

SCIENCE OF LIGHT

LESSON 12.3

Contrast: the range between dark and light tones

Highlights: brightest part of image

Shadows: darkest part of image

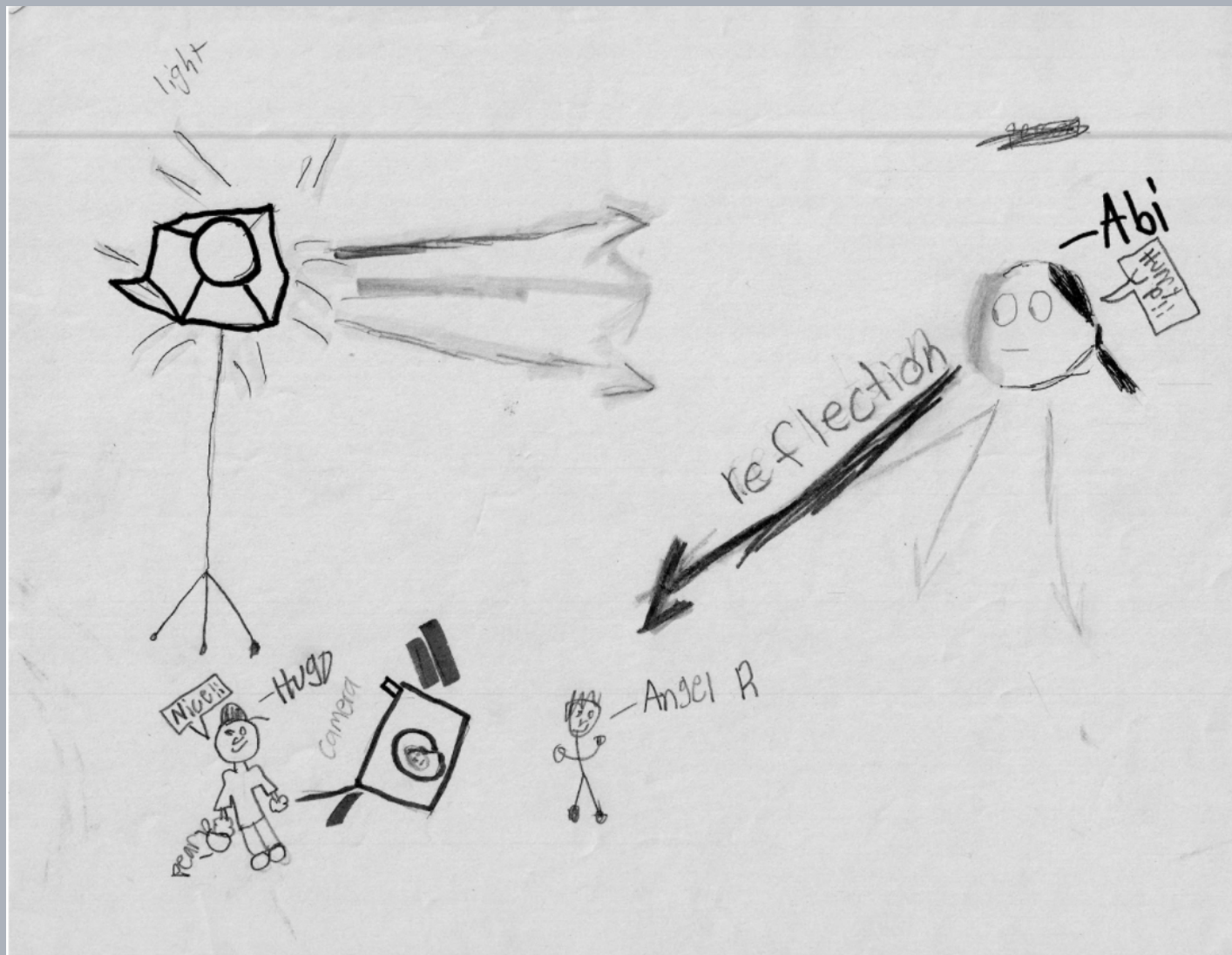
What did we notice about different light sources?

Doors, windows, direct, shade, shadows, etc.

CHALLENGE:

What is the pathway of light into our camera?

Use the sketch paper to help you model it out



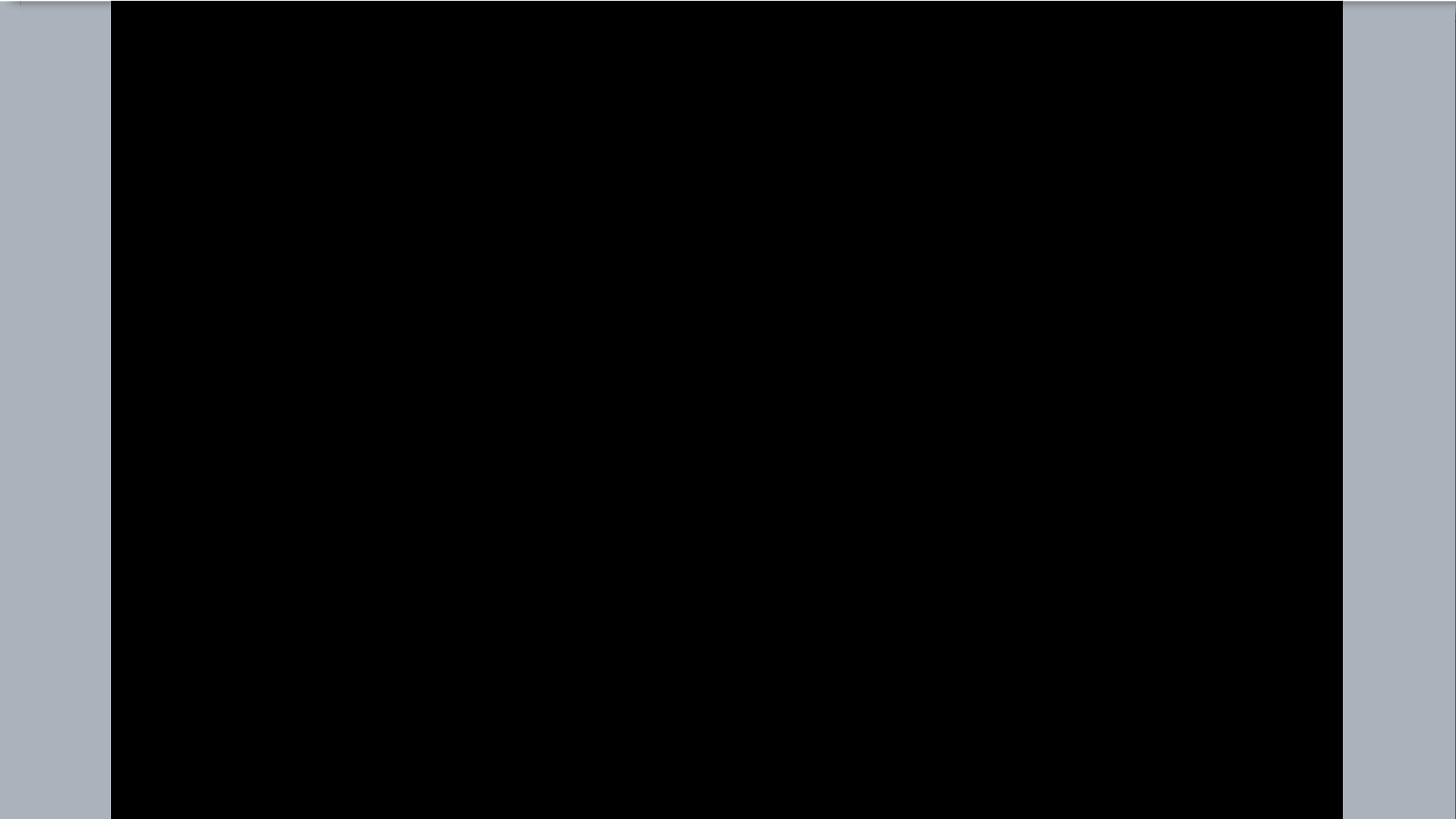
PHOTONS:

Packets of light energy

LIGHT RAYS:

