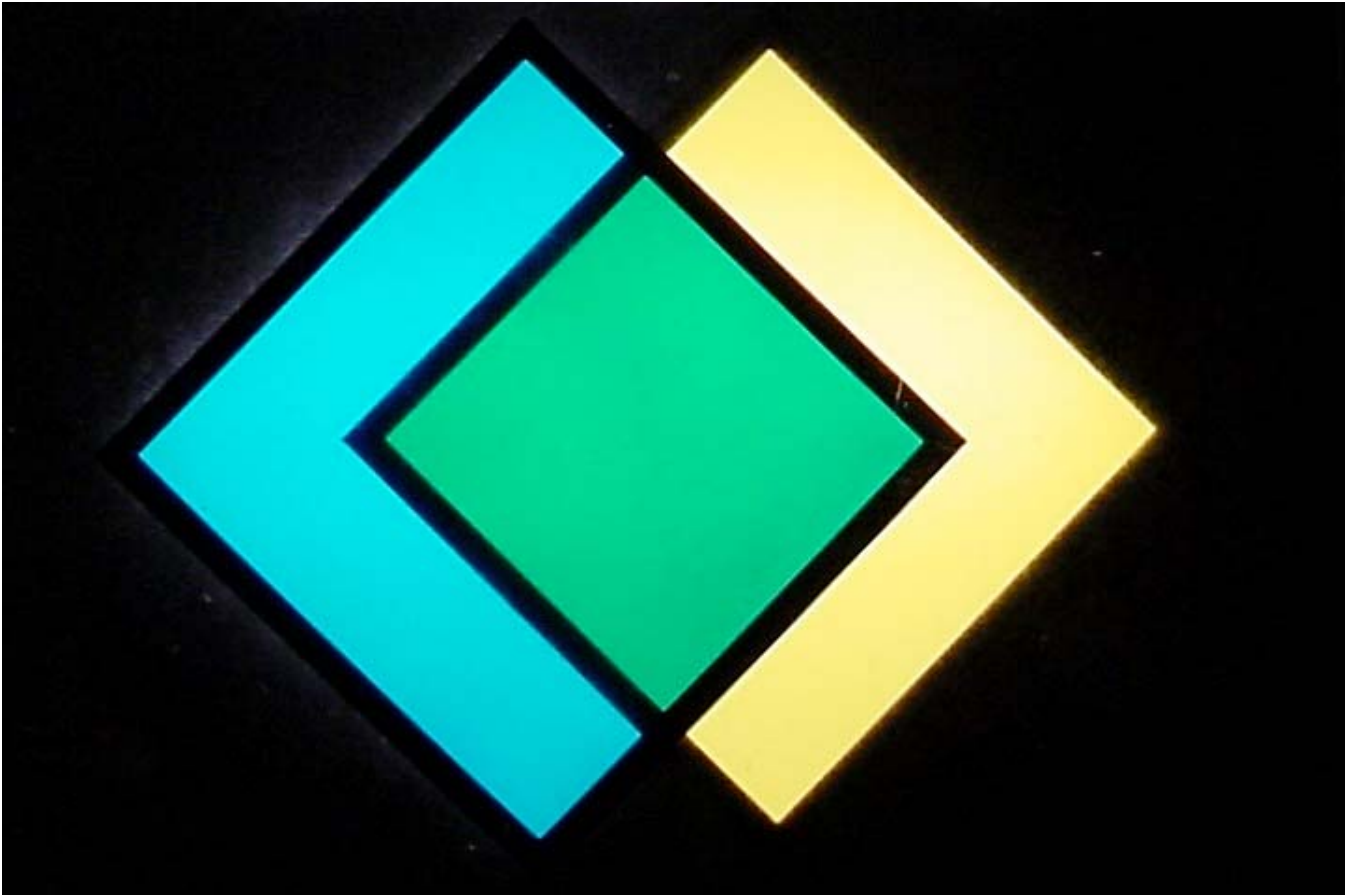
[Question of the Week](#)

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For questions and comments regarding the *Question of the Week* contact [Dr. Richard E. Berg](#) by e-mail or using phone number or regular mail address given on the [Lecture-Demonstration Home Page](#).

