3D Optics

Outreach presentation developed by
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UCSD
CIAN

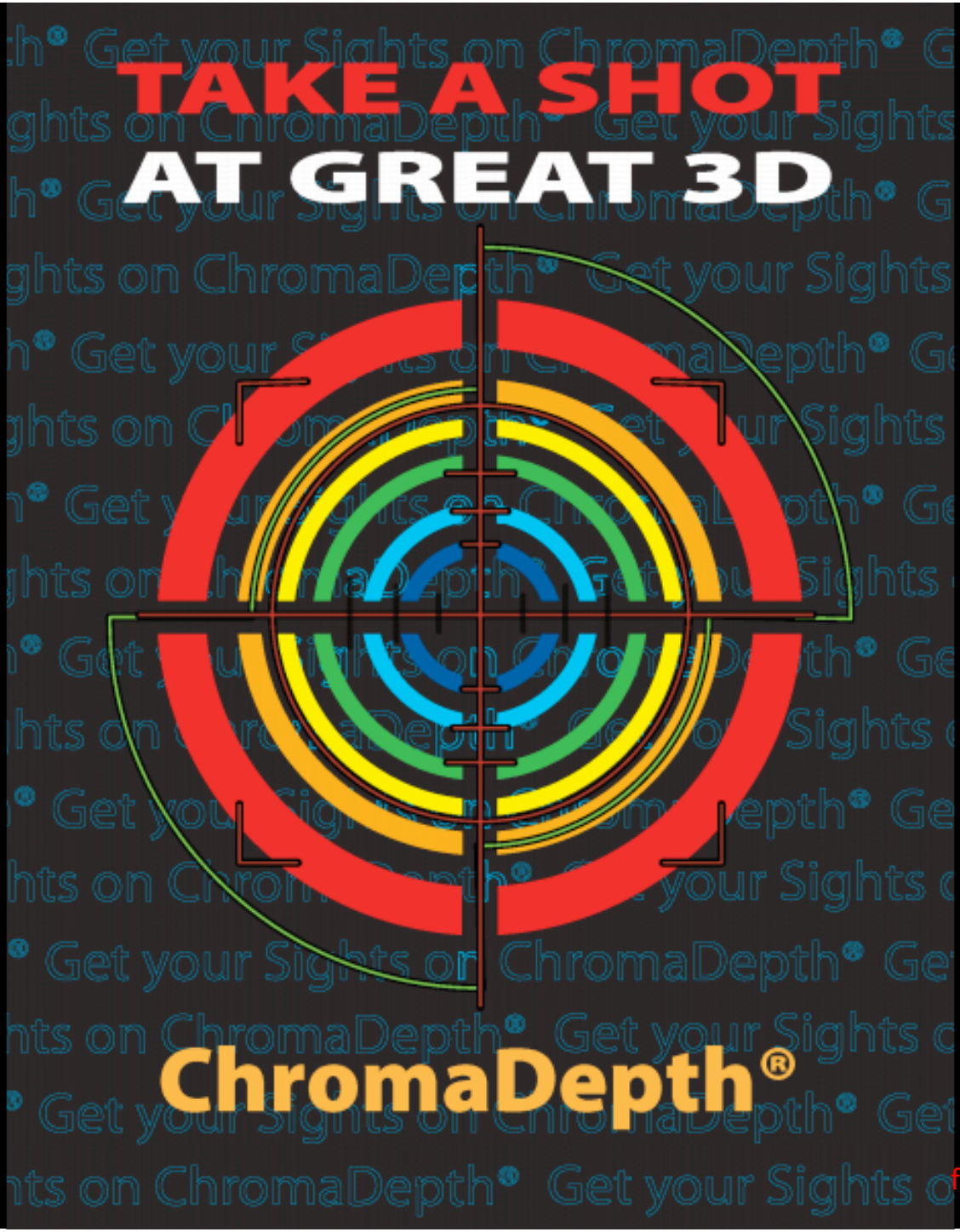
Crayola 3D chalk, 3D markers

Does this really work?
See for yourself!

photo from bitrebels.com

photo from chromadepth.com

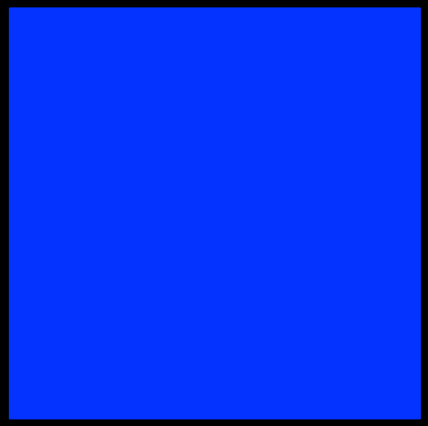

from chromadepth.com

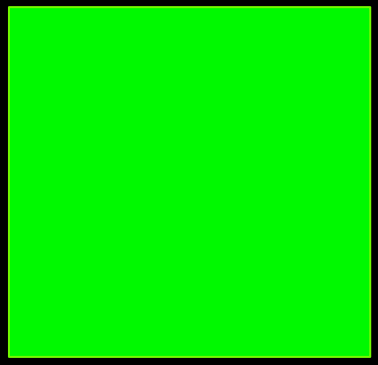

TAKE A SHOT
AT GREAT 3D
ChromaDepth®
from chromadepth.com

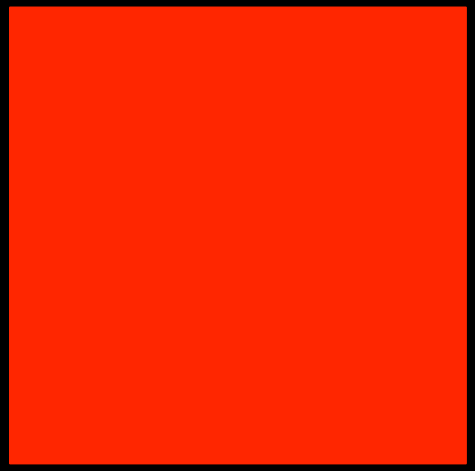

from chromadepth.com

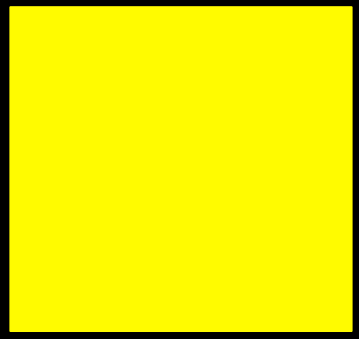
from Disney's The Hunchback of Notre Dame

3D glasses that work on color

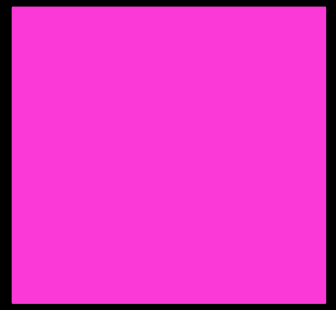








Why does magenta look really weird?



Bonus: why does yellow look really weird?

How does it work?

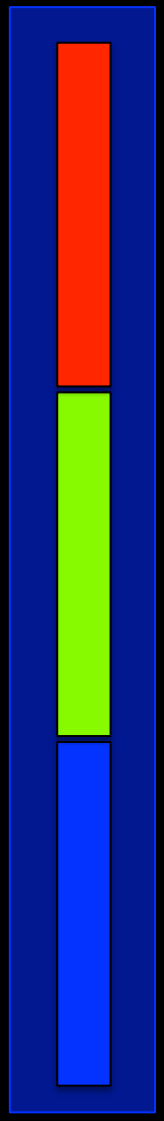
- Hold your finger up by your nose and look at it first with one eye open, then the other.
- Now move it farther away and do the same thing.