A beam of light, which travels in a straight line







LIGHT IN A DIGITAL CAMERA

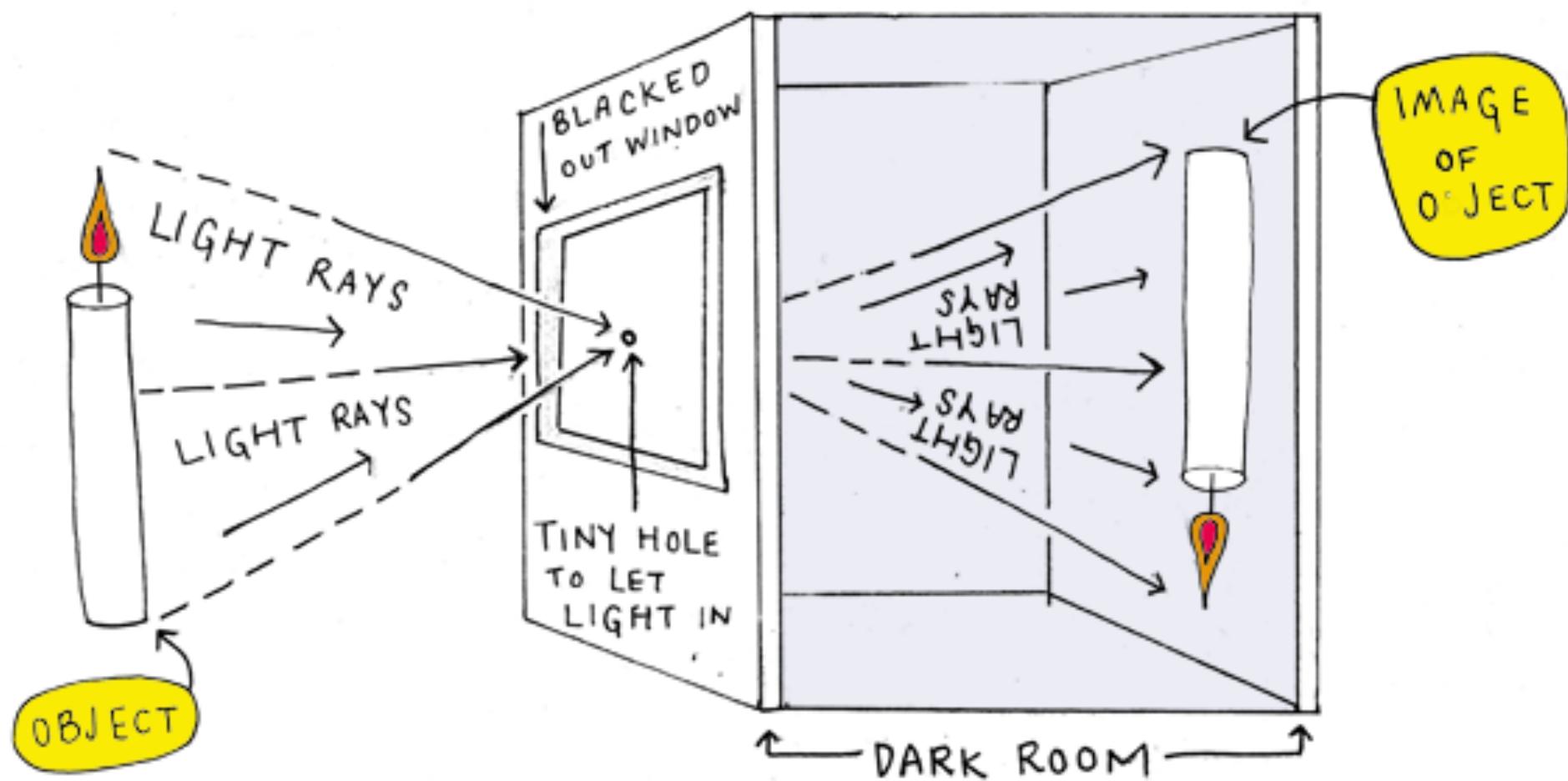
MODEL VIDEO

TURN & TALK

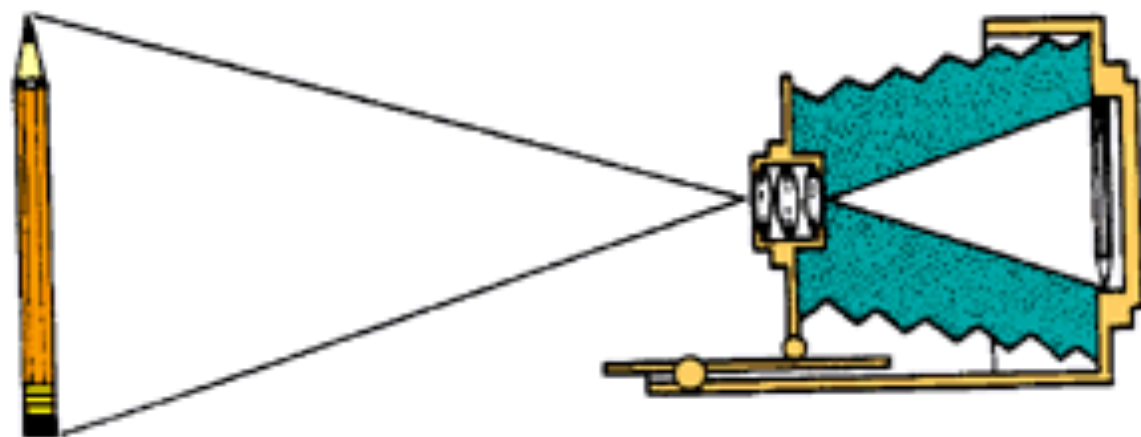
What did you see?

What do we think is happening?

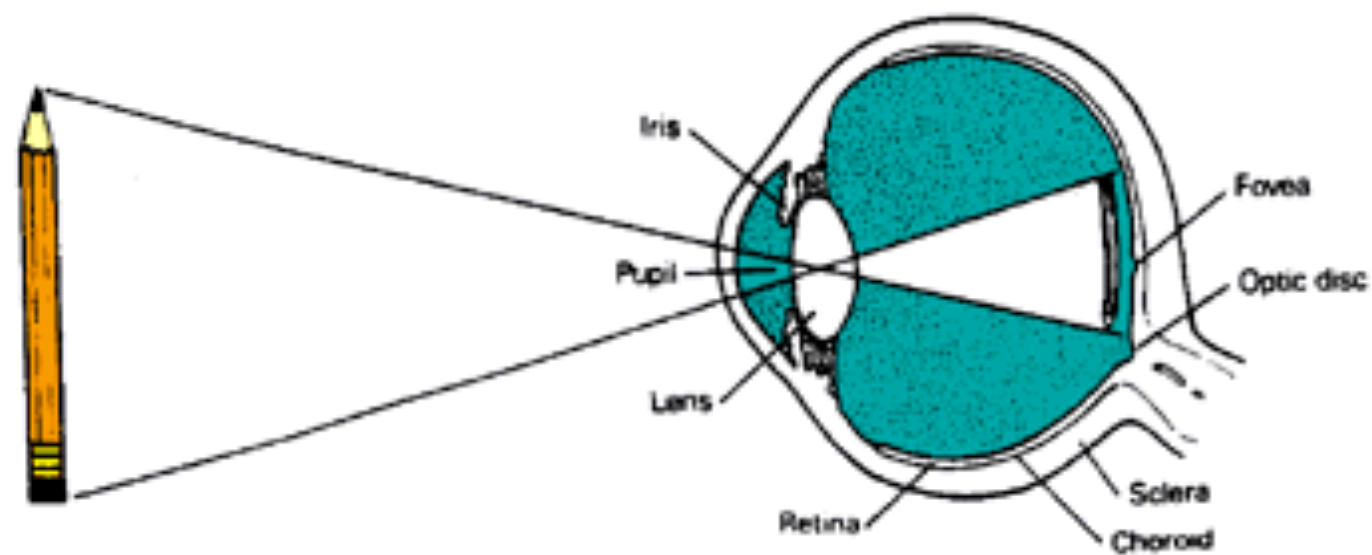
Would we change our model now?



A



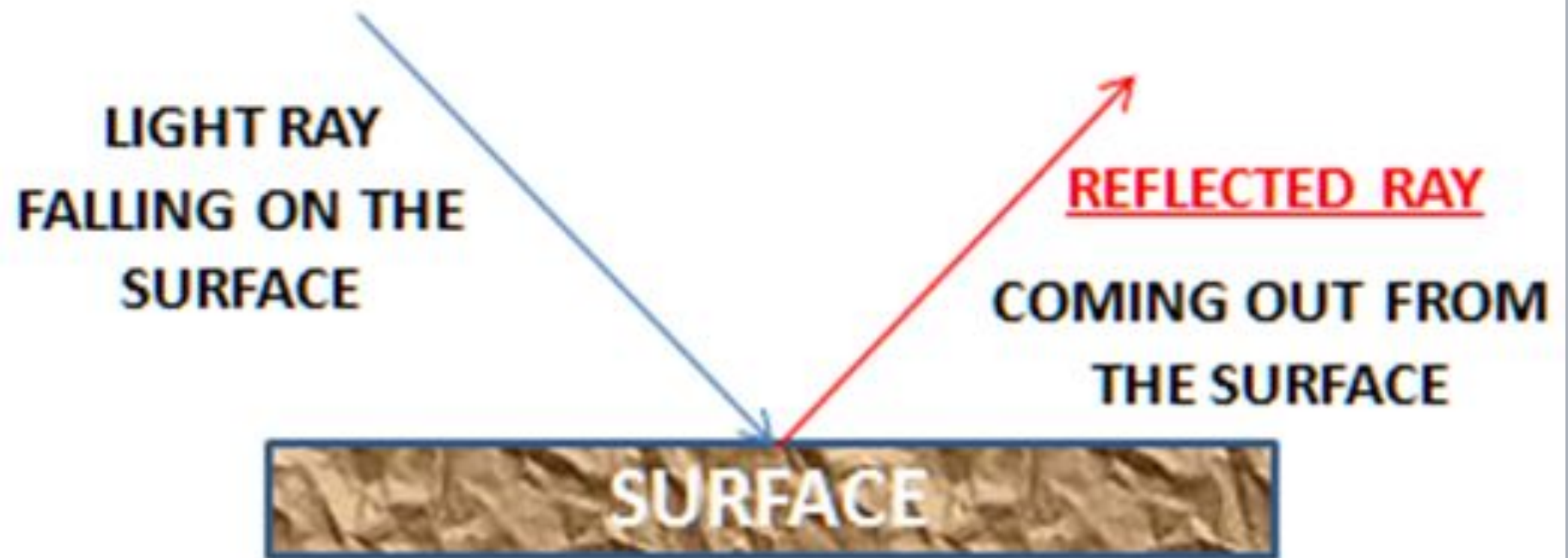
B



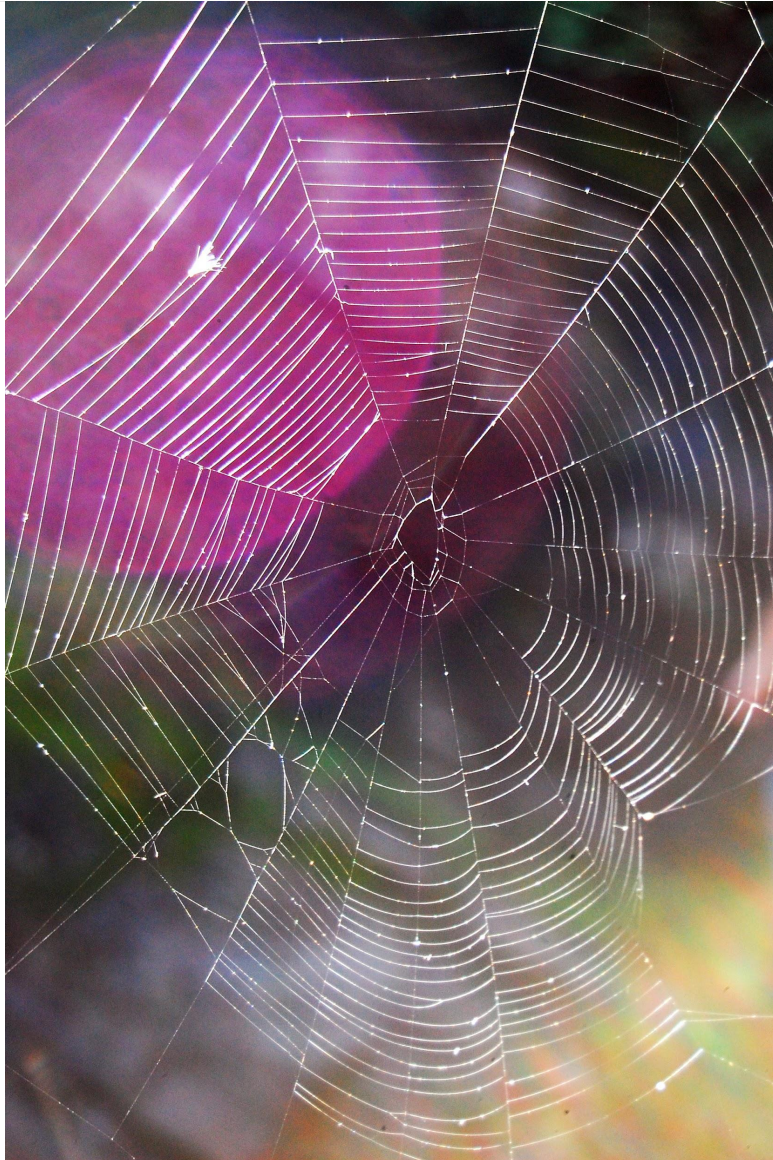
REFLECTION:

When light bounces off of a surface, creating a mirror image









LENS FLARE:

An effect that occurs when
light enters directly into
the camera



OBSERVATION WALK

Work with you partner to try and capture light entering your camera.

You can take pictures of light rays, get close to sources of light, or capture reflections.

SELECT

Look over your photos with your partner and pick ONE photo that captures light in an interesting way

REFLECTION

What did we notice as we were capturing light?

How did our image change as we captured a light source from a different angle or perspective?