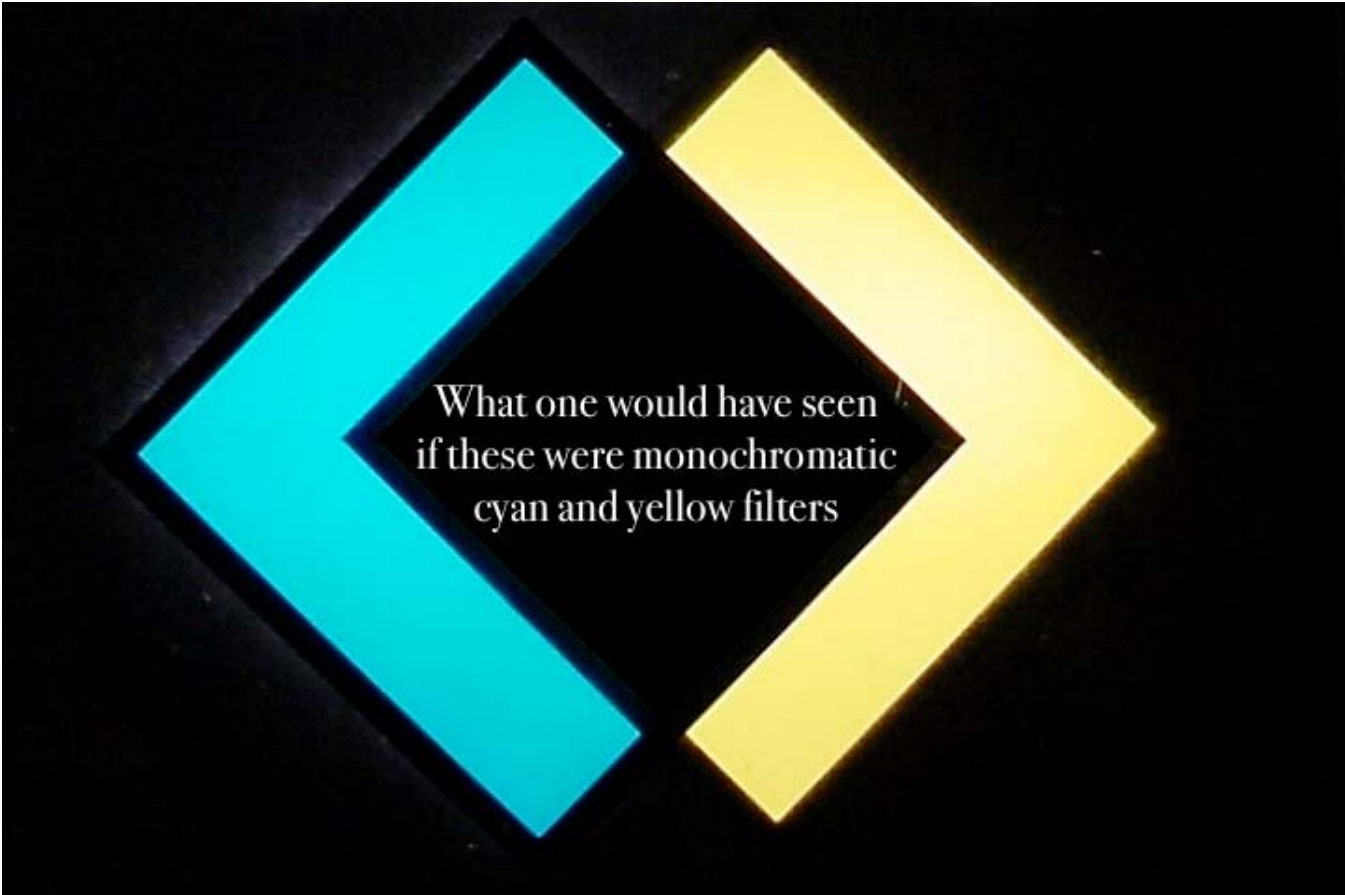


Hypothetical Counterexample Using Monochromatic Filters