Closer things move more between one eye and the other (parallax)

left eye

right eye

How the glasses use parallax to make red look closer



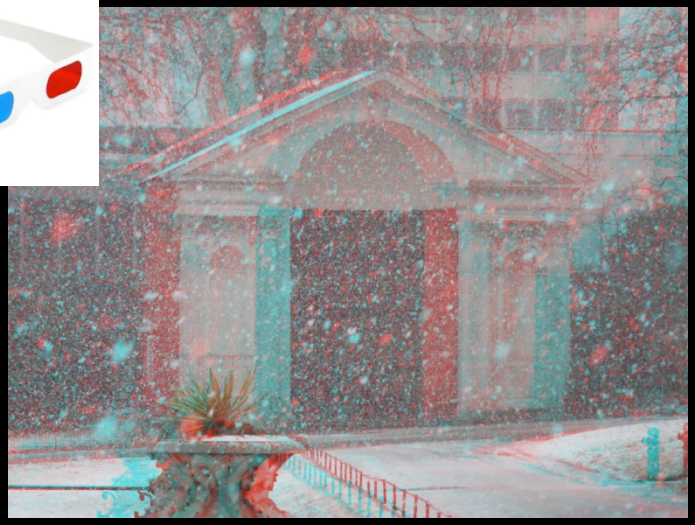
Using your glasses:

- Look at the picture with your left eye only
- Then look with your right eye only

Notice that the glasses move the red shape the most, then the green shape, then the blue shape.

Most 3D technology uses parallax

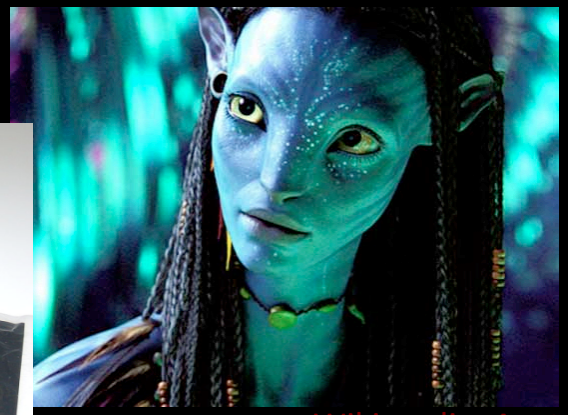
Red/blue 3D glasses



3Dguy.tv, ormaqstudios.com

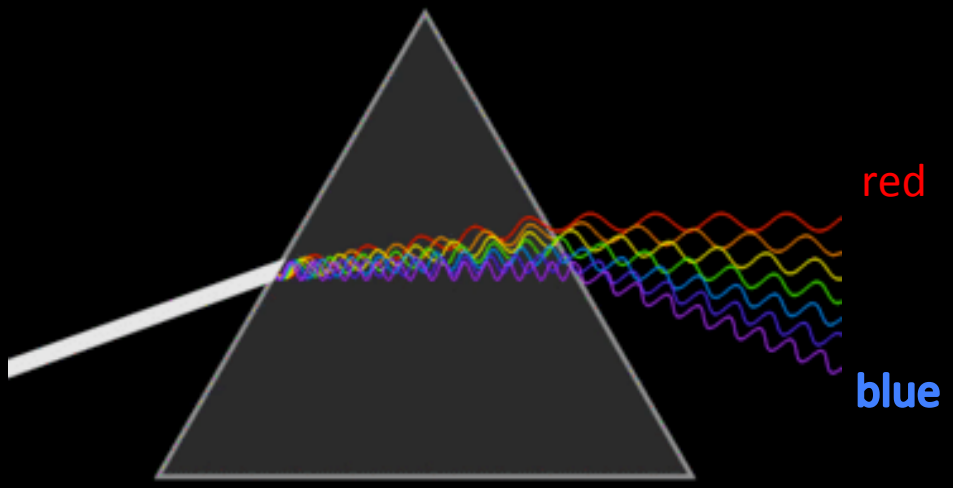
Viewmaster

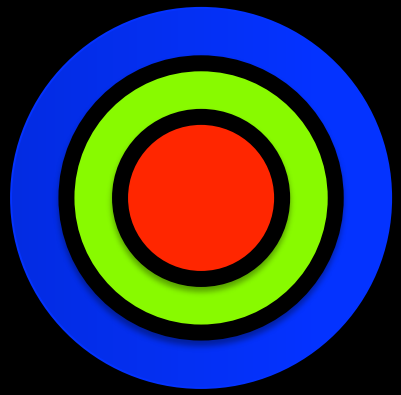
3D movies



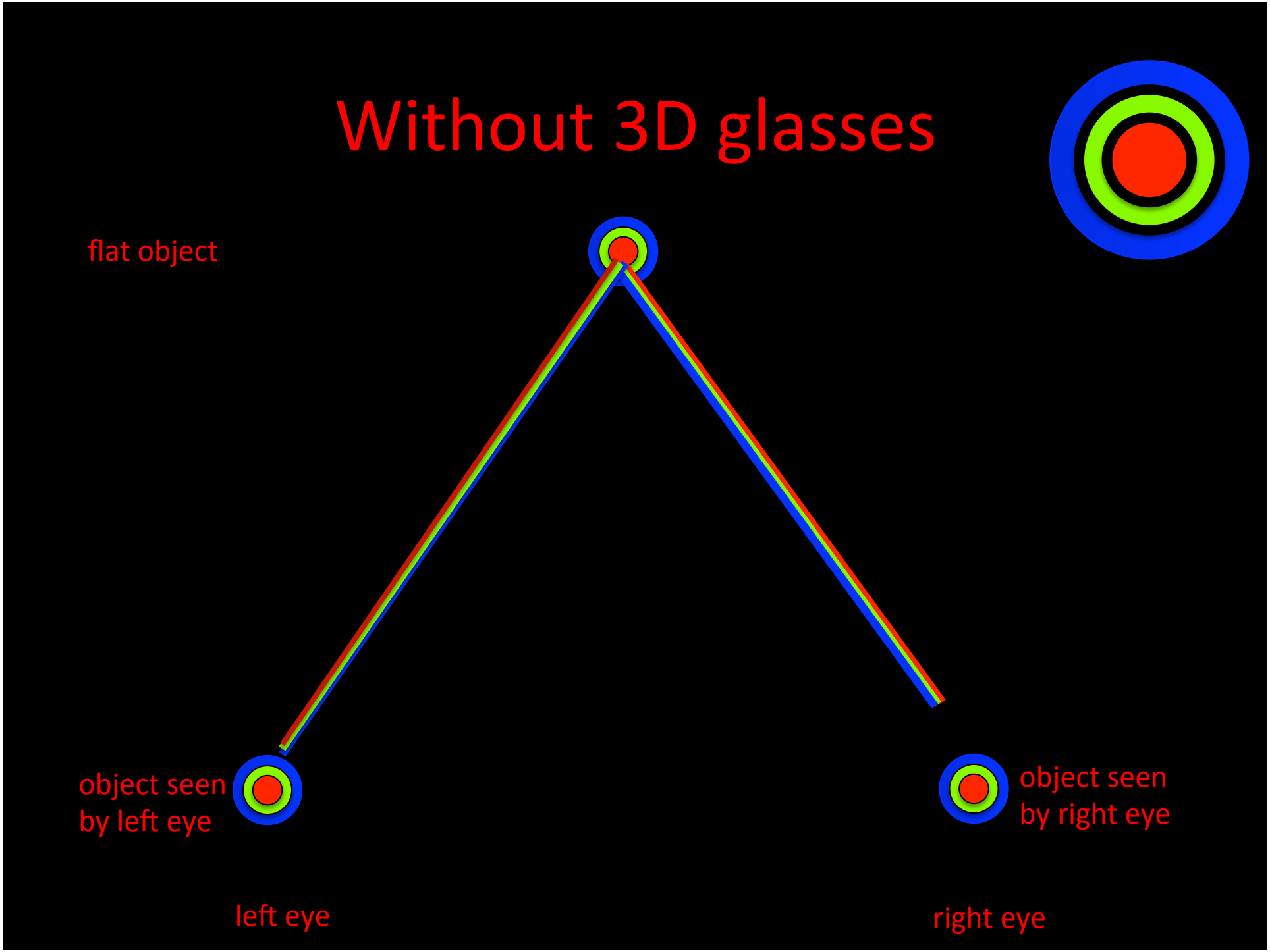
Wikimedia, Avatar

How do the glasses shift red over?