CYANOTYPES

LESSON 12.2

REVIEW

CONTRAST

CYANOTYPE

A cyanotype is a photographic printmaking process that was developed in 1842 and was used well into the 20th century

Cyanotypes use ammonium iron (III) citrate and potassium ferricyanide to react with UV radiation, generating a negative with blue tint

Cyanotypes were originally used as “blueprints” for scientists working in the field and for artists who needed to copy drawings



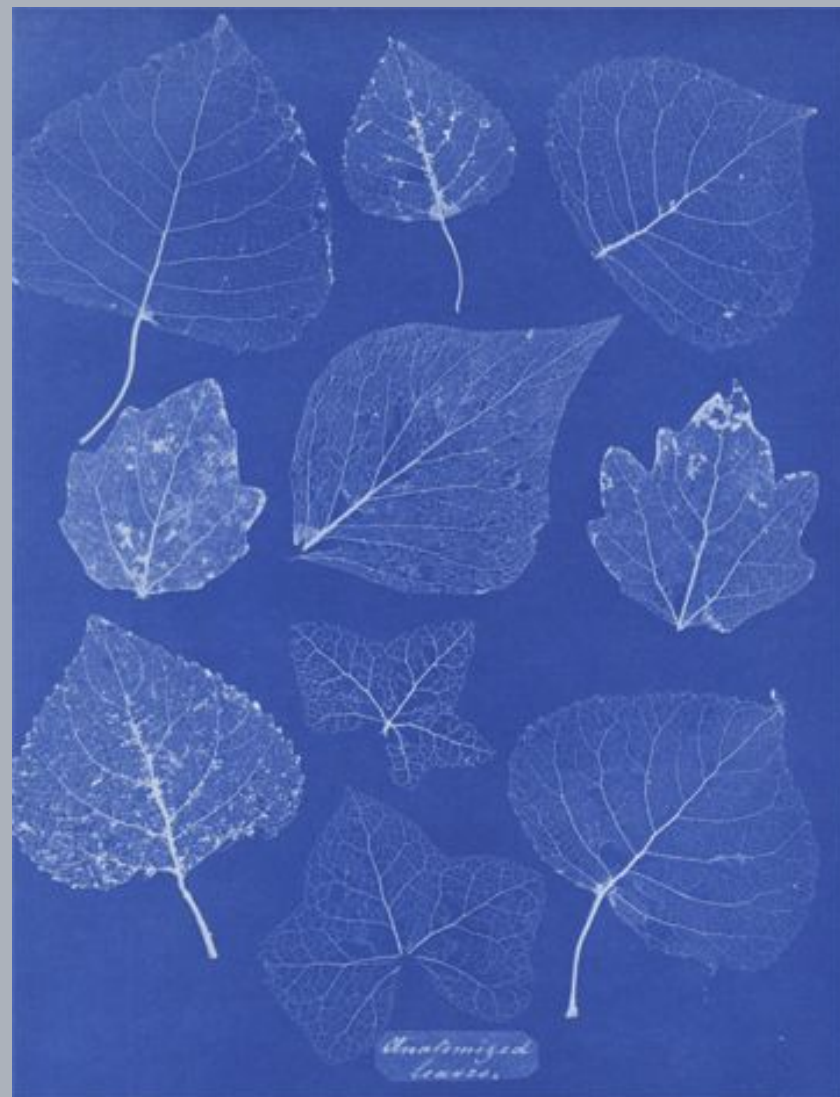
ANNA ATKINS

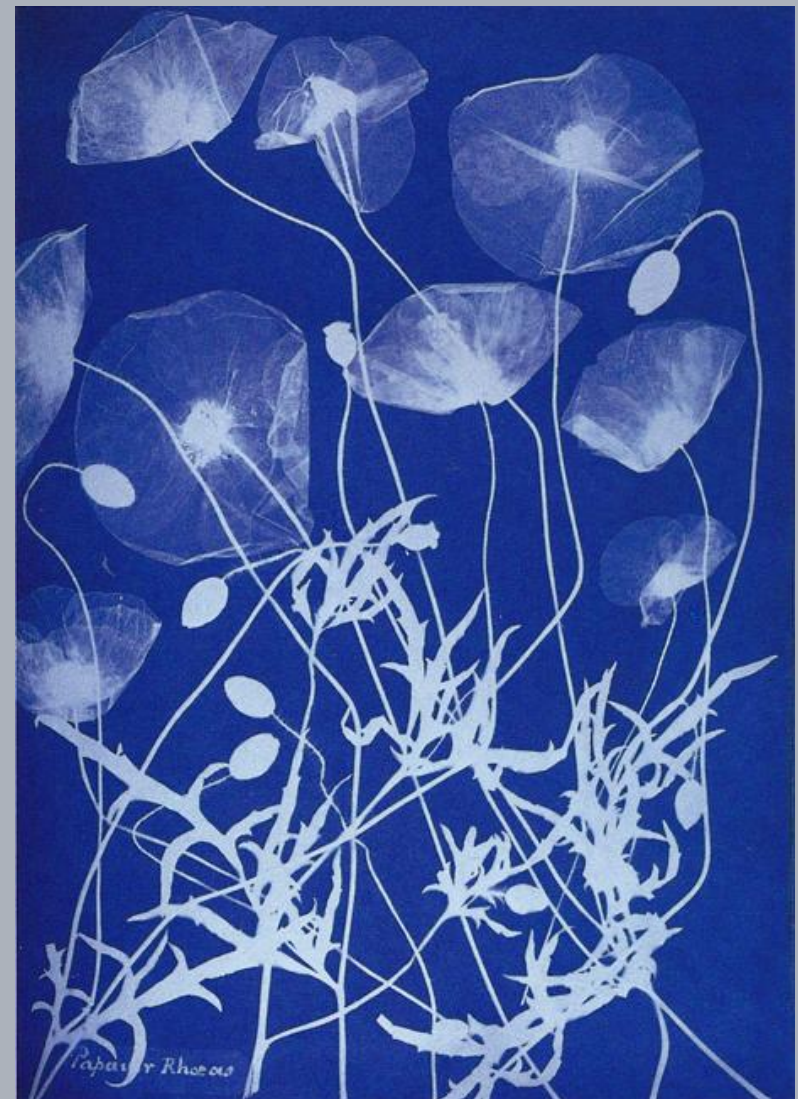
Photographer & Botanist

Early Female Photographer

First to publish a photo book!







MAKE A CYANOTYPE!

STEP 1: Expose the print to direct sunlight

- Depending on how bright or cloudy it is, leave your objects out for longer
- You can check by gently lifting your image to see the difference between the light and dark part of the image
- If it's high contrast: go to the next step!



STEP 2: Stop the reaction by placing it in a tray of water

- Leave in for roughly one minute, or until you start to see your image come through on the paper



STEP 3: Let dry and
hang your print!

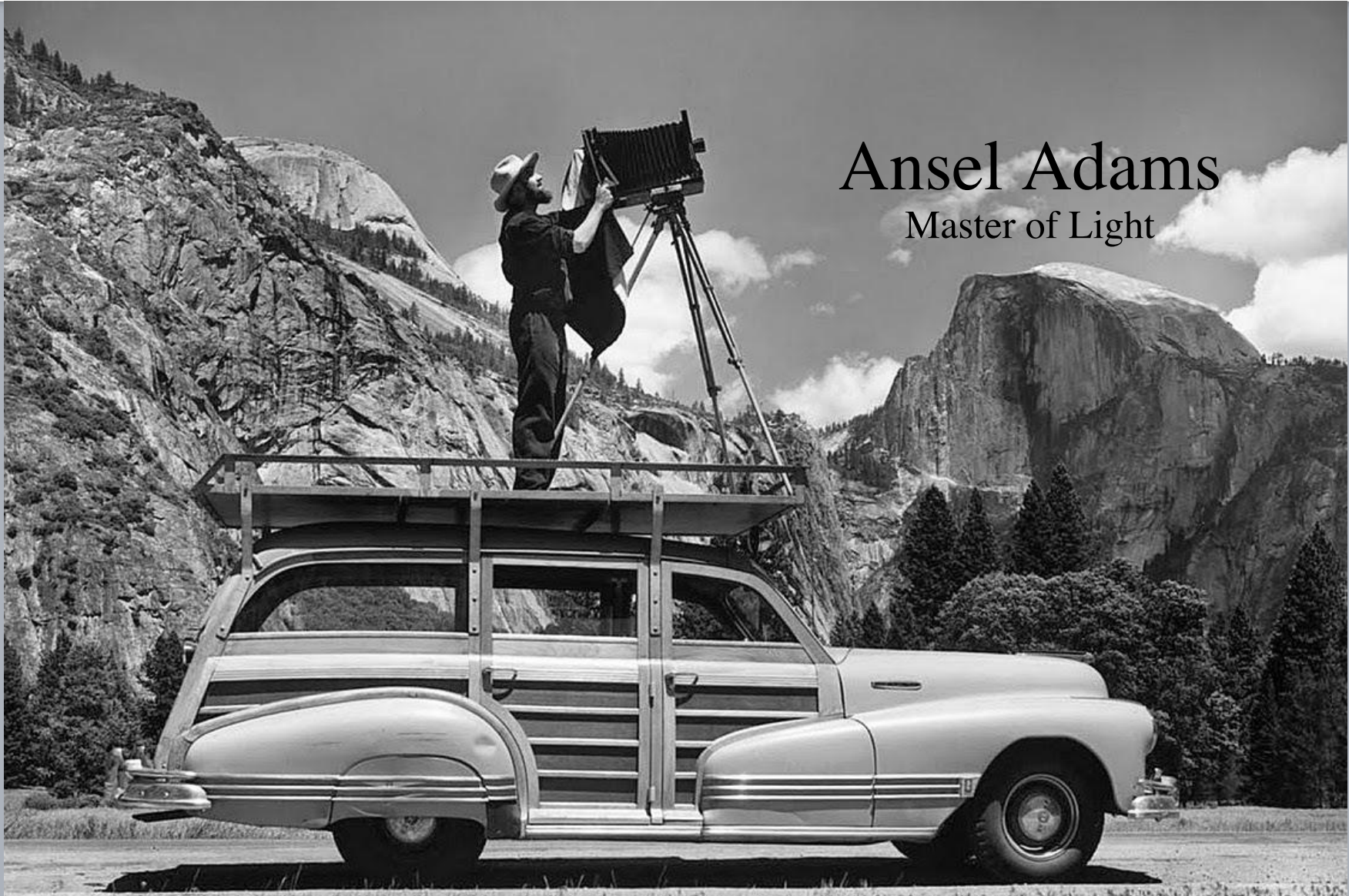


CONTRAST: LIGHT & SHADOW

LESSON 12.1

Ansel Adams

Master of Light





Contrast: the range between dark and light tones

Highlights: brightest part of image

Shadows: darkest part of image







BRAINSTORM

What are some different sources of light?