% Transmittance →

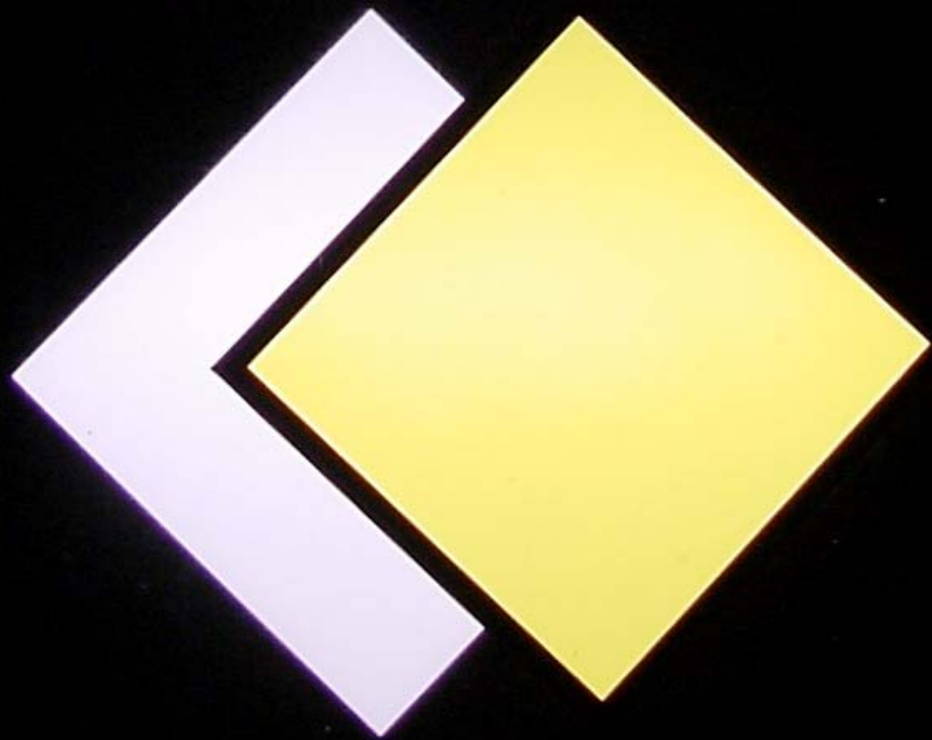
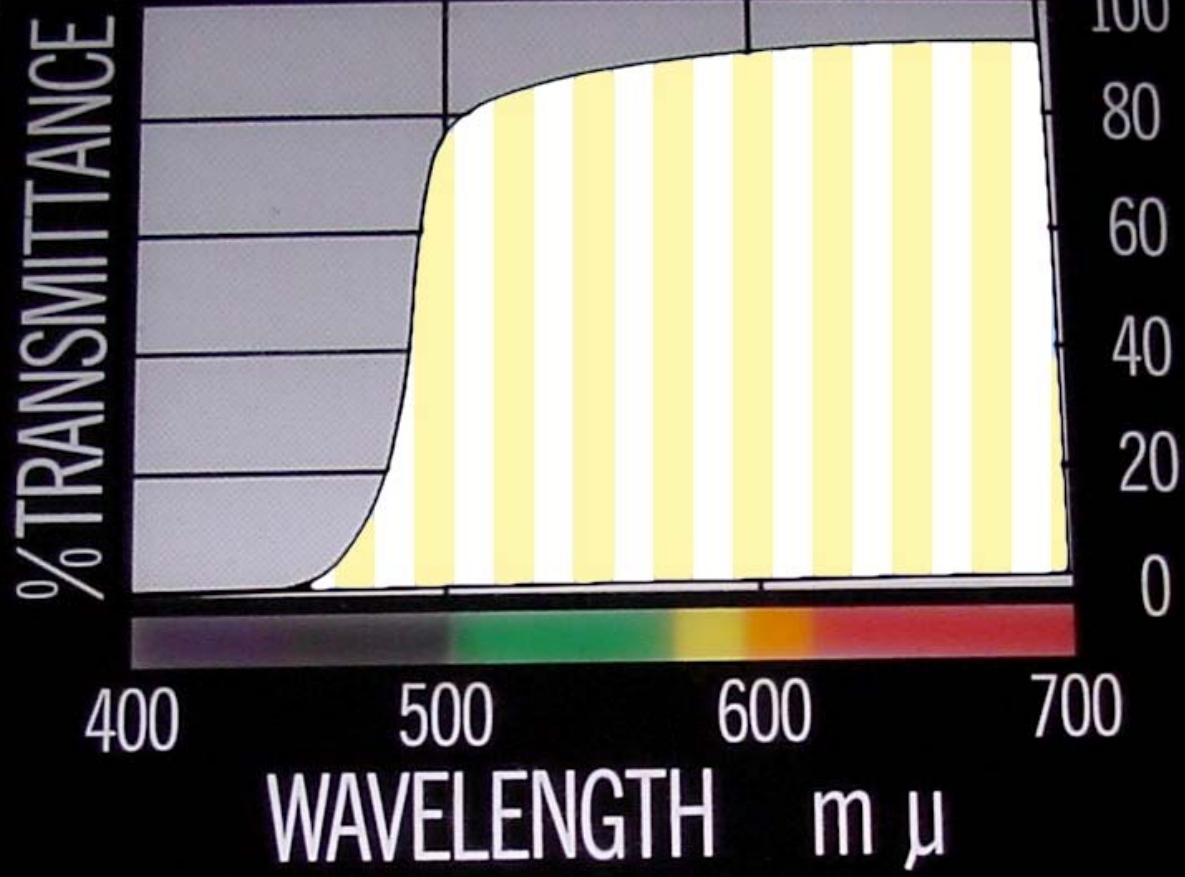