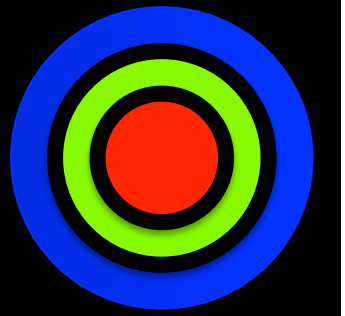


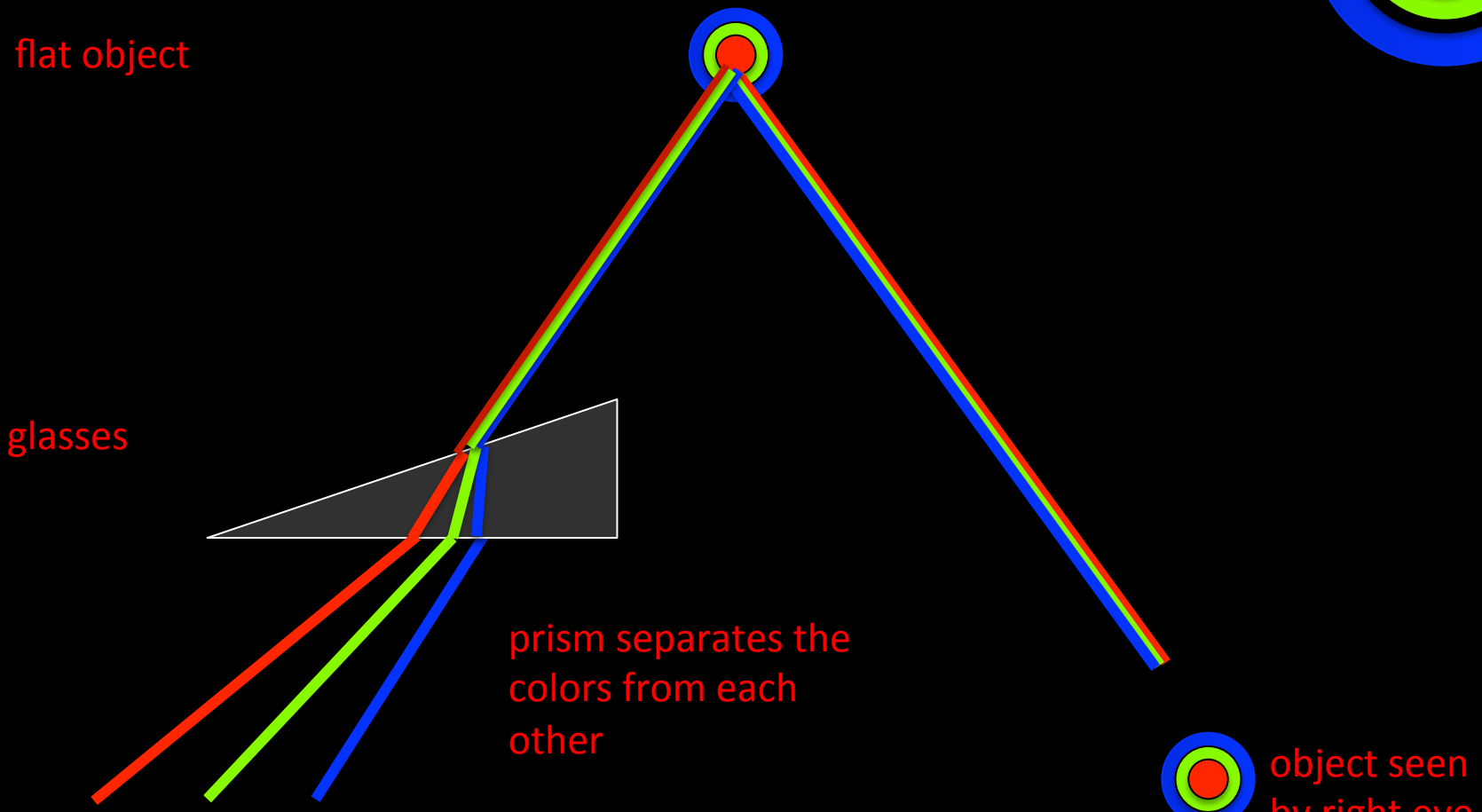


Without 3D glasses



With prism on the left eye





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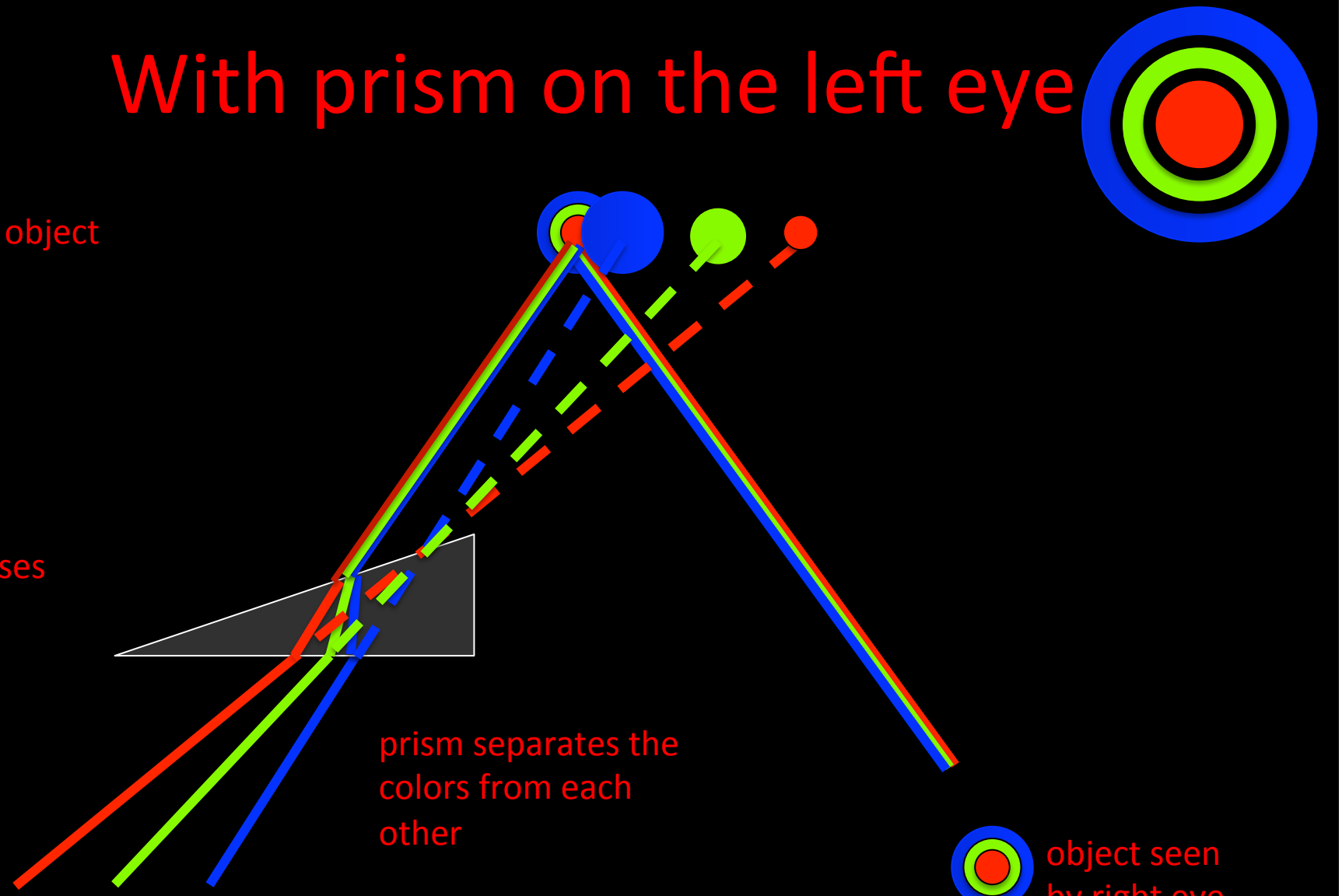