LIGHTING



**BRIGHT
DAYLIGHT-**
bright daylight or
backlighting can
produce high
contrast images

FOGGY/CLOUD

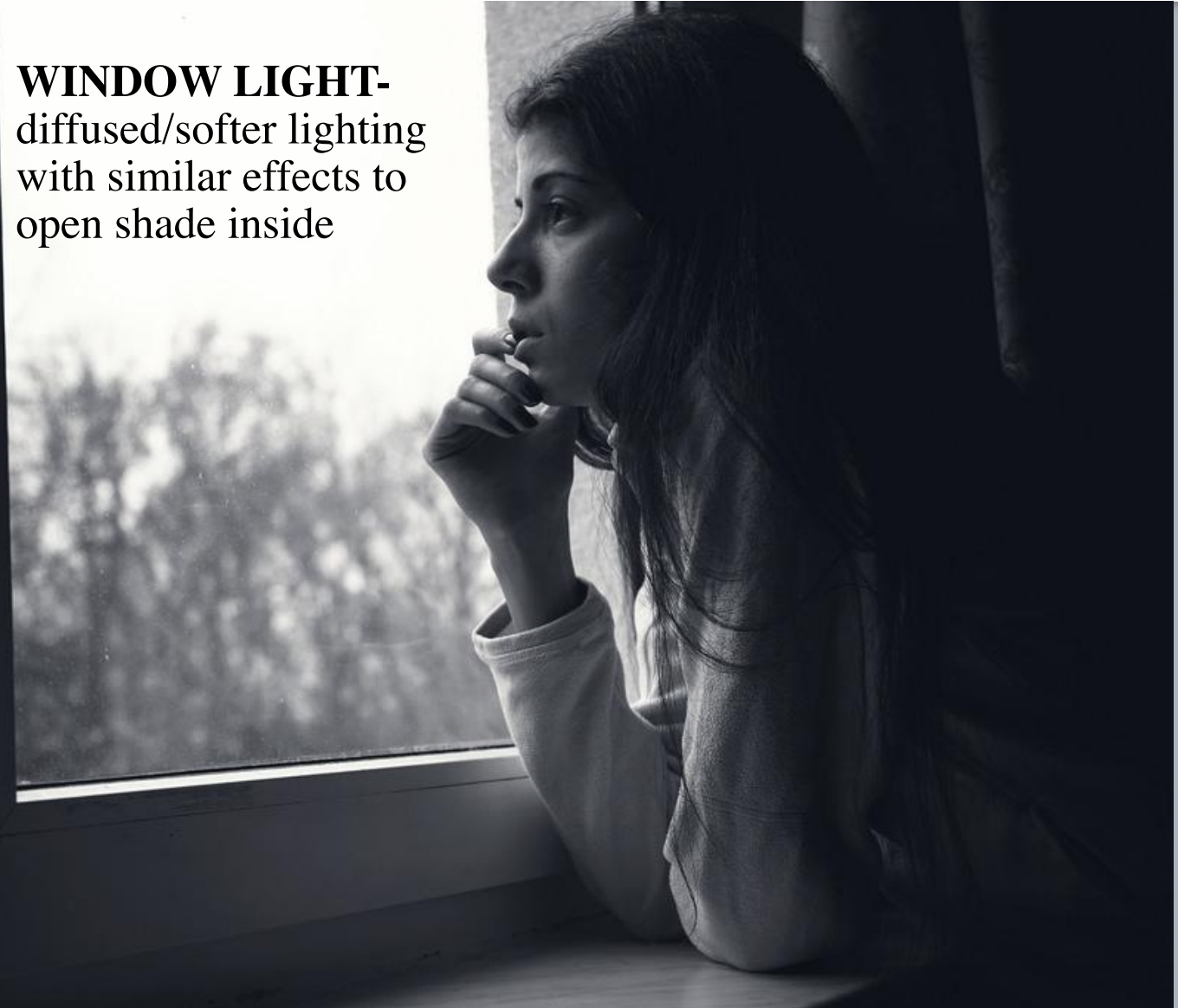
Y- soft or diffused
lighting



OPEN SHADE- softer
lighting, great for portraits

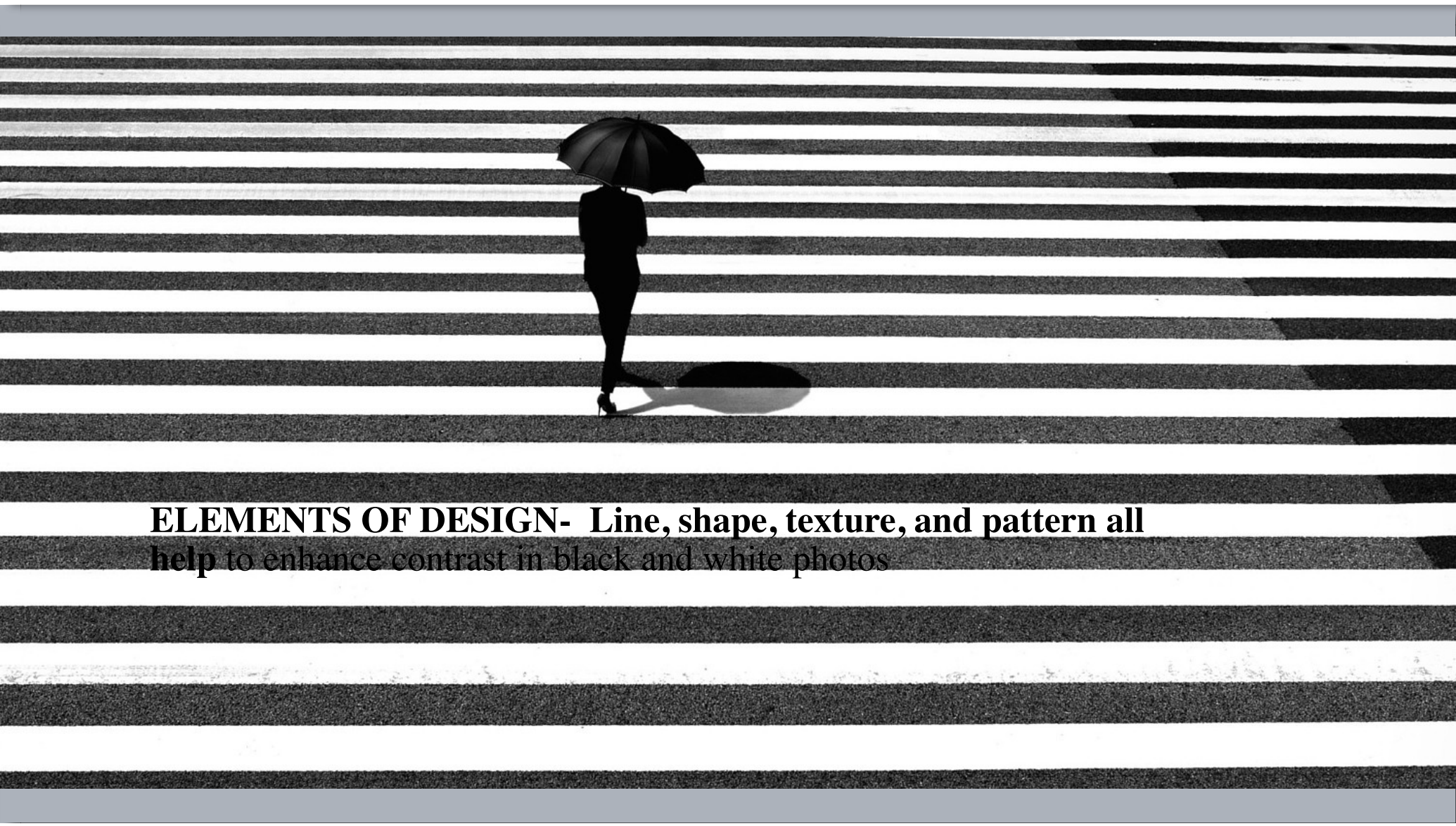


WINDOW LIGHT-
diffused/softer lighting
with similar effects to
open shade inside



TIME OF DAY- look at lighting in different times of day will help you see contrast in a new way- sunset, sunrise, and mid-day light all create a different effect on shadows





ELEMENTS OF DESIGN- Line, shape, texture, and pattern all
help to enhance contrast in black and white photos

THE SHOOT

CONTRAST

Capture 5-10 images with light and shadows

Try photographing in different light sources. How does this affect your photo?

Keep an eye out for elements of design around you- line, shape, texture, pattern

REVIEW & EDIT

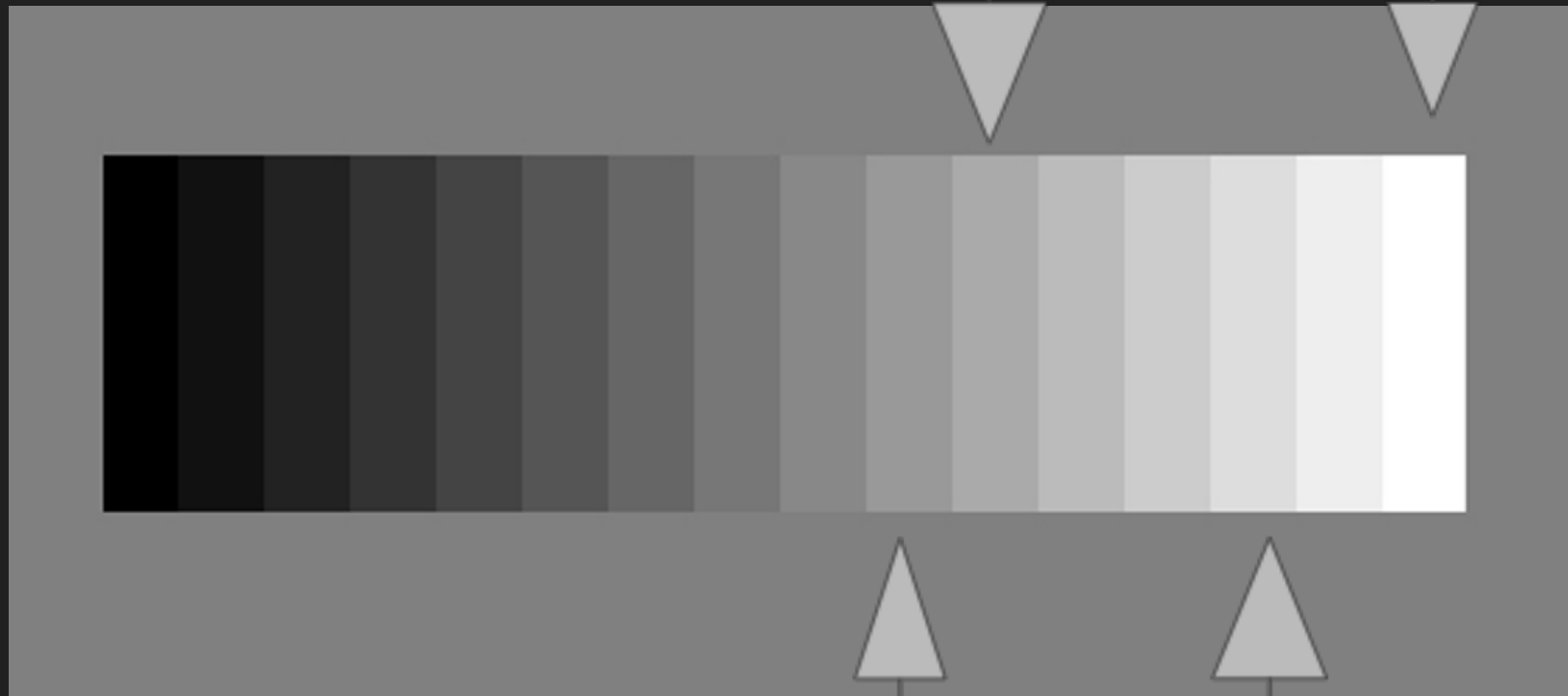
Look over the images you captured with your partner

What did you notice about different sources of light?

How did it affect your subject?