Wavelength →

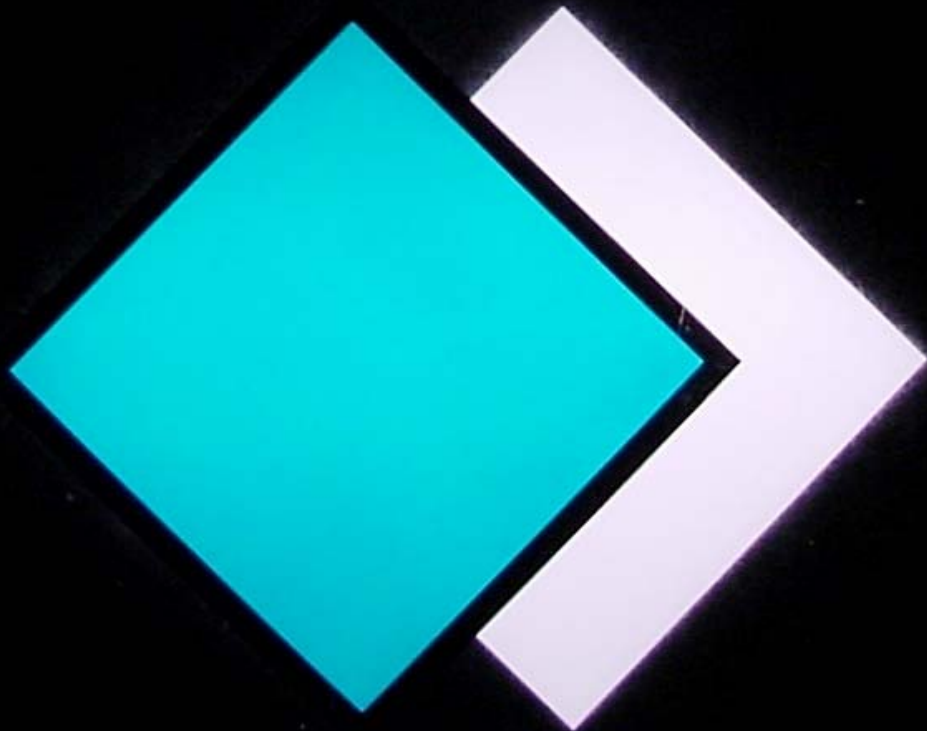
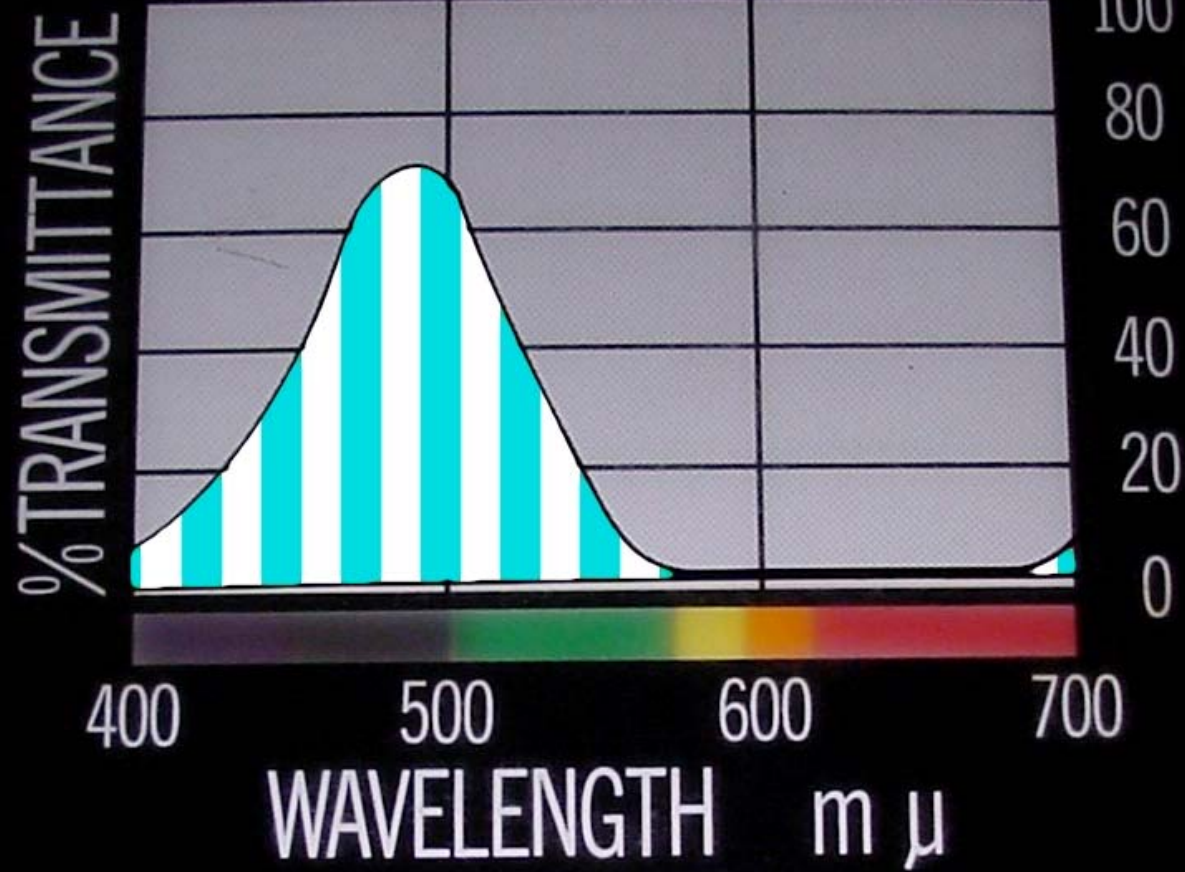


What one would have seen
if these were monochromatic
cyan and yellow filters

SPECTROPHOTOMETRIC CURVE



7 SPECTROPHOTOMETRIC CURVE



7 SPECTROPHOTOMETRIC CURVE 1