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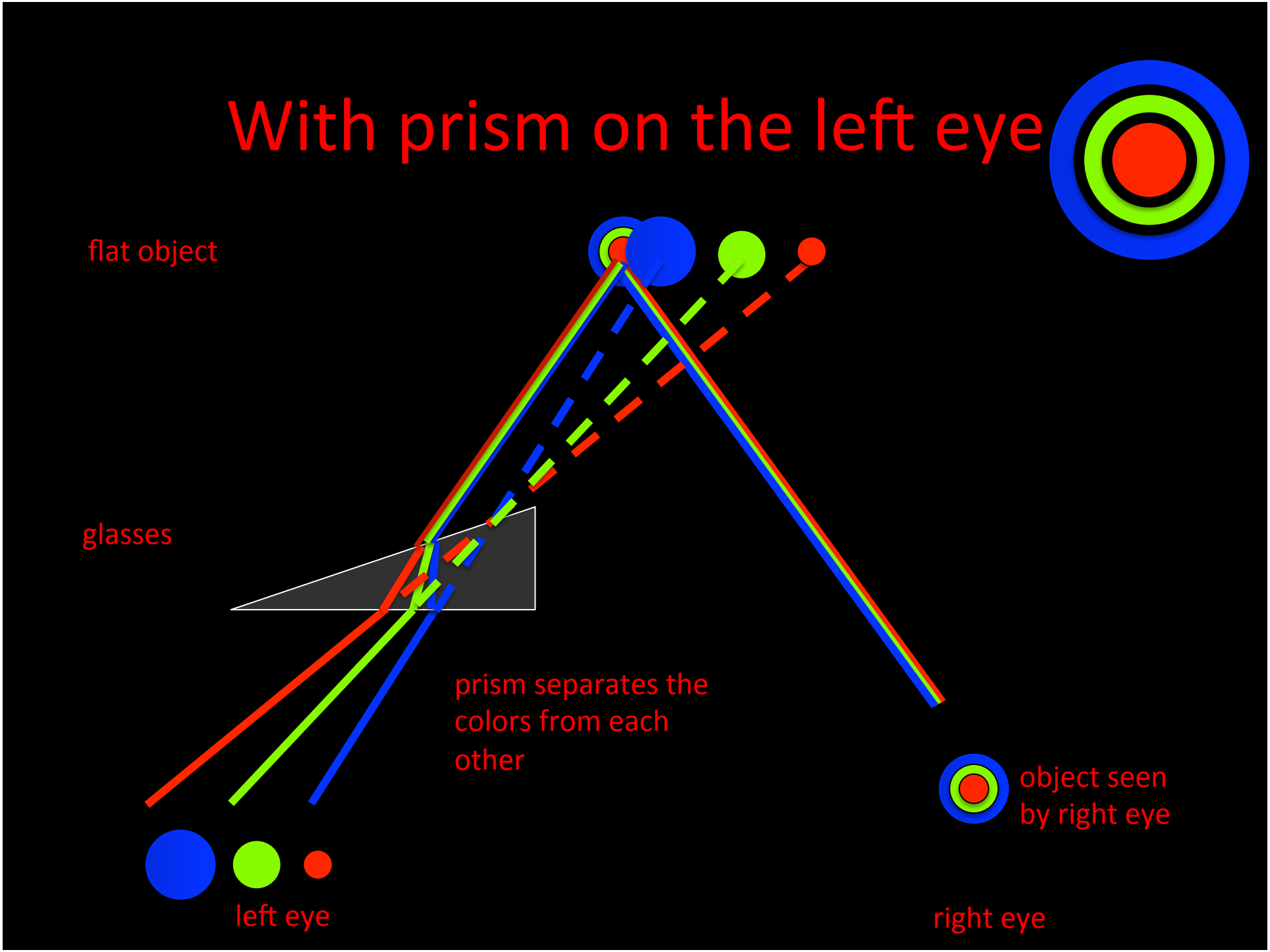

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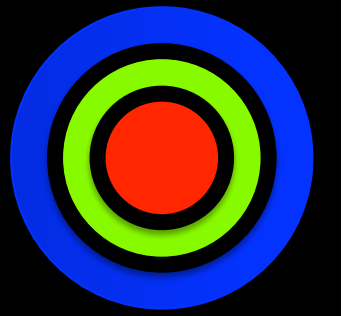