Open
Shade

Direct sunlight



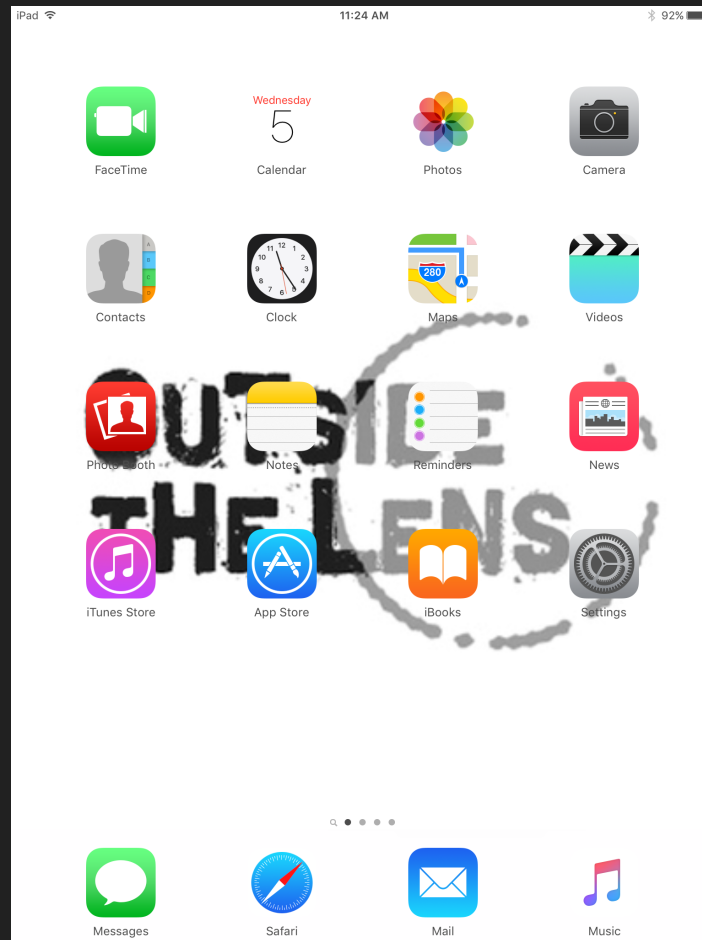
Window Light

Foggy cloudy

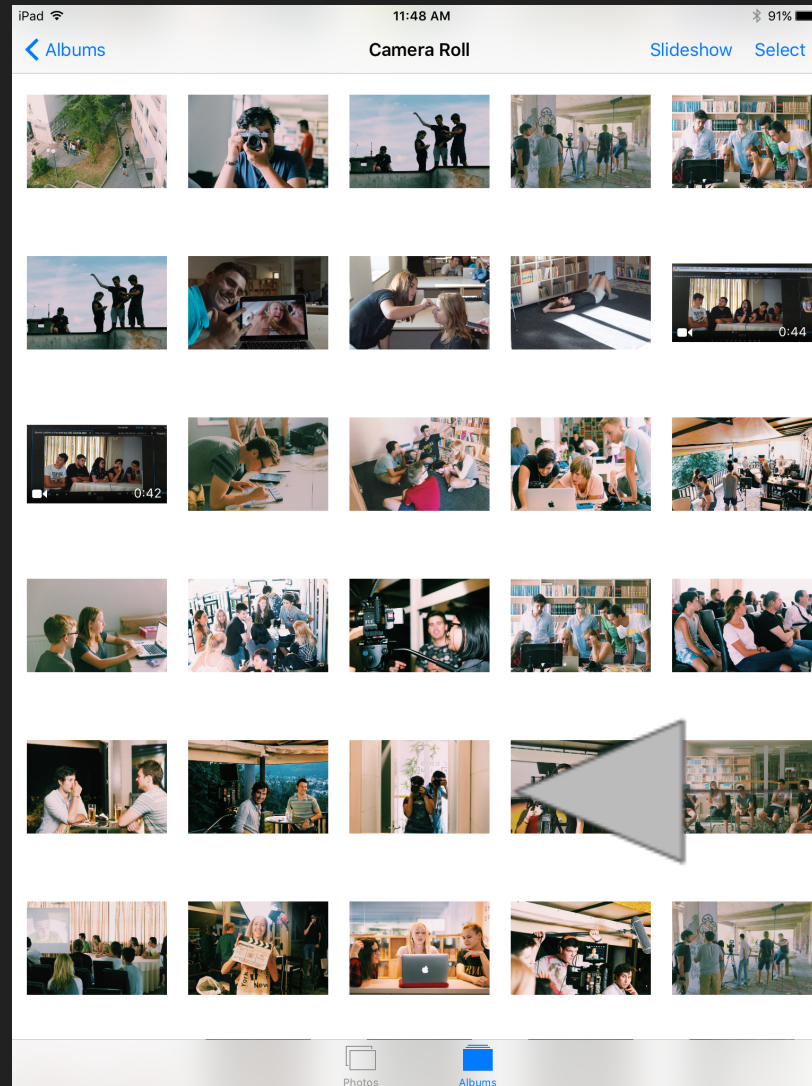
EDITING

B&W for an Apple Device

Select Photos



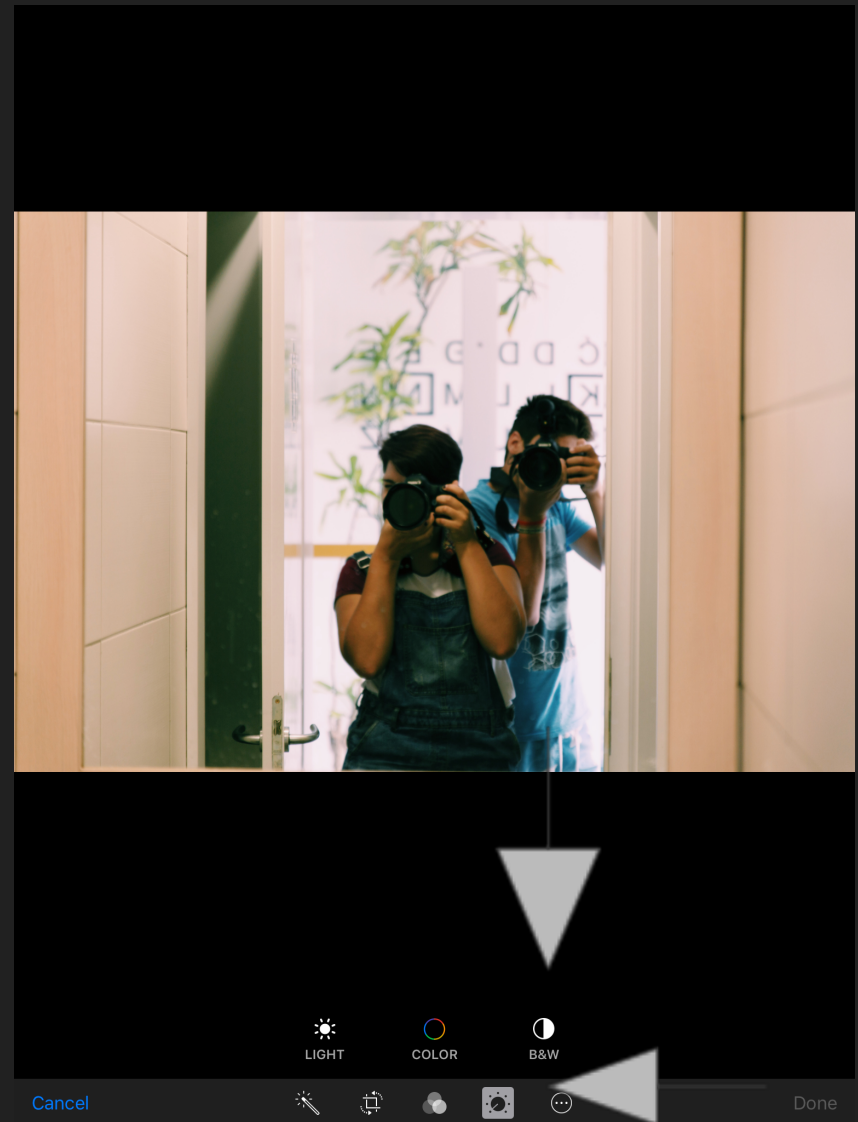
- Select the image



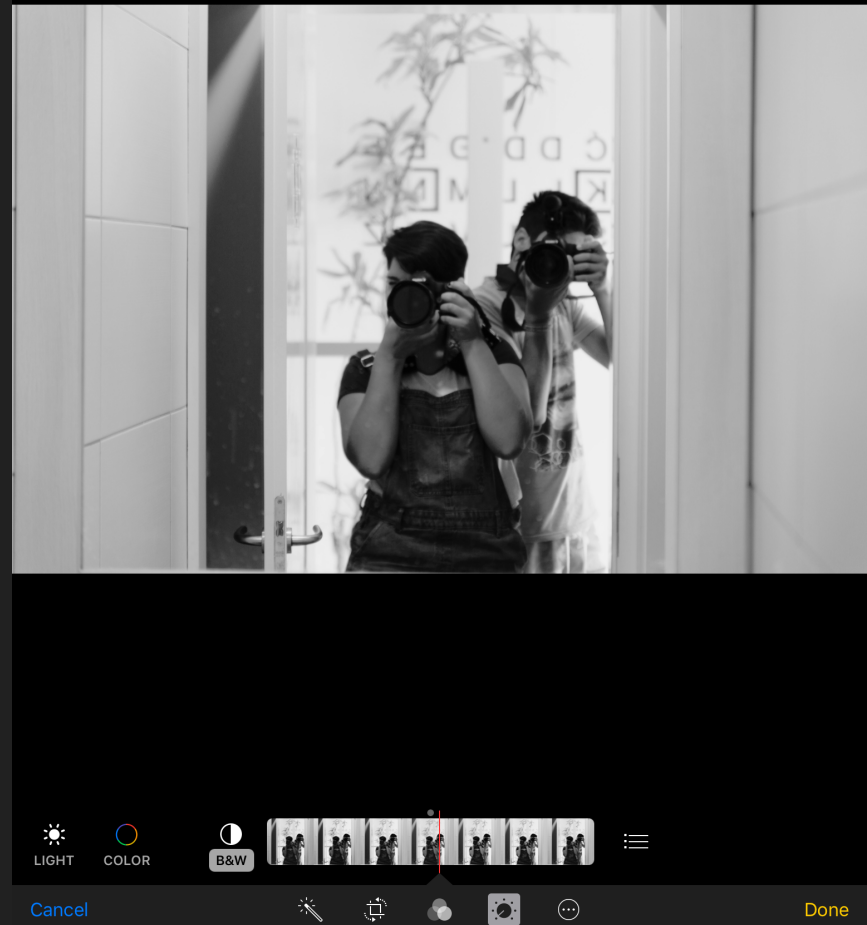
- Select Edit



- Select the fourth icon over
Select 'BW'

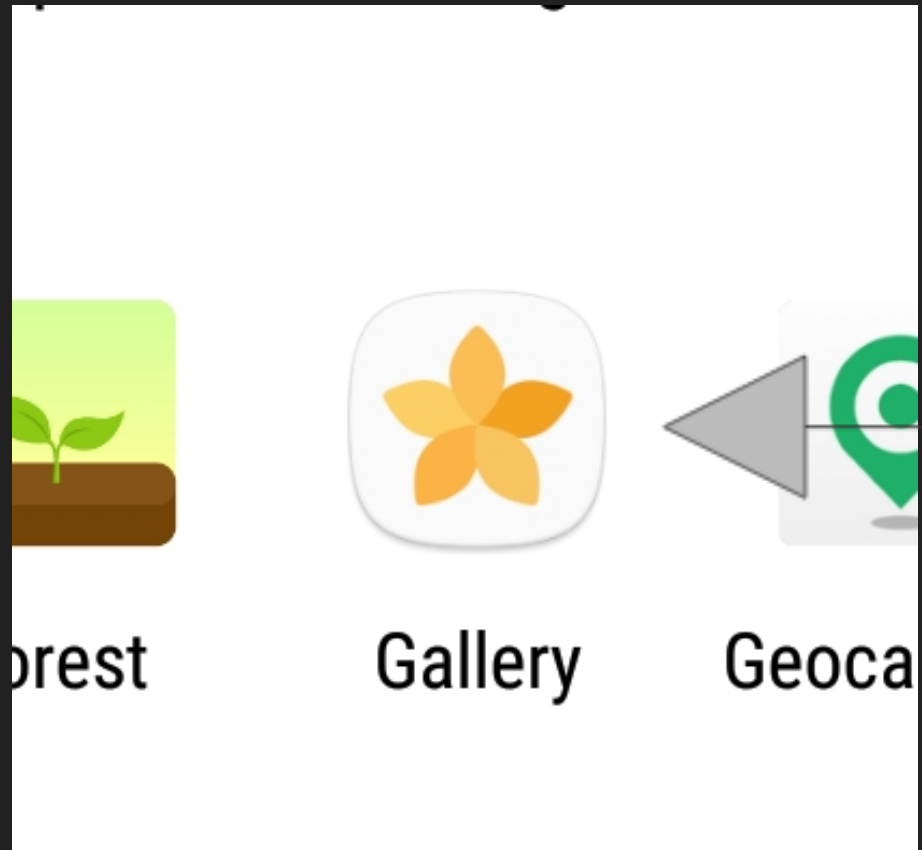


- Select within the grayscale
- Hit Done



B&W from Android

Select Gallery



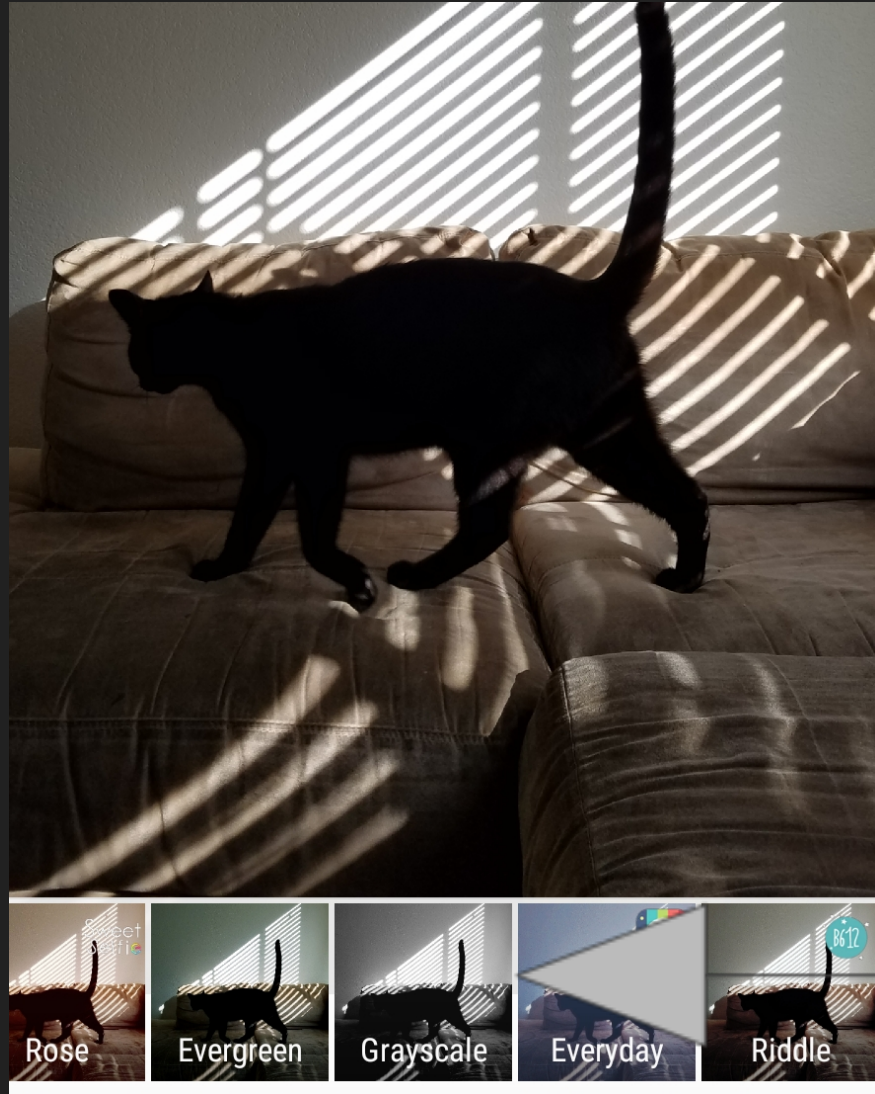
- Select Photo
- Select Edit



- Select Effects

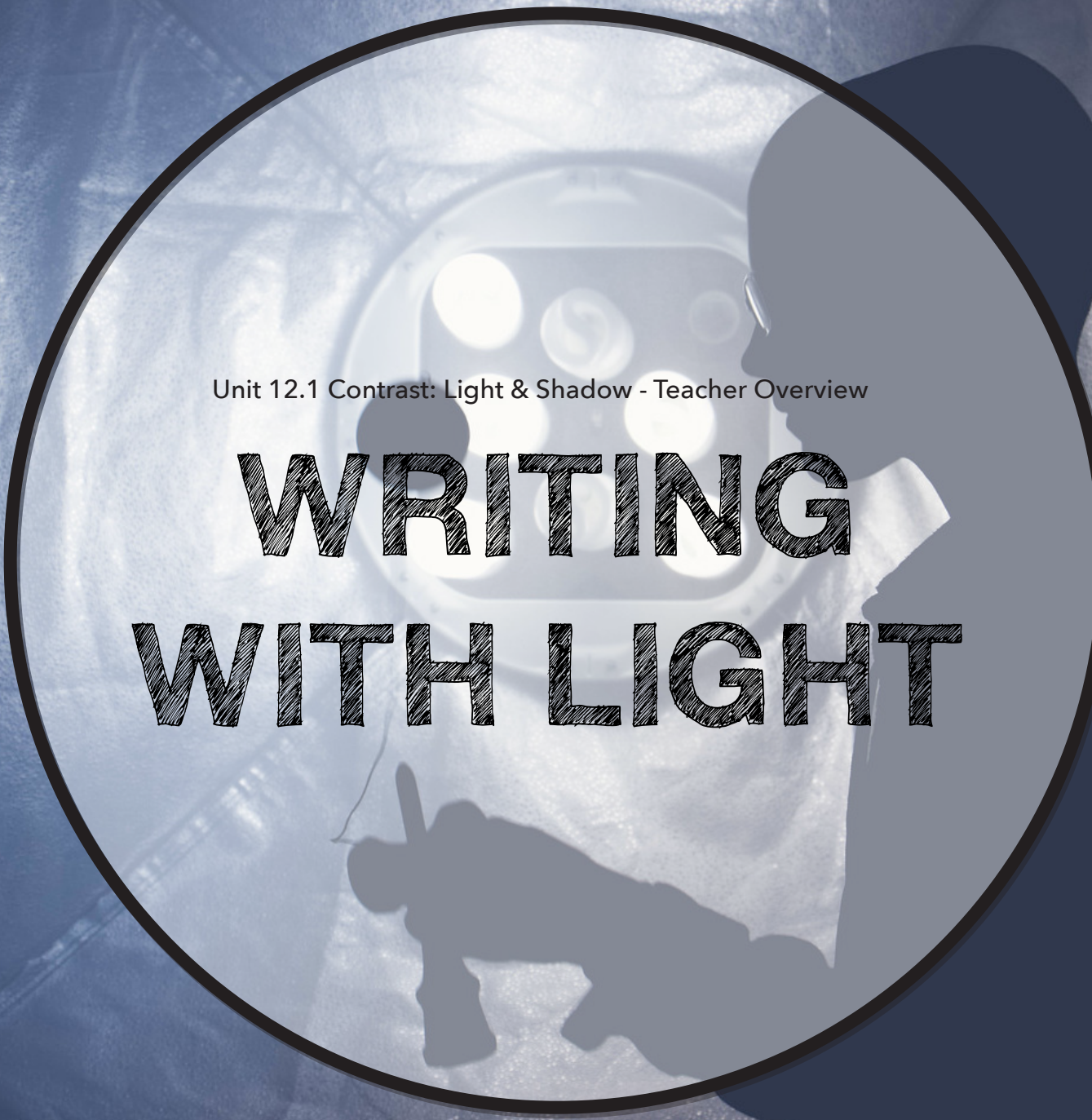


- Select Grayscale



GALLERY WALK

Pick one image to share with the class



Unit 12.1 Contrast: Light & Shadow - Teacher Overview

WRITING WITH LIGHT

OBJECTIVES

- + Students will study the work of Ansel Adams and analyze how he uses light in his images
- + Students will learn about the range of light through contrast, highlights, and shadows
- + Students will consider different sources of light and how light might change how their subject looks
- + Students will create black and white images inspired by Ansel Adams

VOCABULARY

Contrast: the range between dark and light tones in an image. High contrast means parts of the image stand out, whereas low contrast has a more even look or tone.

Highlight: the brightest part of the image.

Shadow: the darkest part of the image.

Light Source: where the light is coming from.

Grayscale - Grayscale is a range of shades of gray without apparent color.

MATERIALS

- + Space with different light (interior, direct, shade)
- + Cameras and/or tablets
- + Slides

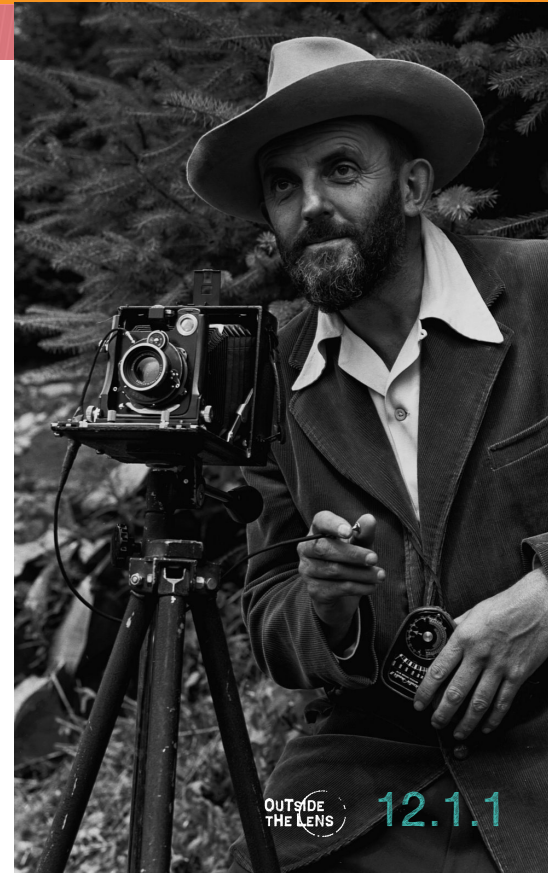
INTRODUCTION

ARTIST STUDY: ANSEL ADAMS

Introduce photographer Ansel Adams using handout story. Here are a few highlights:

- + American landscape & nature photographer
- + Known for capturing national parks and landscapes in black and white.
- + Contributed to conservation efforts through his photography

Show *Thousand Island Lake* by Ansel Adams on slides. Ask students to look quietly at the image for at least 10 seconds.