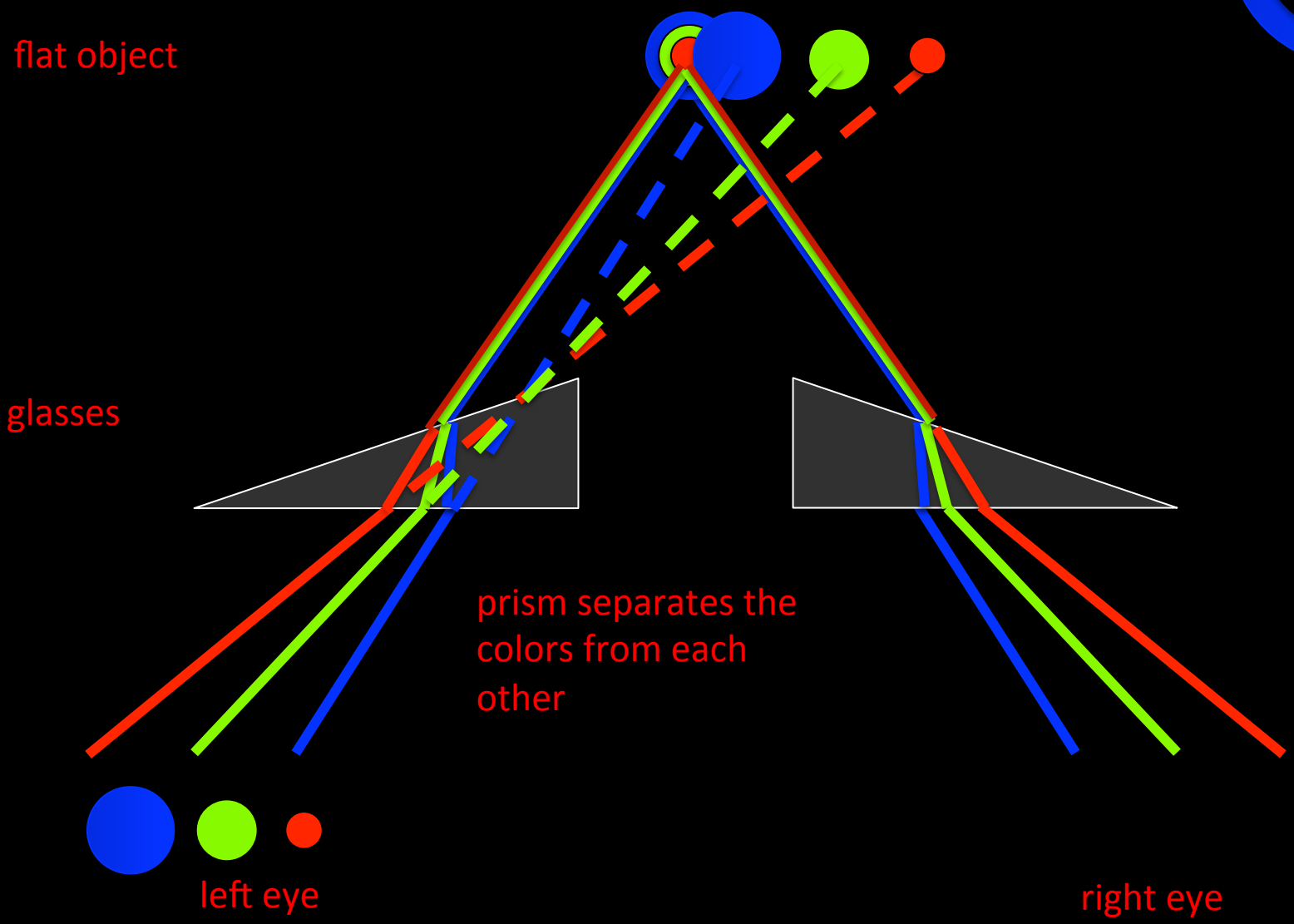

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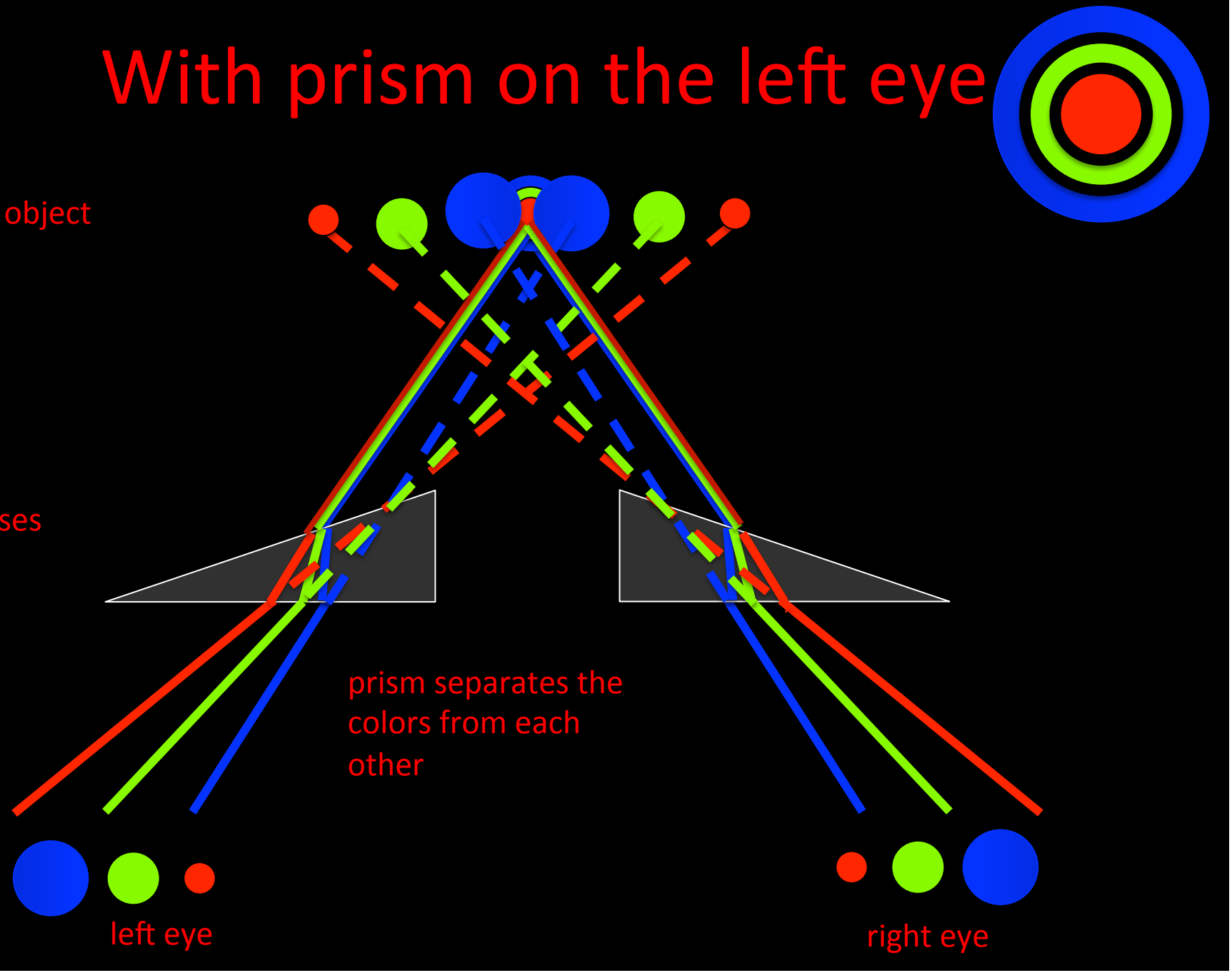