Use **Visual Thinking Strategies (VTS)** to facilitate the discussion of the image.

- What is going on in this picture?
- What do you see that makes you say that?
- What more can you find?

DEFINE: contrast, highlights, shadows

Return to Ansel Adams slides.

- + Look at next image
- + Have students close their eyes and countdown 3...2...1...
- + When students open their eyes, have them point out what they noticed first in the photo

EXPLAIN: This will most likely be the highlight, as our eye tends to be drawn to the brightest point in an image

- + Look at remaining examples and have students point to the highlight and shadow in each image.

INSTRUCTION

LIGHTING

BRAINSTORM: Ask students to look around the area for different sources of light.

- + Ex. Sun, projector, lamp, window, door, etc.
- + While students share, write down a list of their responses for them to see.

EXPLAIN: Different kinds of light affect our images in different ways and can make our images high or low contrast.



Bright daylight - creates high contrast images

Foggy/Cloudy - creates low contrast images, diffused light

Open shade - a good place to find softer lighting in daylight

Window Light - softer lighting, but indoor

Time of Day - time of day can affect our light and shadows. The start and end of each day have longer shadows vs. light at noon

Elements of Design - (optional, if previously discussed)- can review Elements of Design as a way of enhancing our images

Grayscale - Grayscale is a range of shades of gray without apparent color.

+ The **darkest** possible shade is black, which is the total absence of transmitted or reflected light.

+ The **lightest** possible shade is white, the total transmission or reflection of light.

+ Depending on the intensity of the light source, black, white, and shades of gray can be identified on the grayscale.

Show **Lighting Slides** and explain the following:



ACTIVITY

OBSERVATION WALK

Students will go on a walk with their camera to find different sources of light and photograph examples.

- + Working with a partner
- + Capture 5-10 images
- + Remind students to keep an eye out for elements of design

Note:

Make sure you are in a spot with a variety of light sources - inside and outside, doors, windows, etc.

While students are photographing, help students identify different kinds of light and shadows.

EDITING

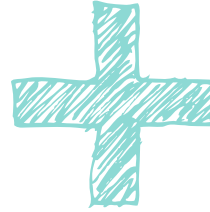
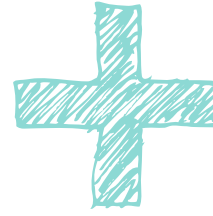
If needed, ask students to edit images into *Black and White mode* using an app or photo editor. This will help students to better understand the contrast in their images and connect with the Ansel Adams photography. If you are using a device with a built in black and white option, skip this step.

If editing images on an *Android* device

- + Edit image within Photo Gallery
- + Or, download the VSCO App

If editing images on an *iPhone/Apple* device

- + Edit image within Photos
- + Or, download VSCO App



REFLECTION



Discussion: When students finish students to look over their images with review their partner and go through the following questions verbally.

- What did they notice about the different light sources?
- Where do they see highlights in their image?
- Where do they see shadows?
- How did it affect their subject?

EXTENSION

MINI-GALLERY WALK

- + Ask students to select one image to share that they felt was the strongest.
- + Have students display their image
- + Have students walk around and look at each other's images.
- + Return to gathering area and discuss what they noticed or appreciated about other's images.

-- END OF LESSON --

ABOUT US



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Unit 12.1 Writing with Light - Teacher Overview

CYANOTYPES

OBJECTIVES

- + Students will continue their study of contrast and light
- + Students will study cyanotypes, an early process for photography/printmaking
- + Students will create their own work of art using light and shadow as the subject

VOCABULARY

REVIEW: Contrast, highlight, and shadow

Cyanotype: a type of printmaking process using UV light, creating blue-tinted images

SCIENCE VOCABULARY

Radiation: A type of energy that comes from the sun (UV rays)

Chemical energy: A type of energy produced by chemical compounds

Reaction or Conversion: The process in which one kind of energy changes into another

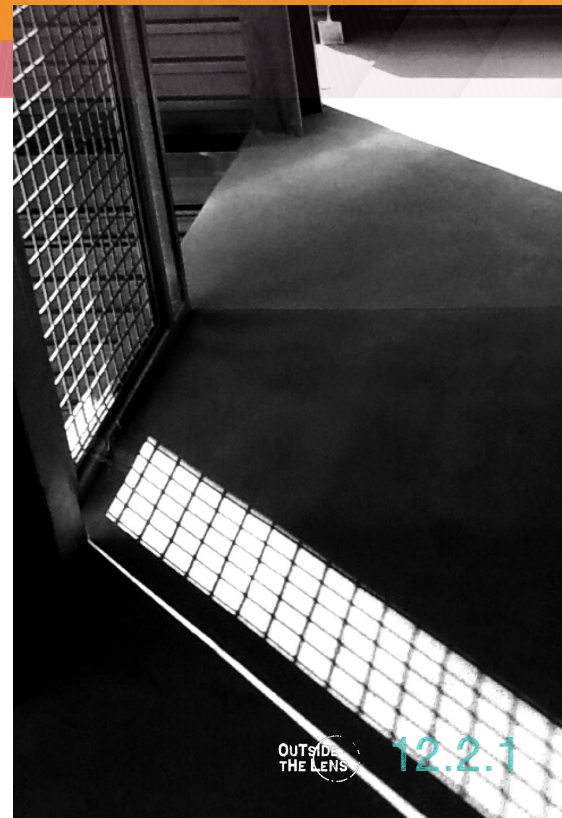
Ex. in cyanotypes, radiation from the sun reacts with the chemicals in the paper, changing the color of the print into blue

MATERIALS

- + Sunprint paper (cyanotype)
- + Flat tray for water
- + Water
- + Paper towels for drying
- + Objects for printing (can be collected or found during session)
Ex. leaves, rocks, grass, shells, etc.

WARM UP REVIEW CONTRAST

- + Review vocabulary from **Lesson 12.1**
- + Create slides or print images of student's work from the previous session capturing contrast



Use *Visual Thinking Strategies (VTS)* to facilitate the discussion of the student's images from last class.

- What is going on in this picture?
- What do you see that makes you say that?
- What more can you find?

In addition, ask students to call out the light sources they notice

INSTRUCTION

DEFINE: cyanotype and discuss the process/purpose using slides

- + A cyanotype is a photographic printmaking process that was developed in 1842 and was used well into the 20th century
- + Cyanotypes use ammonium iron (III) citrate and potassium ferricyanide to react with UV radiation, generating a negative with blue tint
- + Cyanotypes were originally used as "blueprints" for scientists working in the field and for artists who needed to copy drawings

DEFINE SCIENCE VOCABULARY

RADIATION: a type of energy that comes from the sun (UV rays)

CHEMICAL ENERGY: a type of energy produced by chemical compounds

REACTION or CONVERSION: the process in which one kind of energy changes into another

SHOW EXAMPLES OF CYANOTYPES BY ARTIST & BOTANIST, ANNA ATKINS

ASK students to share what they notice about the images

- + Point out the contrast between the blue and white of the image
- + Point out the relationship between science and art



PHOTO CREDIT: WWW.WIKIPEDIA.COM

ACTIVITY

MAKE A CYANOTYPE

PREP: Have students walk around and collect natural objects for their cyanotype composition

- + Natural objects such as leaves, grass, shells, rocks, and flowers work best for prints
- + If working in area with less natural objects, collect small items that might fit on paper

EXPLAIN: Different kinds of light affect our images in different ways and can make our images high or low contrast.

STEP 1

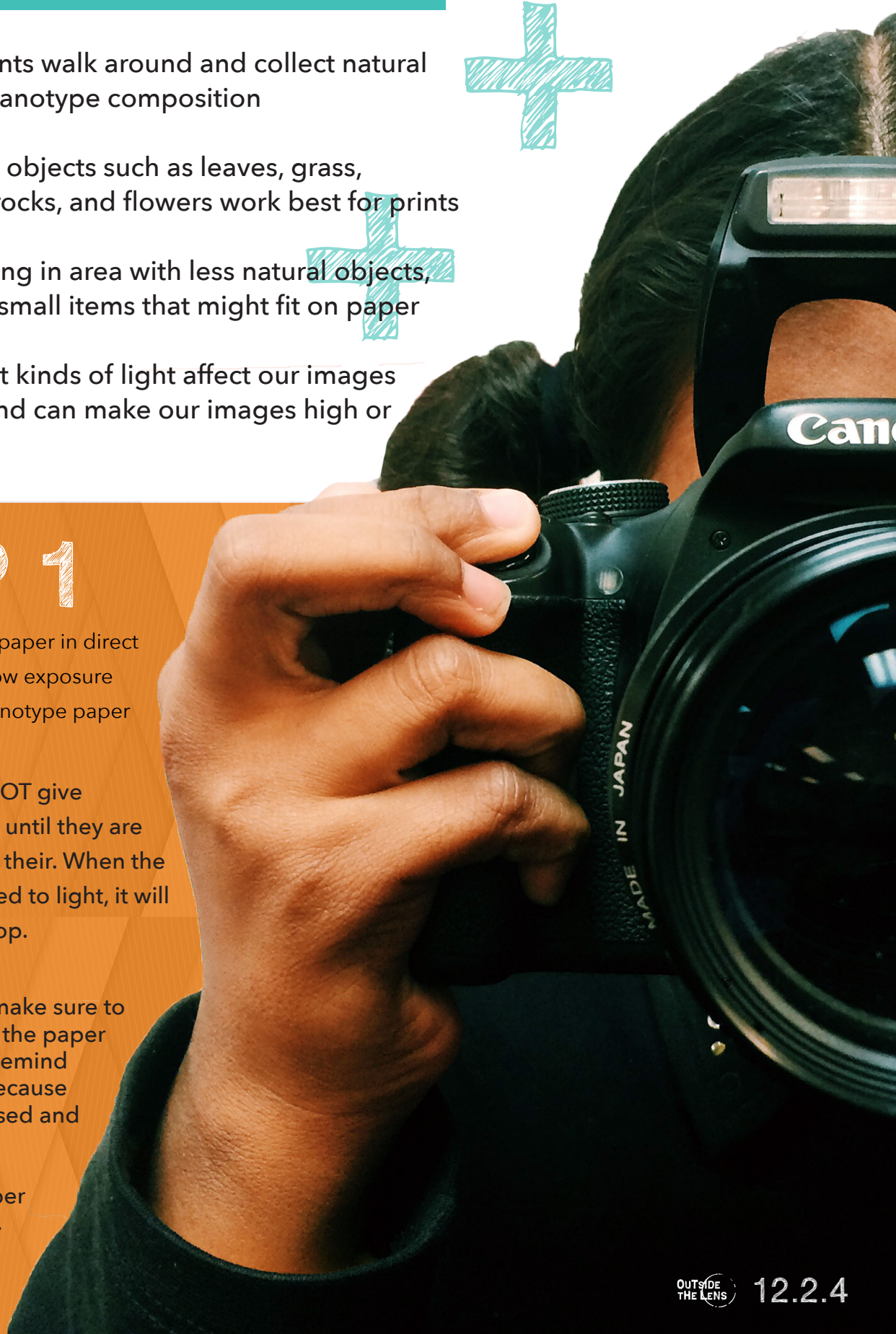
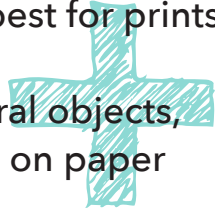
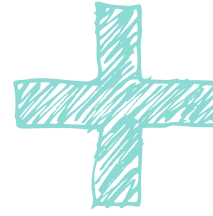
Place objects on top of paper in direct sunlight. Be sure to follow exposure instructions for your cyanotype paper

- + Make sure to NOT give students paper until they are ready to create their. When the paper is exposed to light, it will begin to develop.

Note:

If cloudy conditions, make sure to leave your objects on the paper for double the time. Remind students that this is because the light is more diffused and less direct.

See your sunprint paper for specific directions.



STEP 2

Have students check their image by gently lifting the object to see the shadow underneath

When it's a high contrast between the blue and white, or the area around your object is almost entirely white, it's ready to stop!

STEP 3

Stop the process by placing print in tray of water in shade for roughly 1 minute (be sure to follow your specific sunprint directions).

This is a fun part for students to observe if possible - they can see their image start to emerge and change!

STEP 4

Remove the print from water and lightly dab print with paper towel or leave prints in flat area to dry.

REFLECTION



Discussion:

As a class, ask students to share observations about the process.

If time allows, hang prints up on a clothesline or other drying rack and have students look at the final images of classmates

EXTENSION

CREATE A DOUBLE EXPOSURE OR DIPTYCH USING YOUR CYANOTYPE!

(see slides for instructions)



RESOURCES

CYANOTYPE PROCESS

WEBSITE: www.christopherjames-studio.com
DOCUMENT NAME: CyanotypeProcessSm.pdf



12.2.6

ABOUT US



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Unit 12.3 Writing with Light - Teacher Overview

SCIENCE OF LIGHT

OBJECTIVES

- + Students will understand how light travels in a straight line
- + Students will diagram/model how light operates in a digital camera
- + Students will learn about different ways light can be manipulated in photography

VOCABULARY

Light Energy: The only form of energy that we can actually see directly. It is formed through chemical, radiation, and mechanical means. Light energy can also be converted into other forms of energy.

Photons: Packets or units of light energy

Light Rays: A beam of light which travels in a straight line

Electrical Energy: Energy created from electric potential energy or kinetic energy

Lens Flare: Light is scattered or flared in a lens system, often in response to a bright light, light enters the lens and subsequently hits the camera's film or digital sensor, producing a desirable effect on the image.

Reflection: When light bounces off an object or surface

MATERIALS

+ Slides

+ Pen and paper (for diagrams)

+ White board/marker

+ Cameras and/or tablets

+ DSLR or film camera (optional)

WARM UP : DIAGRAMS

Briefly review our knowledge of **contrast**, **highlights**, **shadows**, and **light sources**

Begin the class by asking students:

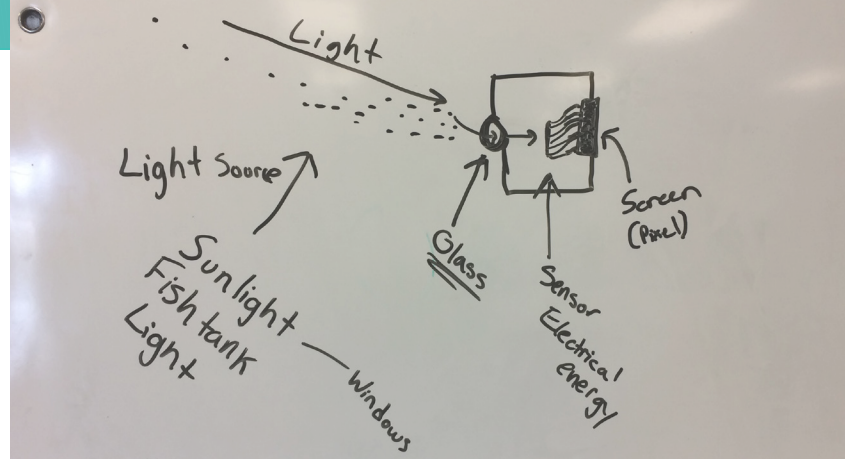
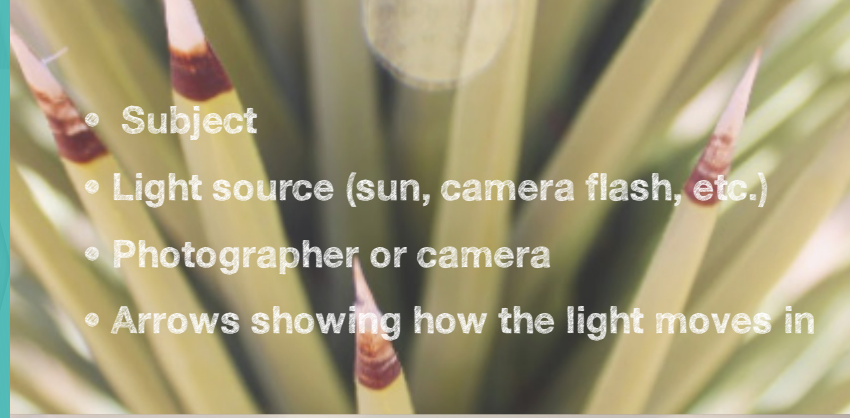
How do you think light travels into our camera?

In small groups of 3-4:

Have students use paper and pencil to draw out the following...

ASK: students to share their diagram

DISCUSS: what ways are we seeing light travel? Does it move in a straight line? Does it reflect off our subject?



INSTRUCTION: LIGHT IN A CAMERA

DESCRIBE: how light moves in a straight line. When reflected, light will “bounce” back off an object and into our camera

SHOW: visualization on how light travels into a digital camera

- While watching, ask students to share what they notice about the images

ASK: Students to turn and talk to a partner and discuss...

- What did we see?
- What do we think is happening to the light?
- Would we change our model now?

While students share, have TA create diagram or list on whiteboard based off of student observations

After response are shared, explain how light travels in a straight line and how the light energy into changes or transforms into electrical energy

DEFINE: science vocabulary as listed on the slides



Light travels in a straight line into our camera



Our shutter opens to let light in



Light is reflected through glass and mirrors in the camera



Finally, light is transformed in electrical energy

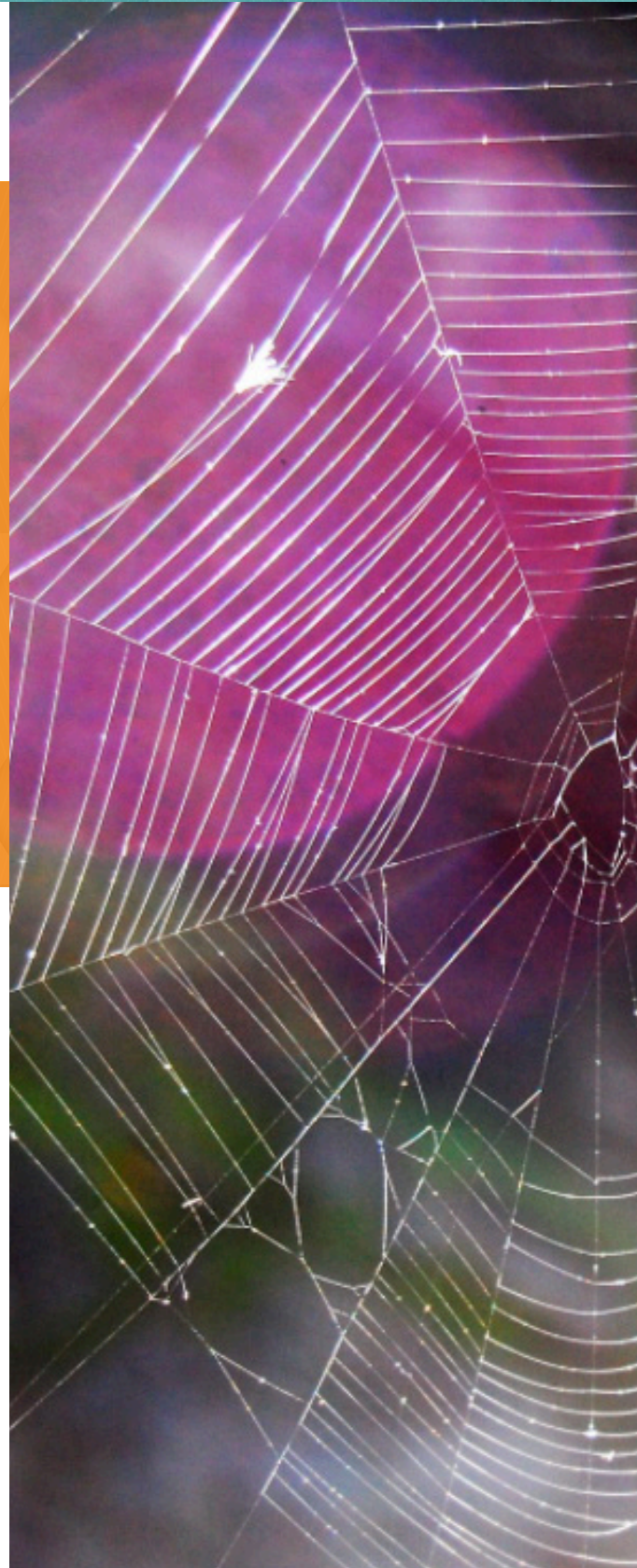


Electronics translate the energy and generate an image

RE-WATCH THE VIDEO:

How does the light travel? Does it move in a straight line? Does it reflect off our subject?

DISCUSS: What did we see that is different?



ACTIVITY

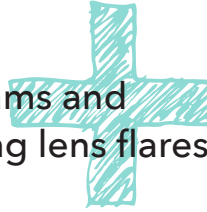
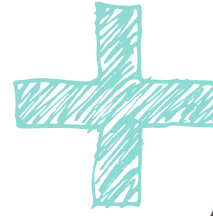
CAPTURING LIGHT

SHARE: Many photographers enjoy manipulating light in their images

DEFINE: Light leaks & reflections and share example slides for each kind of image

SHOOT: Have students to go outside in teams and "catch" light rays in action by photographing lens flares and reflections

- + Have students look for various sources of light in and out of the classroom
- + Have students capture the same light source from different angles and vantage points



REFLECTION



PHOTO REVIEW

Have students select one image they found most interesting and share out with the class

Discuss: what did we notice as we were capturing light? How did our image change as we captured a light source from a different angle or perspective

EXTENSION: FILM CAMERAS



Ask students or parents to bring in older film cameras for students to examine or a strip of old film

- Ex. 35mm, polaroid, instax, holga, etc.

Draw repeat the diagram activity with the film camera and consider how this camera might operate

Describe how film uses chemical energy instead of electrical energy to capture light

Note: can compare to the cyanotype process if helpful

Reflect on drawings with the students

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