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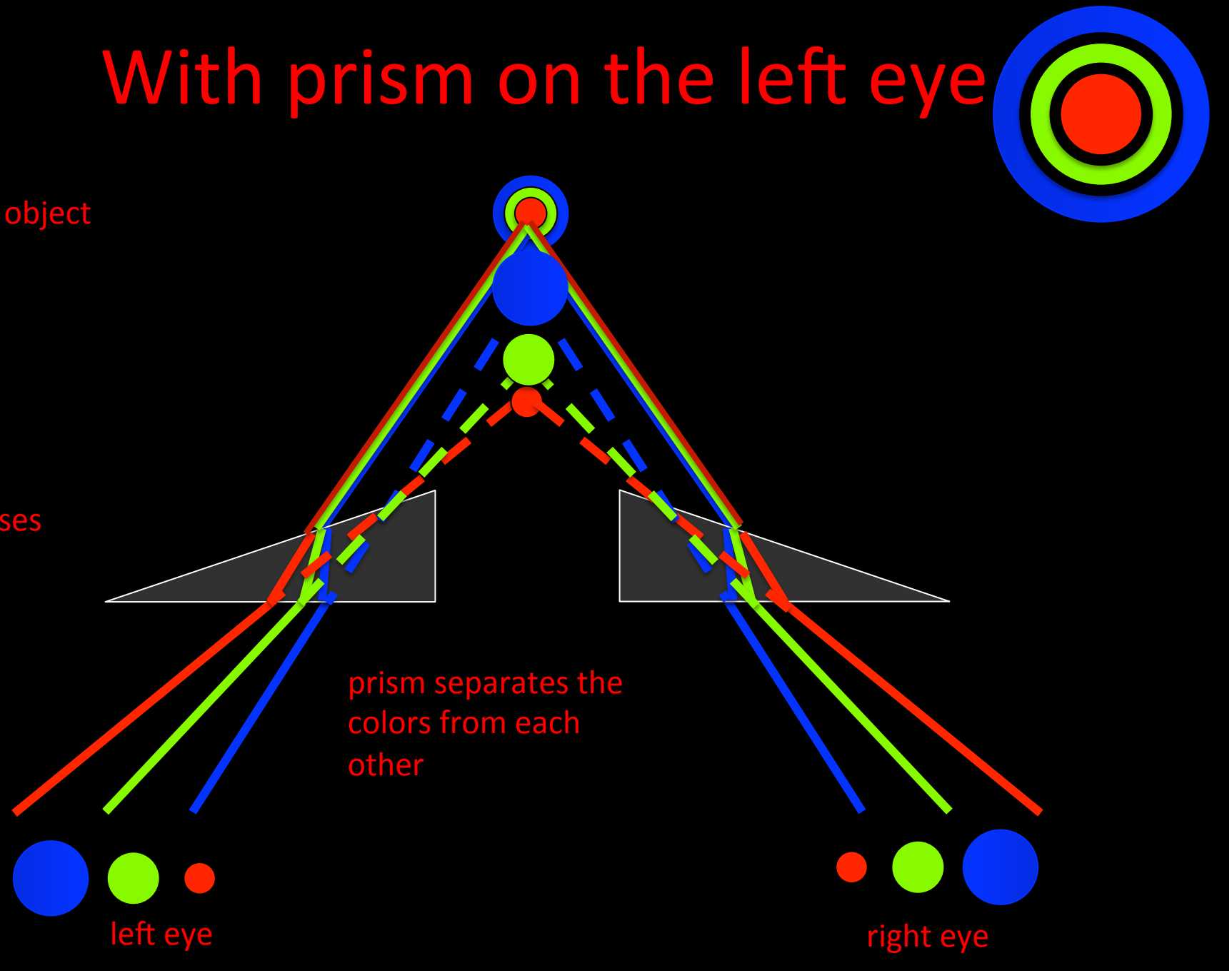
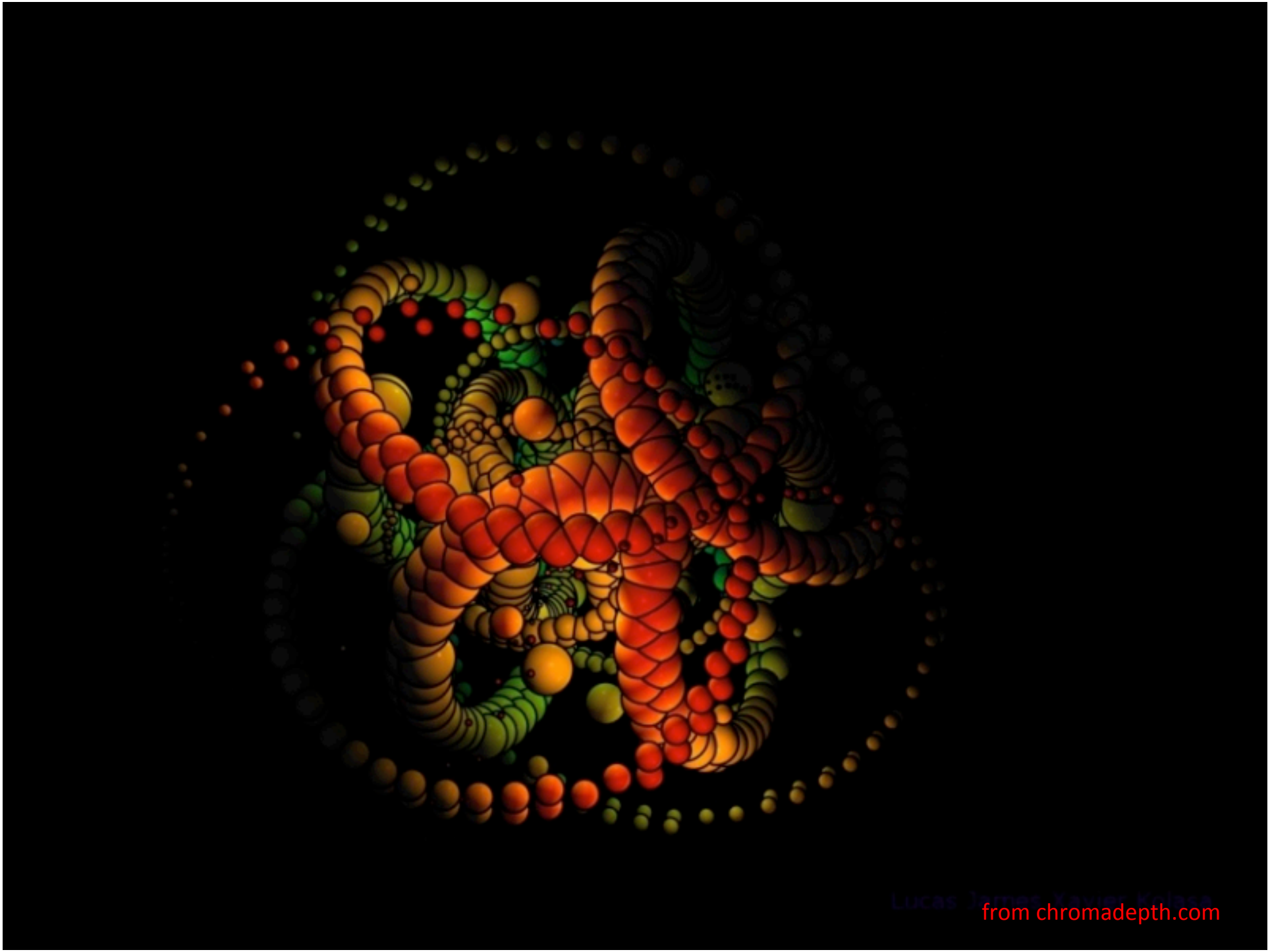
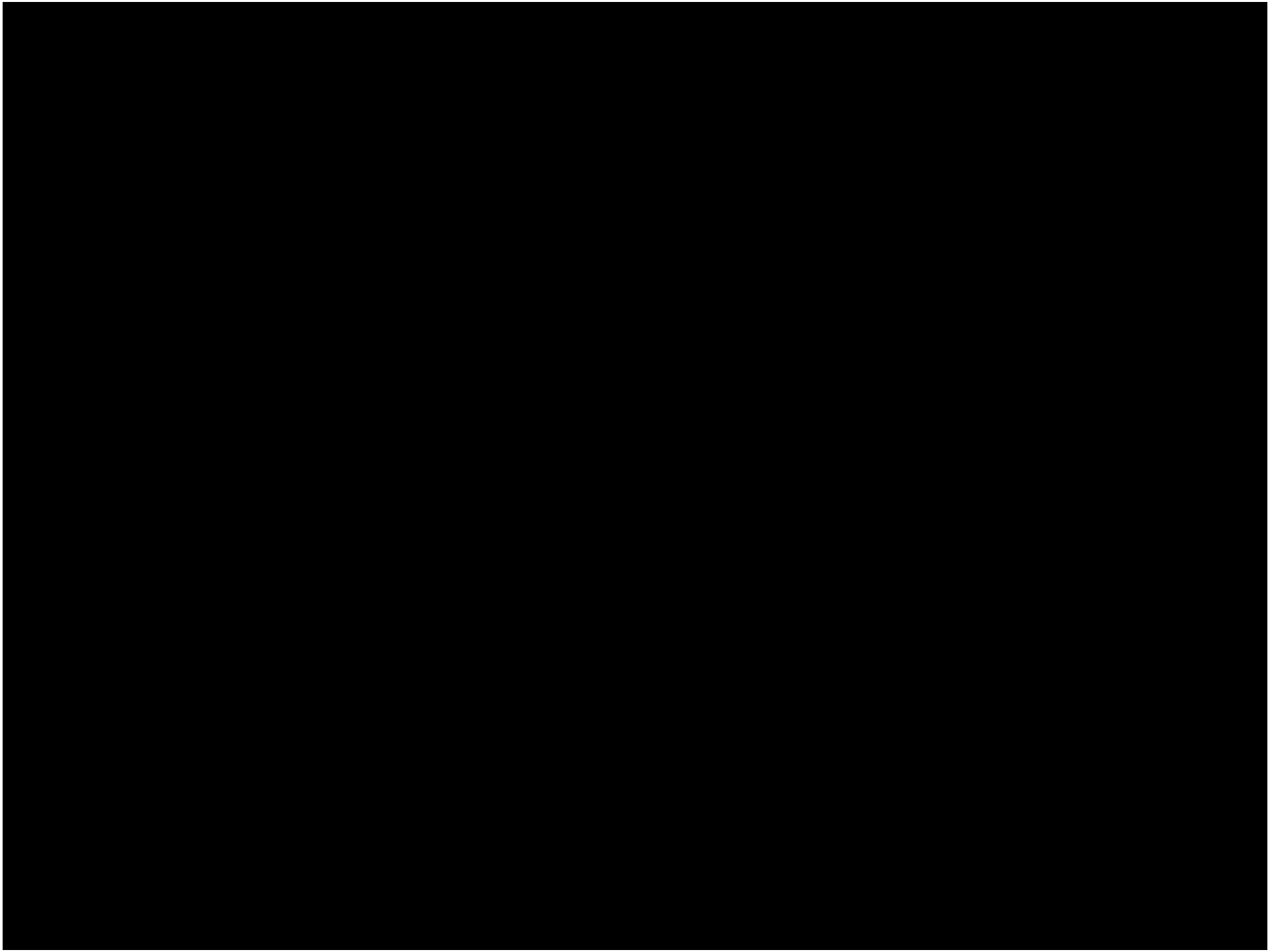
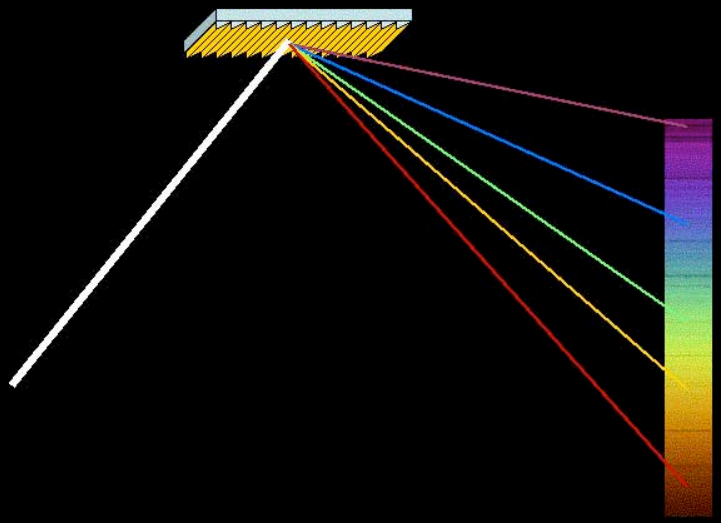



from chromadepth.com

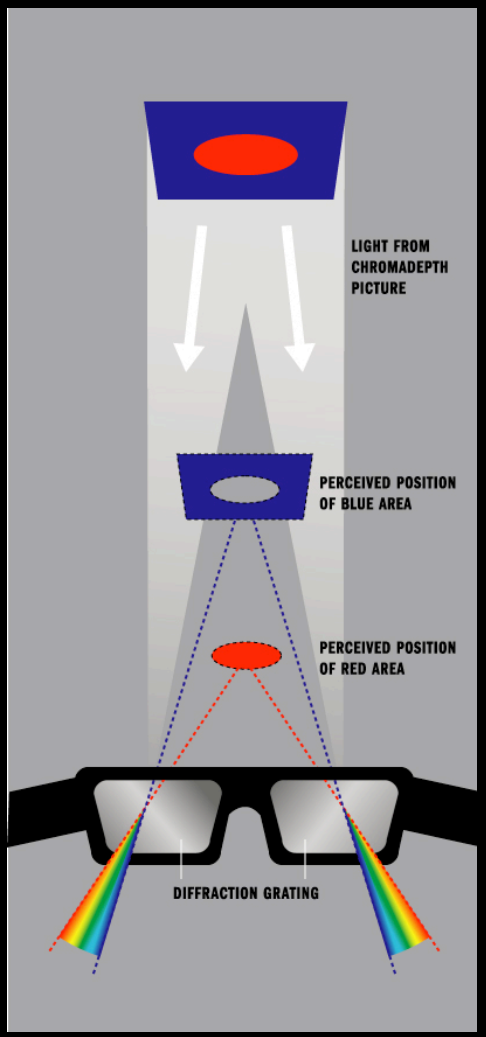


Thinner version of a prism: diffraction grating



jpl.nasa.gov

hyperphysics.com



Mike Bailey, Oregon State University

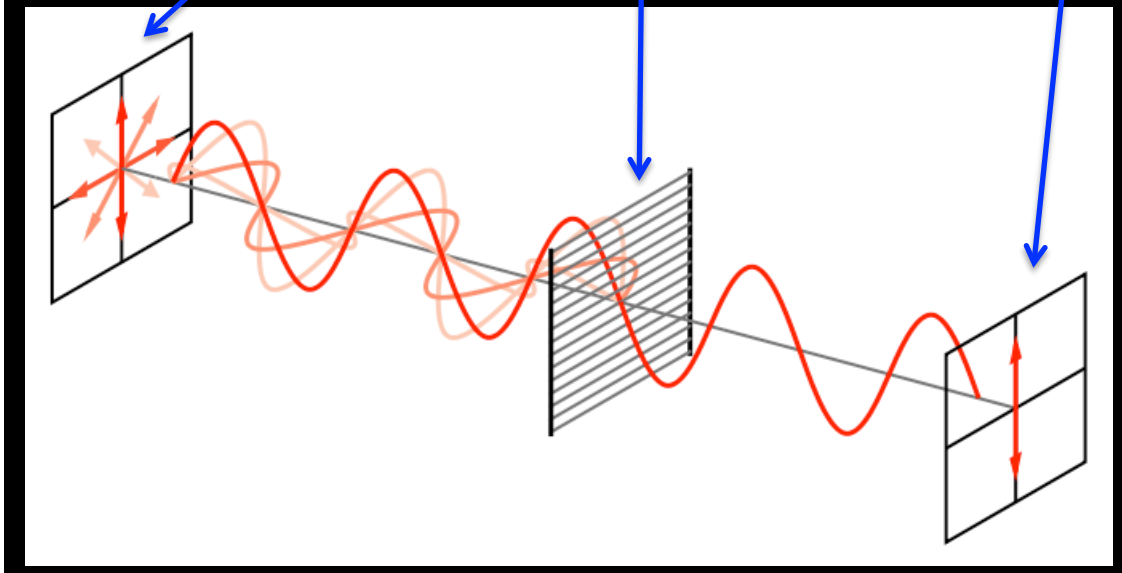
How do 3D movies do it?

- Using polarized light

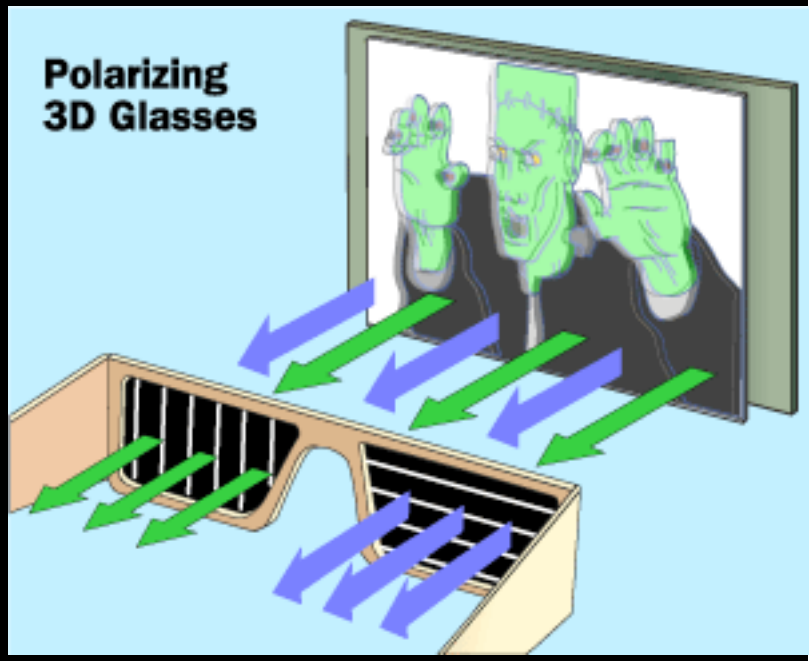
Light waves oscillating in all directions

Polarizing filter

Only vertical waves are left

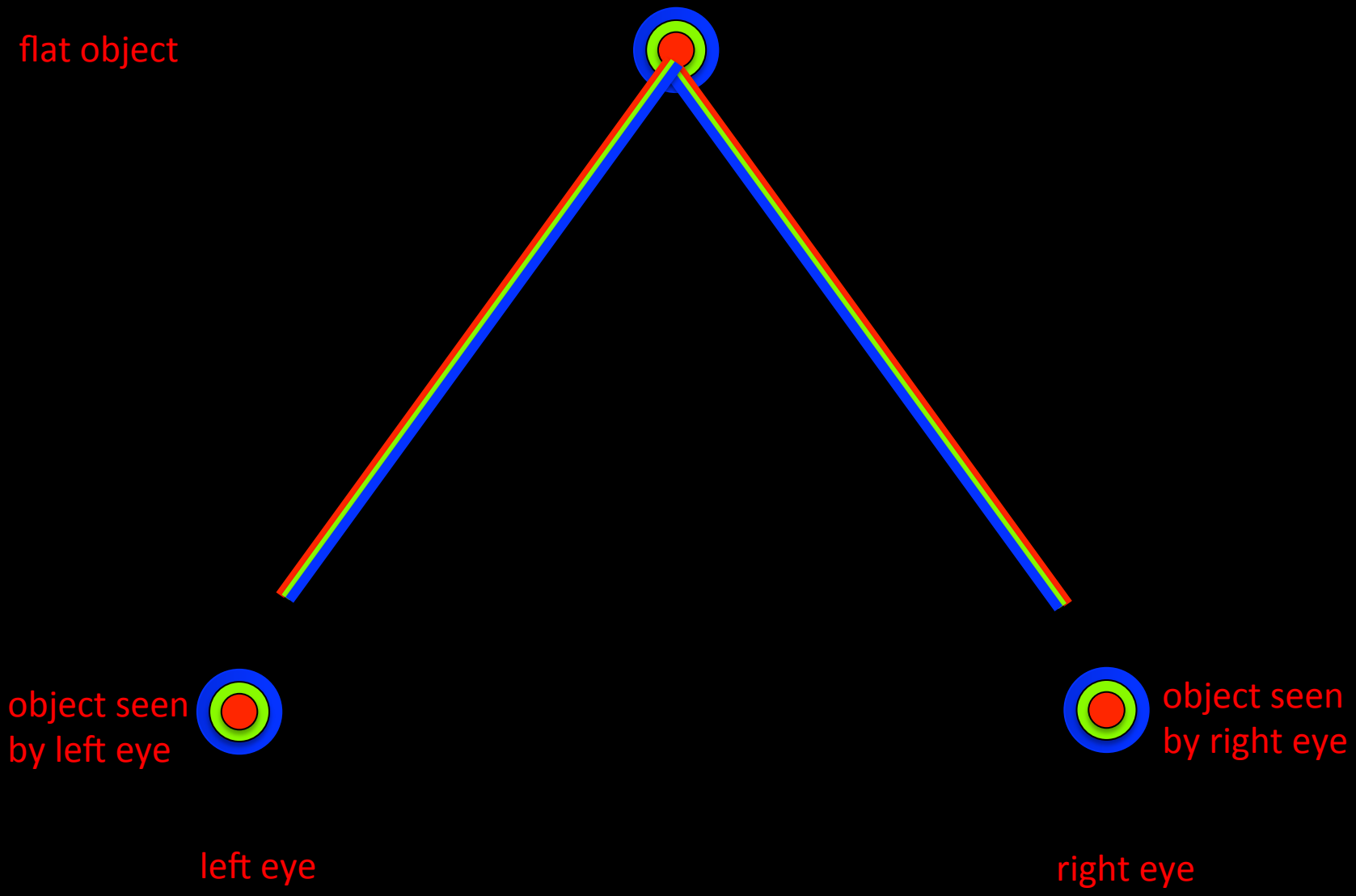


wikimedia

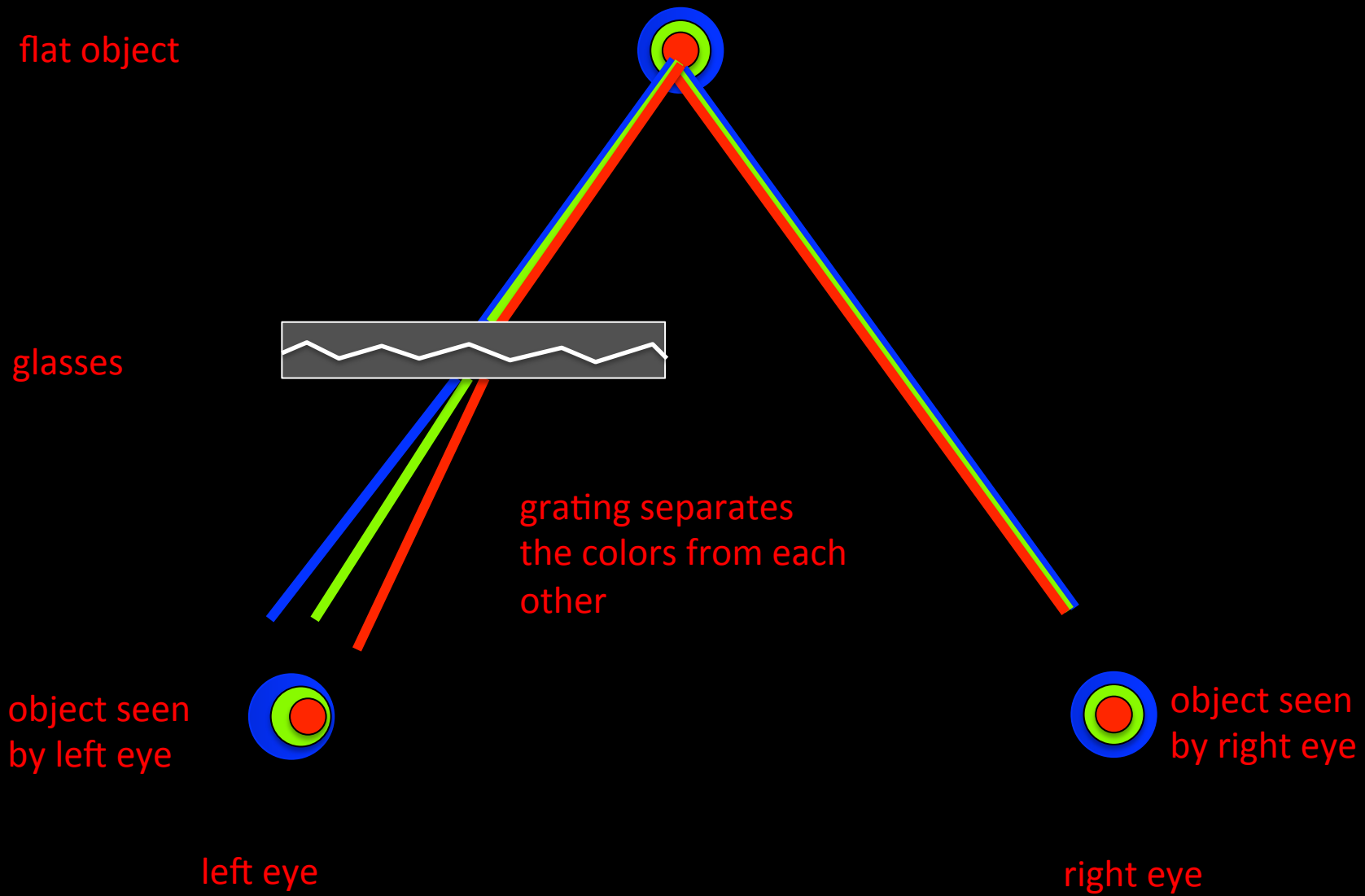


howstuffworks.com

Without 3D glasses



With grating on the left eye



With grating on the left eye